SOLICITATION NO. DACW37-02-B-0015

FLOOD CONTROL

RED RIVER OF THE NORTH

WAHPETON, NORTH DAKOTA

CONSTRUCTION PROJECT DOCUMENTS FOR

WAHPETON N.D. STAGE 1

FEBRUARY 2003

US Army Corps of Engineers

St. Paul District

FLOOD CONTROL
RED RIVER OF THE NORTH
RICHLAND CO., ND

WAHPETON N.D. STAGE 1

TABLE OF CONTENTS

NON-TECHNICAL REQUIREMENTS:

BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT

00010	Standard Form 1442 and Bidding Schedule
00100	Instructions, Conditions, and Notices to Bidders
00600	Representations, Certifications, and Other Statements of Bidders
00700	Contract Clauses
00800	Special Contract Requirements
00830	Attachments

TECHNICAL REQUIREMENTS, SPECIFICATIONS:

DIVISION 01 GENERAL

01000	General
01140	Work Restrictions
01270	Measurement and Payment
01312	Quality Control System (QCS)
01320	Project Schedule
01330	Submittal Procedures
01355	Environmental Protection
01356	Storm Water Pollution Prevention Measures
01451	Contractor Quality Control
01500	Temporary Construction Facilities
01565	North Dakota Pollutant Discharge Elimination System
01720	Contractor Surveys
01780	Closeout Submittals

DIVISION 02 SITE WORK

02220	Demolition
02230	Clearing and Grubbing
02300	Earthwork
02315	Excavation, Filling and Backfilling for Structures
02316	Excavation, Trenching, and Backfilling for Utility Systems
02388	Stone Protection (Riprap)
02630	Storm-Drainage System
02720	Aggregate Base Course
02920	Seeding, Sodding and Topsoil

FLOOD CONTROL
RED RIVER OF THE NORTH
RICHLAND CO., ND

WAHPETON N.D. STAGE 1

TABLE OF CONTENTS

DIVISION 03	**CONCRETE**
03100	Structural Concrete Formwork
03150	Expansion Joints, Contraction Joints, and Waterstops
03200	Concrete Reinforcement
03300	Cast-In-Place Concrete
DIVISION 04	**MASONRY**
04200	Masonry
DIVISION 05	**METALS**
05055	Metalwork, Fabrication, Machine Work, Miscellaneous Provisions
05120	Structural Steel
05210	Steel Joists
05300	Steel Decking
05500	Miscellaneous Metal
05615	Stoplogs
DIVISION 06	**WOOD AND PLASIC**
06100	Rough Carpentry
DIVISION 07	**THERMAL & MOISTURE PROTECTION**
07412	Non-Structural Metal Roofing
07600	Sheet Metalwork, General
07720	Roof Ventilators
07900	Joint Sealing
DIVISION 08	**DOORS & WINDOWS**
08110	Steel Doors and Frames
08361	Sectional Overhead Doors
08600	Skylights
08700	Builders' Hardware
DIVISION 09	**FINISHES**
09900	Painting: General
DIVISION 10 - 12	**NOT USED**

FLOOD CONTROL
RED RIVER OF THE NORTH
RICHLAND CO., ND

WAHPETON N.D. STAGE 1

TABLE OF CONTENTS

DIVISION 13	**SPECIAL CONSTRUCTION**
13120	Standard Metal Building Systems
DIVISION 14	**CONVEYING SYSTEMS**
14600	Cranes, Single-Girder Bridge, Monorail and Jib
DIVISION 15	**MECHANICAL**
15050	Sluice Gates and Operators
15131	Pumps and Equipment
15200	Discharge Pipelines
15895	Heating & Ventilating Systems
DIVISION 16	**ELECTRICAL**
16000	Electrical General Requirements
16120	Insulated Wire and Cable
16415	Electrical Work, Interior
16528	Exterior Lighting
16920	Pump Station Control

SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. DACW37-02-B-0015	2. TYPE OF SOLICITATION [X] SEALED BID (IFB) [ ] NEGOTIATED *(RFP)*	3. DATE ISSUED 06-Feb-2003	PAGE OF PAGES 1 OF 167

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO. W81G67-2212-3595	6. PROJECT NO.

7. ISSUED BY CODE DACW37	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
CONTRACTING DIVISION USACE - ST PAUL 190 5TH STREET E ST PAUL MN 55101-1638	**See Item 7**
TEL: FAX: 651-290-5706	TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)*
	WILLIAM J HURLEY	651-290-5416

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

Wahpeton Section 205 Flood Control Project - Stage 1 Construction Contract Work

Overland flooding from the Red River of the North causes frequent and significant flood related problems for the city. The proposed project includes construction of pumping stations, excavation of ponding areas, and acquisition of flowage easements to preserve a flood breakout channel (stage 1 of construction) to protect the city from flood related damages. The stage 1 construction contract includes excavation of ponding areas, limited levee construction site work to allow for installation of a number of permanent pumping stations, construction of pump station buildings and the installation the Government provided pumps and generators, and construction of a number of miscellaneous interior drainage pipes and structures.

Estimated order of magnitude of the requirement in terms of physical characteristics and estimated price range is between $1,000,000 and $5,000,000. This procurement is issued unrestricted under SMALL BUSINESS COMPETITIVE DEMONSTRATION PROGRAM (Public Law 100-656). The North American Industry Classification System (NAICS) Code is 237990; the Small Business Size Standard is $28,500,000.

11. The Contractor shall begin performance within 10 calendar days and complete by 30 April 2004 and after receiving [ ] award, [X] notice to proceed. This performance period is [X] mandatory, [ ] negotiable. *(See* 52.211-10 *Section 00700 .)*

12 A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES," indicate within how many calendar days after award in Item 12B.)* [X] YES [ ] NO	12B. CALENDAR DAYS 10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and _____ copies to perform the work required are due at the place specified in Item 8 by 02:00 PM *(hour)* local time 11 Mar 2003 *(date)*. If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee [X] is, [ ] is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 60 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

OFFER ***(Must be fully completed by offeror)***

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NO. *(Include area code)*
	16. REMITTANCE ADDRESS *(Include only if different than Item 14)* **See Item 14**
CODE / FACILITY CODE	

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirements stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)*

AMOUNTS	SEE SCHEDULE OF PRICES

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD ***(To be completed by Government)***

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	**ITEM**	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ☐ 41 U.S.C. 253(c)
26. ADMINISTERED BY CODE		27. PAYMENT WILL BE MADE BY: CODE

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _____ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation, is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)* TEL: EMAIL:	
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

Table of Contents: Sections 00010 through 00800

TABLE OF CONTENTS: SECTIONS 00010 THROUGH 00800 3

SECTION 00010 - SOLICITATION CONTRACT FORM 8

BID SCHEDULE NOTES: 19

SECTION 00100 - BIDDING SCHEDULE/INSTRUCTIONS TO BIDDERS 22

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (JUN 99) 22
52.209-4001 BIDDER'S QUALIFICATIONS (APR 1984) FAR 9.105-1 22
52.214-3 AMENDMENTS TO INVITATIONS FOR BIDS (DEC 1989) 23
52.214-4 FALSE STATEMENTS IN BIDS (APR 1984) 23
52.214-5 SUBMISSION OF BIDS (MAR 1997) 23
52.214-6 EXPLANATION TO PROSPECTIVE BIDDERS (APR 1984) 23
52.214-7 LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF BIDS (NOV 1999) 24
52.214-18 PREPARATION OF BIDS--CONSTRUCTION (APR 1984) 24
52.214-19 CONTRACT AWARD--SEALED BIDDING--CONSTRUCTION (AUG 1996) 25
52.214-34 SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991) 25
52.214-35 SUBMISSION OF OFFERS IN U.S. CURRENCY (APR 1991) 25
52.214-4001 INQUIRIES - BID INFORMATION 26
52.214-4002 ALL OR NONE QUALIFICATIONS (APR 1984) FAR 14.404-5 26
52.216-1 TYPE OF CONTRACT (APR 1984) 26
52.217-5 EVALUATION OF OPTIONS (JUL 1990) 26
52.225-10 NOTICE OF BUY AMERICAN ACT REQUIREMENT--CONSTRUCTION MATERIALS (MAY 2002) 27
52.232-38 SUBMISSION OF ELECTRONIC FUNDS TRANSFER INFORMATION WITH OFFER (MAY 1999) 28
52.233-2 SERVICE OF PROTEST (AUG 1996) 28
52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995) 28
52.236-4002 WORK PERFORMED BY THE CONTRACTOR 29
52.236-4005 UNAVAILABILITY OF UTILITY SERVICES 29
52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998) 29
252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION (NOV 2001) 30

SECTION 00600 - REPRESENTATIONS & CERTIFICATIONS 31

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985) 31
52.203-11 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991) 32
52.204-3 TAXPAYER IDENTIFICATION (OCT 1998) 32
52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999) 34
52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001) 34
52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2002) - ALTERNATE I (APR 2002) 35
52.219-2 EQUAL LOW BIDS. (OCT 1995) 37
52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (OCT 2000) 38
52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999) 38
52.222-38 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (DEC 2001) 39
52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 2000) 39
252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998) 40
252.225-7003 INFORMATION FOR DUTY-FREE ENTRY EVALUATION (MAR 1998) 41

252.225-7017 PROHIBITION ON AWARD TO COMPANIES OWNED BY THE PEOPLE'S REPUBLIC OF CHINA (FEB 2000) 41
252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992) 42

SECTION 00700 - CONTRACT CLAUSES 43

52.202-1 DEFINITIONS (DEC 2001) --ALTERNATE I (MAY 2001) 43
52.202-4001 DEFINITIONS (MAY 1995) EFARS PART 2.101 44
52.203-3 GRATUITIES (APR 1984) 45
52.203-5 COVENANT AGAINST CONTINGENT FEES (APR 1984) 45
52.203-7 ANTI-KICKBACK PROCEDURES. (JUL 1995) 46
52.203-8 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997) 47
52.203-10 PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997) 48
52.203-12 LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 1997) 49
52.204-4 PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER (AUG 2000) 53
52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUL 1995) 54
52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) - ALTERNATE I (APR 1984) 55
52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000) 55
52.211-13 TIME EXTENSIONS (SEP 2000) 55
52.211-18 VARIATION IN ESTIMATED QUANTITY (APR 1984) 56
52.214-26 AUDIT AND RECORDS--SEALED BIDDING. (OCT 1997) 56
52.214-27 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - MODIFICATIONS - SEALED BIDDING. (OCT 1997) 57
52.214-28 SUBCONTRACTOR COST OR PRICING DATA - MODIFICATIONS - SEALED BIDDING. (OCT 1997) 58
52.217-4000 OPTION FOR ADDITIONAL WORK (CONSTRUCTION) (AUG 2000) 59
52.219-4 NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999) 60
52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS (OCT 2000) 61
52.219-9 SMALL BUSINESS SUBCONTRACTING PLAN (JAN 2002)--ALTERNATE I (OCT 2001). 62
52.219-16 LIQUIDATED DAMAGES-SUBCONTRACTING PLAN (JAN 1999) 67
52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 1997) 67
52.222-3 CONVICT LABOR (AUG 1996) 68
52.222-4 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION. (SEP 2000) 68
52.222-6 DAVIS-BACON ACT (FEB 1995) 69
52.222-7 WITHHOLDING OF FUNDS (FEB 1988) 70
52.222-8 PAYROLLS AND BASIC RECORDS (FEB 1988) 71
52.222-9 APPRENTICES AND TRAINEES (FEB 1988) 72
52.222-10 COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988) 73
52.222-11 SUBCONTRACTS (LABOR STANDARDS (FEB 1988) 73
52.222-12 CONTRACT TERMINATION--DEBARMENT (FEB 1988) 73
52.222-13 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988) 74
52.222-14 DISPUTES CONCERNING LABOR STANDARDS (FEB 1988) 74
52.222-15 CERTIFICATION OF ELIGIBILITY (FEB 1988) 74
52.222-21 PROHIBITION OF SEGREGATED FACILITIES (FEB 1999) 74
52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999) 75
52.222-26 EQUAL OPPORTUNITY (APR 2002) 76
52.222-27 AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (FEB 1999) 77

52.222-30 DAVIS-BACON ACT--PRICE ADJUSTMENT (NONE OR SEPARATELY SPECIFIED METHOD) (DEC 2001) 81
52.222-35 AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (APR 1998) 82
52.222-36 AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES (JUN 1998) 84
52.222-37 EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (JAN 1999) 85
52.223-5 POLLUTION PREVENTION AND RIGHT-TO-KNOW INFORMATION (APR 1998) 86
52.223-6 DRUG-FREE WORKPLACE (MAY 2001) 86
52.223-14 TOXIC CHEMICAL RELEASE REPORTING (OCT 2000) 87
52.225-9 BUY AMERICAN ACT—CONSTRUCTION MATERIALS (MAY 2002) 88
52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (JUL 2000) 91
52.226-1 UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES (JUN 2000) 91
52.227-1 AUTHORIZATION AND CONSENT (JUL 1995) 92
52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 1996) 93
52.227-4 PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984) 93
52.228-1 BID GUARANTEE (SEP 1996) 94
52.228-2 ADDITIONAL BOND SECURITY (OCT 1997) 94
52.228-11 PLEDGES OF ASSETS (FEB 1992) 94
52.228-14 IRREVOCABLE LETTER OF CREDIT (DEC 1999) 95
52.228-15 PERFORMANCE AND PAYMENT BONDS--CONSTRUCTION (JUL 2000)- 99
52.228-4022 REQUIREMENT FOR BID GUARANTEE (FAR 28.101-2) 99
52.229-3 FEDERAL, STATE, AND LOCAL TAXES (JAN 1991) 100
52.229-5 TAXES--CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO (APR 1984) 100
52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (MAY 1997) 101
52.232-17 INTEREST (JUNE 1996) 103
52.232-23 ASSIGNMENT OF CLAIMS (JAN 1986) - ALTERNATE I (APR 1984) 104
52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (FEB 2002) 104
52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER—CENTRAL CONTRACTOR REGISTRATION (MAY 1999) 110
52.232-35 DESIGNATION OF OFFICE FOR GOVERNMENT RECEIPT OF ELECTRONIC FUNDS TRANSFER INFORMATION (MAY 1999) 112
52.233-1 DISPUTES. (DEC 1998) 113
52.233-3 PROTEST AFTER AWARD (AUG. 1996) 114
52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) 115
52.236-2 DIFFERING SITE CONDITIONS (APR 1984) 115
52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984) 116
52.236-4 PHYSICAL DATA (APR 1984) 116
52.236-5 MATERIAL AND WORKMANSHIP (APR 1984) 117
52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984) 117
52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991) 118
52.236-8 OTHER CONTRACTS (APR 1984) 118
52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (APR 1984) 118
52.236-10 OPERATIONS AND STORAGE AREAS (APR 1984) 119
52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984) 119
52.236-12 CLEANING UP (APR 1984) 119
52.236-13 ACCIDENT PREVENTION (NOV 1991) – ALTERNATE I (NOV 1991) 120
52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984) 121
52.236-16 QUANTITY SURVEYS (APR 1984) - ALTERNATE I (APR 1984) 121
52.236-17 LAYOUT OF WORK (APR 1984) 122

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997) 122
52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995) 123
52.242-13 BANKRUPTCY (JUL 1995) 123
52.242-14 SUSPENSION OF WORK (APR 1984) 123
52.243-4 CHANGES (AUG 1987) 124
52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (MAY 2002) 125
52.245-2 GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS) (DEC 1989) 125
52.245-3 IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (APR 1984) 128
52.245-19 GOVERNMENT PROPERTY FURNISHED "AS IS" (APR 1984) 128
52.245-4002 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION AND LOCATION 129
52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996) 130
52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994) 131
52.247-34 F.O.B. DESTINATION (NOV 1991) 132
52.247-55 F.O.B. POINT FOR DELIVERY OF GOVERNMENT-FURNISHED PROPERTY (APR 1984) 133
52.248-3 VALUE ENGINEERING--CONSTRUCTION (FEB 2000) 133
52.249-2 TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) (SEP 1996) - ALTERNATE I (SEP 1996) 136
52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984) 139
52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998) 140
52.253-1 COMPUTER GENERATED FORMS (JAN 1991) 140
252.201-7000 CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991) 140
252.203-7001 PROHIBITION ON PERSONS CONVICTED OF FRAUD OR OTHER DEFENSE-CONTRACT-RELATED FELONIES (MAR 1999) 141
252.204-7003 CONTROL OF GOVERNMENT PERSONNEL WORK PRODUCT (APR 1992) 142
252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION (NOV 2001) 142
252.205-7000 PROVISION OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS (DEC 1991) 143
252.209-7000 ACQUISITION FROM SUBCONTRACTORS SUBJECT TO ONSITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY (NOV 1995) 144
252.209-7004 SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998) 144
252.219-7003 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR. 1996) 145
252.223-7004 DRUG-FREE WORK FORCE (SEP 1988) 145
252.223-7006 PROHIBITION ON STORAGE AND DISPOSAL OF TOXIC AND HAZARDOUS 147
252.225-7012 PREFERENCE FOR CERTAIN DOMESTIC COMMODITIES (APR 2002) 147
252.225-7014 PREFERENCE FOR DOMESTIC SPECIALTY METALS (MAR 1998) 149
252.225-7031 SECONDARY ARAB BOYCOTT OF ISRAEL (JUN 1992) 150
252.227-7033 RIGHTS IN SHOP DRAWINGS (APR 1966) 150
252.231-7000 SUPPLEMENTAL COST PRINCIPLES (DEC 1991) 150
252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991) 151
252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (AUG 2000) 151
252.236-7002 OBSTRUCTION OF NAVIGABLE WATERWAYS. (DEC 1991) 152
252.236-7008 CONTRACT PRICES - BIDDING SCHEDULES. (DEC 1991) 152
252.242-7000 POSTAWARD CONFERENCE (DEC 1991) 153
252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991) 153
252.243-7002 REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998) 153
252.244-7000 SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (DOD) (MAR 2000) 154
252.246-7000 MATERIAL INSPECTION AND RECEIVING REPORT (DEC 1991) 154
252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002) 154
252.247-7024 NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000) 157

SECTION 00800 - SPECIAL CONTRACT REQUIREMENTS 159

52.000-4004 PARTNERING 159
52.212-4003 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (OCT 1989) ER 415-1-15 159
52.214-5000 ARITHMETIC DISCREPANCIES 160
52.228-4002 INSURANCE 160
52.228-4022 REQUIREMENT FOR BID GUARANTEE (FAR 28.101-2) 161
52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE 161
52.232-4004 INVOICE PROCEDURES 161
52.232-5002 CONTINUING CONTRACTS (ALTERNATE) (MAR 1995)--EFARS 162
52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984) 163
52.236-4006 SAFETY AND HEALTH REQUIREMENTS MANUAL INTERIM CHANGES, EM 385-1-1 (APR 2001) 164
52.236-4012 MATERIAL SOURCES 164
52.236-4014 PURCHASE ORDERS 165
52.239-4001 YEAR 2000 COMPLIANCE (FAR 39.106) (JUL 1998) 165
52.245-4002 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION AND LOCATION 165
52.245-4003 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION 166
52.246-4001 LABORATORY AND TESTING FACILITIES 166
52.249-5000 BASIS FOR SETTLEMENT OF PROPOSALS 166
252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991) 167

Section 00010 - Solicitation Contract Form

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001	Pump Station 1A Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002	Pump Station 1A Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003	Pump Station 1A Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004	Pump Station 1A Install Pumps	2	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0005	Pump Station 1A Sluice Gates	2	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0006	Pump Station 1A Electrical Service	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0007	Pump Station 7 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0008	Pump Station 7 Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0009	Pump Station 7 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0010	Pump Station 7 Install Pumps	2	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0011	Pump Station 7 Sluice Gates	2	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0012	Pump Station 7 Electrical Service	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0013	Pump Station 1 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0014	Pump Station 1 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0015	Pump Station 2 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0016	Pump Station 2 Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0017	Pump Station 2 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0018	Pump Station 3 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0019	Pump Station 3 Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0020	Pump Station 3 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0021	Pump Station 4 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0022	Pump Station 4 Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0023	Pump Station 4 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0024	Pump Station 4 Install Pumps	1	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0025	Pump Station4 Electrical Service	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0026	Pump Station 5 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0027	Pump Station 5Electricall	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0028	Pump Station 5 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0029	Pump Station 5 Install Pumps	1	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0030	Pump Station 5 Electrical Service	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0031	Pump Station 6 Structure	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0032	Pump Station 6 Electrical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0033	Pumps Station 6 Mechanical	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0034	Clearing and Grubbing	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0035	Demolition	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0036	Select Impervious Fill	3,760	Cubic Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0037	4" Topsoil and Seed	36,990	Square Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0038	8" Topsoil and Seed	7,110	Square Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0039	Stripping	455	Cubic Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0040	Inspection Trench	650	Cubic Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0041	Aggregate Surface Course	80	Cubic Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0042	Excavation	138,458	Cubic Yard	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0043	Riprap Type R20	1,290	Net Ton (2,000 LB)	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0044	Riprap Type R30	120	Net Ton (2,000 LB)	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0045	Riprap Type R45	620	Net Ton (2,000 LB)	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0046	Bedding Type B1	640	Net Ton (2,000 LB)	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0047	Bedding Type B2	250	Net Ton (2,000 LB)	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0048	Sanitary Manhole at 4th Ave N	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0049	Sanitary Manhole at 2nd Ave N	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0050	Sanitary Manhole at 3rd Ave S	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0051	Sanitary Manhole at 7th Ave S	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0052	Storage Shed	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0053	Pad for Portable Pumps	3	Each	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0054	Storm Sewer B	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0055	Storm Sewer C	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0056	Bonds for Basic Items (Performance and Payment)	1	Lump Sum	_____.____	_____.____

Total Price for Basic Items 0001 through 0056:_____

Option 1 Items:

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0057 OPTION	Storm Sewer C1	1	Lump Sum	_____.____	_____.____

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0058 OPTION	Bonds for Option 1 (Performance and Payment)	1	Lump Sum	_____.____	_____.____

Total Price for Option 1: Items 0057 through 0058: _____

Total Price for Items 0001 through 0058: _____

BID SCHEDULE NOTES:

1. EFFECTIVE MAY 31, 1998, ALL CONTRACTORS MUST REGISTER WITH THE DEFENSE CENTRAL CONTRACTOR REGISTRATION (CCR) IN ORDER TO RECEIVE ANY CONTRACT AWARD. (other than those made via the Government credit card program). Contractors may register on line at www.ccr2000.com See Clause 252.204-7004 in Section 00100.

2. FACSIMILE OF BIDS/PROPOSALS AND FACSIMILE OF MODIFICATIONS THERETO, WILL NOT BE ACCEPTED.

3. All Quantities are estimated except where unit is given as "EA" (EACH) or "LS" (LUMP SUM).

4. NOTICE TO LARGE BUSINESS: The U.S. Army Corps of Engineers, St. Paul District, is committed to participation of Small Business, Small Disadvantaged Business and Women-Owned Small Business in the performance of work under this solicitation and resultant contract.

   Your attention is directed to the solicitation clauses 52.219-8 entitled "Utilization of Small, Small Disadvantaged and Women-Owned Small Business Concerns", 52.219-9 Alt I entitled "Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan," and 252.219-7003 entitled "Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (DOD Contracts)".

   If you are a large business and the apparent low bidder with a bid exceeding $1,000,000, submission of a Subcontracting Plan in accordance with above clauses will be required. The Contracting Officer will review the plan using the following goals to assure that it represents your best efforts to maximize subcontracting opportunities. Award will not be made until the Contracting Officer approves the Subcontracting Plan.

   The following subcontracting goals are informational only and not legally binding but are considered reasonable and achievable during the resultant contract from this solicitation. The goals expressed in percent of total planned subcontracting dollars are:

Small	57.2%
Small Disadvantaged Business	8.9%
Women-Owned Small Business	8.1%
HUBZone Small Business	3.0%
Service-Disabled Veteran-Owned Small Business	3.0%
Subcontract Reporting (SF 294 & SF 295)	100.0%

5. The apparent low bidder will be requested to provide the following information as soon as possible after bid opening:

   a. A Financial Statement, to include a balance sheet and income statement, and

   b. A Bank Certification of Financial Capability (line of credit).

This information will be treated as confidential. The financial statements should be not over 60 days old. If over 60 days old, a certification should be attached stating that the financial condition of the firm is substantially the same or, if not the same, the changes that have taken place.

6. All extensions of the unit prices shown will be subject to verification by the Government. In case of a discrepancy between the unit price and the extension, the unit price will govern.

7. The original bid/proposal and any modifications must be complete as to all the items on the schedule. Award will be made to that bidder whose bid is most advantageous to the Government, based on price and the price related factors included in the solicitation.

8. Unbalanced Bids. The government may reject as nonresponsive any bid that is materially unbalanced between contract line item numbers or sub-items on the bidding schedule. A bid is materially unbalanced when it is based on prices that are significantly less than cost for some work and prices that are overstated, in relation to cost, for other work. A materially unbalanced bid may be rejected if the Contracting Officer has a reasonable doubt as to whether the bid will result in the lowest overall cost to the government even though it may be the low evaluated bid. Additionally, a bid that is so unbalanced so as to be tantamount to an advance payment will be rejected as nonresponsive even if acceptance of the bid would result in the lowest overall cost to the government.

9. Any prospective bidder desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must request it in writing in accordance with Section 00100, Contract Clause "Explanation To Prospective Bidders", not later than 10 days prior to bid opening. Questions can be faxed to the contract specialist at (651) 290-5706. Questions received after the deadline may not be answered prior to bid submittal.

10. Funding for this contract is contingent upon the conditions stated in Section 00800, Clause No. 52.232-5002, Continuing Contracts.

11. The addresses, phone numbers, and Internet address (if available) for references cited in these specifications are listed in the Corps of Engineer Guide Specification (CEGS) 01090 SOURCES FOR REFERENCE PUBLICATIONS. CEGS 01090 is available on the TECHINFO page of the Corps of Engineers Huntsville District Internet site at: http://w2.hnd.usace.army.mil/.

12. Any forthcoming amendments will only be available on this web site. E-mail notifications will be sent upon issuance of any amendments to all registered firms. E-mail message notifications may not be reliable based on system constraints. It is therefore recommended that each registered firm check this web site periodically for updates. A paper hard copy of each amendment will not be mailed unless specifically requested in writing.

13. Bid Bonds

a. It is the responsibility of the bidder to include an acceptable bid guarantee with its bid. This bid note does not provide bidders with an all-inclusive checklist for submitting an acceptable bid bond – rather, it provides some “lessons learned” information as to the unacceptability of photocopied bid bonds.

b. This solicitation requires bidders to submit a bid guarantee along with their bids (see clause 52.228-1). One acceptable form of bid guarantee is a bid bond. For a bid to be responsive, the bid bond accompanying the bid must unequivocally bind the bonding company – if it does not, the bid <u>must</u> be rejected as nonresponsive. Please note that a nonresponsive bid may not be corrected after bid opening to make it responsive – it <u>must</u> be rejected. The Contracting Officer has the authority and responsibility to determine whether the bid bond and its accompanying documentation clearly show that the person(s) executing the bid bond on behalf of the surety have the authority to unequivocally bind the bonding company. In order for a bid bond to be acceptable, it must

be accompanied by a valid power-of-attorney issued by the surety (the bonding company, not the insurance agency writing the bond).

c. Special Note to all bidders: This paragraph has been revised from previous bid notes.

Photocopied or faxed powers-of-attorney are not acceptable. In order for a power-of-attorney accompanying a bid bond to be acceptable, it must be: (i) an original power-of-attorney (containing all original signatures) or (ii) a copy of a power-of-attorney accompanied by an original certification (original means original signature) by the secretary (or other authorized officer) of the surety stating that the copied power-of-attorney is still in full force and effect as of the date of the certification and has not been revoked. An original signature is one that (I) has been added at the time of the certification and (II) is manually affixed to the power of attorney (not computer generated). The presence of an original seal (a raised, crimped corporate seal or a paper or foil corporate seal that is manually attached) at the certification block of a power-of-attorney is <u>not</u> a substitute for an original signature.

14. For purposes of the clause entitled "52.219-4 -- Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jan 1999)", the term "otherwise successful offer" means the lowest responsive bid from a responsible bidder prior to the application of any evaluation preference required by this clause.

    The solicitation clause FAR 52.219-4 expressed that Small Disadvantaged Business (SDB) firms would receive both the HUBZone and SDB evaluation preference adjustments (See FAR clause 52.219-23). Guidance from the Office of the Under Secretary of Defense provides that DOD contracting activities, including the Department of the Army, shall suspend the use of price evaluation adjustments for SDB businesses in DOD Acquisitions, as prescribed in FAR subpart 19.11.

    Therefore the clause 52.219-23 is not contained in this solicitation and no SDB evaluation preference adjustment will be utilized

Section 00100 - Bidding Schedule/Instructions to Bidders

CLAUSES INCORPORATED BY FULL TEXT

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (JUN 99)

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" followed by the DUNS number that identifies the offeror's name and address exactly as stated in the offer.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-800-333-0505. The offeror should be prepared to provide the following information:

(1) Company name.

(2) Company address.

(3) Company telephone number.

(4) Line of business.

(5) Chief executive officer/key manager.

(6) Date the company was started.

(7) Number of people employed by the company.

(8) Company affiliation.

(c) Offerors located outside the United States may obtain the location and phone number of the local Dun and Bradstreet Information Services office from the Internet Home Page at http://www.customerservice@dnb.com. If an offeror is unable to locate a local service center, it may send an e-mail to Dun and Bradstreet at globalinfo@mail.dnb.com.

(End of provision)

52.209-4001 BIDDER'S QUALIFICATIONS (APR 1984) FAR 9.105-1

Before a bid is considered for award, the bidder may be requested by the Government to submit a statement regarding his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the work.

52.214-3 AMENDMENTS TO INVITATIONS FOR BIDS (DEC 1989)

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date in the space provided for this purpose on the form for submitting a bid, (3) by letter or telegram, or (4) by facsimile, if facsimile bids are authorized in the solicitation. The Government must receive the acknowledgment by the time and at the place specified for receipt of bids.

(End of provision)

52.214-4 FALSE STATEMENTS IN BIDS (APR 1984)

Bidders must provide full, accurate, and complete information as required by this solicitation and its attachments. The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

(End of provision)

52.214-5 SUBMISSION OF BIDS (MAR 1997)

(a) Bids and bid modifications shall be submitted in sealed envelopes or packages (unless submitted by electronic means) (1) addressed to the office specified in the solicitation, and (2) showing the time and date specified for receipt, the solicitation number, and the name and address of the bidder.

(b) Bidders using commercial carrier services shall ensure that the bid is addressed and marked on the outermost envelope or wrapper as prescribed in subparagraphs (a)(1) and (2) of this provision when delivered to the office specified in the solicitation.

(c) Telegraphic bids will not be considered unless authorized by the solicitation; however, bids may be modified or withdrawn by written or telegraphic notice.

(d) Facsimile bids, modifications, or withdrawals, will not be considered unless authorized by the solicitation.

(e) Bids submitted by electronic commerce shall be considered only if the electronic commerce method was specifically stipulated or permitted by the solicitation.

(End of provision)

52.214-6 EXPLANATION TO PROSPECTIVE BIDDERS (APR 1984)

Any prospective bidder desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must request it in writing soon enough to allow a reply to reach all prospective bidders before the submission of their bids. Oral explanations or instructions given before the award of a contract will not be binding. Any information given a prospective bidder concerning a solicitation will be furnished promptly to all other prospective bidders as an amendment to the solicitation, if that information is necessary in submitting bids or if the lack of it would be prejudicial to other prospective bidders.

(End of provision)

52.214-7 LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF BIDS (NOV 1999)

(a) Bidders are responsible for submitting bids, and any modifications or withdrawals, so as to reach the Government office designated in the invitation for bids (IFB) by the time specified in the IFB. If no time is specified in the IFB, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that bids are due.

(b)(1) Any bid, modification, or withdrawal received at the Government office designated in the IFB after the exact time specified for receipt of bids is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late bid would not unduly delay the acquisition; and--

(i) If it was transmitted through an electronic commerce method authorized by the IFB, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of bids; or

(ii) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of bids and was under the Government's control prior to the time set for receipt of bids.

(2) However, a late modification of an otherwise successful bid that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(c) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the bid wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(d) If an emergency or unanticipated event interrupts normal Government processes so that bids cannot be received at the Government office designated for receipt of bids by the exact time specified in the IFB and urgent Government requirements preclude amendment of the IFB, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(e) Bids may be withdrawn by written notice received at any time before the exact time set for receipt of bids. If the IFB authorizes facsimile bids, bids may be withdrawn via facsimile received at any time before the exact time set for receipt of bids, subject to the conditions specified in the provision at 52.214-31, Facsimile Bids. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for receipt of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

(End of provision)

52.214-18 PREPARATION OF BIDS--CONSTRUCTION (APR 1984)

(a) Bids must be (1) submitted on the forms furnished by the Government or on copies of those forms, and (2) manually signed. The person signing a bid must initial each erasure or change appearing on any bid form.

(b) The bid form may require bidders to submit bid prices for one or more items on various bases, including--

(1) Lump sum bidding;

(2) Alternate prices;

(3) Units of construction; or

(4) Any combination of subparagraphs (1) through (3) above.

(c) If the solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

(d) Alternate bids will not be considered unless this solicitation authorizes their submission.

(End of provision)

52.214-19 CONTRACT AWARD--SEALED BIDDING--CONSTRUCTION (AUG 1996)

(a) The Government will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the Government, considering only price and the price-related factors specified elsewhere in the solicitation.

(b) The Government may reject any or all bids, and waive informalities or minor irregularities in bids received.

(c) The Government may accept any item or combination of items, unless doing so is precluded by a restrictive limitation in the solicitation or the bid.

(d) The Government may reject a bid as nonresponsive if the prices bid are materially unbalanced between line items or subline items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the Government even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

(End of provison)

52.214-34 SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991)

Offers submitted in response to this solicitation shall be in the English language. Offers received in other than English shall be rejected.

(End of provision)

52.214-35 SUBMISSION OF OFFERS IN U.S. CURRENCY (APR 1991)

Offers submitted in response to this solicitation shall be in terms of U.S. dollars. Offers received in other than U.S. dollars shall be rejected.

(End of provision)

52.214-4001 INQUIRIES - BID INFORMATION

(a) Inquiries:

Any questions regarding this solicitation should be directed to Bill Hurley, Contract Specialist, at telephone number (651) 290-5416 (collect calls not accepted). It is requested that all technical questions on the plans and specifications be submitted to the Contract Specialist by facsimile transmission to (651) 290-5706.

The Planholder's List and bid results can be found on the St. Paul District web site at http://www.mvp.usace.army.mil (click on "Contracting/Bidders Info", then "Electronic Bid Solicitations").

(b) Bid Depository/Bid Opening Information:

Bids must be deposited prior to the date and time set for opening of bids. The bid depository is located in the Contracting Division, 6th Floor, of the St. Paul District, Corps of Engineers Centre, 190 Fifth Street East, St. Paul, Minnesota 55101-1638. A public bid opening will be held at the same location.

52.214-4002 ALL OR NONE QUALIFICATIONS (APR 1984) FAR 14.404-5

A bidder/offeror must quote on all items in this solicitation to be eligible for award. The Government will award on a "All or None" basis. Evaluation of bids/offers will be based, among other factors, upon the total price quoted for all items.

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a firm-fixed price contract resulting from this solicitation.

(End of clause)

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

(a) Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

(b) The Government may reject an offer as nonresponsive if it is materially unbalanced as to prices for the basic requirement and the option quantities. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(End of provision)

52.225-10 NOTICE OF BUY AMERICAN ACT REQUIREMENT--CONSTRUCTION MATERIALS (MAY 2002)

(a) Definitions. Construction material, domestic construction material, and foreign construction material, as used in this provision, are defined in the clause of this solicitation entitled "Buy American Act--Construction Materials" (Federal Acquisition Regulation (FAR) clause 52.225-9).

(b) Requests for determinations of inapplicability. An offeror requesting a determination regarding the inapplicability of the Buy American Act should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of the clause at FAR 52.225-9 in the request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act before submitting its offer, or has not received a response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) Evaluation of offers. (1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction material, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(3)(i) of the clause at FAR 52.225-9.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) Alternate offers.

(1) When an offer includes foreign construction material not listed by the Government in this solicitation in paragraph (b)(2) of the clause at FAR 52.225-9, the offeror also may submit an alternate offer based on use of equivalent domestic construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of the clause at FAR 52.225-9 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of the clause at FAR 52.225-9 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic construction material, and the offeror shall be required to furnish such domestic construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

52.232-38 SUBMISSION OF ELECTRONIC FUNDS TRANSFER INFORMATION WITH OFFER (MAY 1999)

The offeror shall provide, with its offer, the following information that is required to make payment by electronic funds transfer (EFT) under any contract that results from this solicitation. This submission satisfies the requirement to provide EFT information under paragraphs (b)(1) and (j) of the clause at 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration.

(1) The solicitation number (or other procurement identification number).

(2) The offeror's name and remittance address, as stated in the offer.

(3) The signature (manual or electronic, as appropriate), title, and telephone number of the offeror's official authorized to provide this information.

(4) The name, address, and 9-digit Routing Transit Number of the offeror's financial agent.

(5) The offeror's account number and the type of account (checking, savings, or lockbox).

(6) If applicable, the Fedwire Transfer System telegraphic abbreviation of the offeror's financial agent.

(7) If applicable, the offeror shall also provide the name, address, telegraphic abbreviation, and 9-digit Routing Transit Number of the correspondent financial institution receiving the wire transfer payment if the offeror's financial agent is not directly on-line to the Fedwire and, therefore, not the receiver of the wire transfer payment.

(End of provision)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from

U.S. Army Corps of Engineers
Contracting Division
Attn: Contracting Officer
190 East Fifth Street
St. Paul, Minnesota 55101-1638

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995)

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) Site visits may be arranged during normal duty hours by contacting:

Name: Mike Evenson

Address: Fargo Resident Office
15 So. 21st Street Suite 103 Federal Bldg.
Fargo, North Dakota 58103

Telephone: (701) 451-0888

(End of provision)

52.236-4002 WORK PERFORMED BY THE CONTRACTOR

The successful bidder must furnish the Contracting Officer within 10 days after the award, the items of work which he will perform with his own forces, the percentage of the total work this represents, and the estimated cost thereof. (See Section 00700, clause entitled ("Performance of Work by the Contractor").

52.236-4005 UNAVAILABILITY OF UTILITY SERVICES

The responsibility shall be upon the Contractor to provide and maintain at its expense, adequate utilities for its use for construction and domestic consumption, and to install and maintain necessary connections and lines for same, but only at such locations and in such manner as may be approved by the Contracting Officer. Before final acceptance, temporary connections and lines installed by the Contractor shall be removed in a manner satisfactory to the Contracting Officer.

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

www.arnet.gov/far

(End of provision)

252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION (NOV 2001)

(a) Definitions.

As used in this clause--

(1) Central Contractor Registration (CCR) database means the primary DoD repository for contractor information required for the conduct of business with DoD.

(2) Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet Information Services to identify unique business entities.

(3) Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by Dun and Bradstreet plus a 4-digit suffix that may be assigned by a parent (controlling) business concern. This 4-digit suffix may be assigned at the discretion of the parent business concern for such purposes as identifying subunits or affiliates of the parent business concern.

(4) Registered in the CCR database means that all mandatory information, including the DUNS number or the DUNS+4 number, if applicable, and the corresponding Commercial and Government Entity (CAGE) code, is in the CCR database; the DUNS number and the CAGE code have been validated; and all edits have been successfully completed.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee must be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation, except for awards to foreign vendors for work to be performed outside the United States.

(2) The offeror shall provide its DUNS or, if applicable, its DUNS+4 number with its offer, which will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(3) Lack of registration in the CCR database will make an offeror ineligible for award.

(4) DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant submitting an application through a method other than the Internet may take up to 30 days. Therefore, offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

(c) The Contractor is responsible for the accuracy and completeness of the data within the CCR, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to confirm on an annual basis that its information in the CCR database is accurate and complete.

(d) Offerors and contractors may obtain information on registration and annual confirmation requirements by calling 1-888-227-2423, or via the Internet at http://www.ccr.gov.

(End of clause)

Section 00600 - Representations & Certifications

CLAUSES INCORPORATED BY FULL TEXT

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that --

(b) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to –

(i) Those prices,

(1) The intention to submit an offer, or

(iii) The methods of factors used to calculate the prices offered:

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provison _____ (insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of provision)

52.203-11 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this Certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(End of provision)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

“Common parent,” as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

“Taxpayer Identification Number (TIN),” as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting

requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

___ TIN:._____

___ TIN has been applied for.

___ TIN is not required because:

___ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999)

(a) Definition. Women-owned business concern, as used in this provision, means a concern that is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.] The offeror represents that it ( ) is a women-owned business concern.

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that--

(i) The Offeror and/or any of its Principals --

(A) Are ( ) are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not ( ), within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision.

(ii) The Offeror has ( ) has not ( ), within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2002) - ALTERNATE I (APR 2002)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 237990.

(2) The small business size standard is $28,500,000.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture:_____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

____ Black American.

____ Hispanic American.

____ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

____ Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

____ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

____ Individual/concern, other than one of the preceding.

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern --

(1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; or

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.219-2 EQUAL LOW BIDS. (OCT 1995)

(a) This provision applies to small business concerns only.

(b) The bidder's status as a labor surplus area (LSA) concern may affect entitlement to award in case of tie bids. If the bidder wishes to be considered for this priority, the bidder must identify, in the following space, the LSA in which the costs to be incurred on account of manufacturing or production (by the bidder or the first-tier subcontractors) amount to more than 50 percent of the contract price.

_____

_____

(c) Failure to identify the labor surplus area as specified in paragraph (b) of this provision will preclude the bidder from receiving priority consideration. If the bidder is awarded a contract as a result of receiving priority consideration under this provision and would not have otherwise received award, the bidder shall perform the

contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (OCT 2000)

(a) Definition.

"Emerging small business" as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the North American Industry Classification System (NAICS) code assigned to a contracting opportunity.

(b) [Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.] The Offeror [ ] is, [ ] is not an emerging small business.

(c) (Complete only if the Offeror is a small business or an emerging small business, indicating its size range.)

Offeror's number of employees for the past 12 months (check this column if size standard stated in solicitation is expressed in terms of number of employees) or Offeror's average annual gross revenue for the last 3 fiscal years (check this column if size standard stated in solicitation is expressed in terms of annual receipts). (Check one of the following.)

No. of Employees	Avg. Annual Gross Revenues
____ 50 or fewer	____ $1 million or less
____ 51 - 100	____ $1,000,001 - $2 million
____ 101 - 250	____ $2,000,001 - $3.5 million
____ 251 - 500	____ $3,500,001 - $5 million
____ 501 - 750	____ $5,000,001 - $10 million
____ 751 - 1,000	____ $10,000,001 - $17 million
____ Over 1,000	____ Over $17 million

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) ( ) It has, ( ) has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of

this solicitation;

(b) ( ) It has, ( ) has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of provision)

52.222-38 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (DEC 2001)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (i.e., if it has any contract containing Federal Acquisition Regulation clause 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans), it has submitted the most recent VETS-100 Report required by that clause.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (Check each block that is applicable.)

( ) (i) The facility does not manufacture, process or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

( ) (ii) The facility does not have 10 or more full-time employees as specified in section 313.(b)(1)(A) of EPCRA 42 U.S.C. 11023(b)(1)(A);

( ) (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

( ) (iv) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

( ) (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

(End of clause)

252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) "Definitions."

As used in this provision --

(a) "Government of a terrorist country" includes the state and the government of a terrorist country, as well as any political subdivision, agency, or instrumentality thereof.

(2) "Terrorist country" means a country determined by the Secretary of State, under section 6(j)(1)(A) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(i)(A)), to be a country the government of which has repeatedly provided support for such acts of international terrorism. As of the date of this provision, terrorist countries include: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.

(3) "Significant interest" means --

(i) Ownership of or beneficial interest in 5 percent or more of the firm's or subsidiary's securities. Beneficial interest includes holding 5 percent or more of any class of the firm's securities in "nominee shares," "street names," or some other method of holding securities that does not disclose the beneficial owner;

(ii) Holding a management position in the firm, such as a director or officer;

(iii) Ability to control or influence the election, appointment, or tenure of directors or officers in the firm;

(iv) Ownership of 10 percent or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(v) Holding 50 percent or more of the indebtness of a firm.

(b) "Prohibition on award."

In accordance with 10 U.S.C. 2327, no contract may be awarded to a firm or a subsidiary of a firm if the government of a terrorist country has a significant interest in the firm or subsidiary or, in the case of a subsidiary, the firm that owns the subsidiary, unless a waiver is granted by the Secretary of Defense.

(c) "Disclosure."

If the government of a terrorist country has a significant interest in the Offeror or a subsidiary of the Offeror, the Offeror shall disclosure such interest in an attachment to its offer. If the Offeror is a subsidiary, it shall also disclose

any significant interest the government of a terrorist country has in any firm that owns or controls the subsidiary. The disclosure shall include --

(1) Identification of each government holding a significant interest; and

(2) A description of the significant interest held by each government.

(End of provision)

252.225-7003 INFORMATION FOR DUTY-FREE ENTRY EVALUATION (MAR 1998)

(a) Does the offeror propose to furnish—

(1) A domestic end product with nonqualifying country components for which the offeror requests duty-free entry; or

(2) A foreign end product consisting of end items, components, or material of foreign origin other than those for which duty-free entry is to be accorded pursuant to the Duty-Free Entry--Qualifying Country Supplies (End Products and Components) clause or, if applicable, the Duty-Free Entry--Eligible End Products clause of this solicitation?

Yes ( ) No ( )

(ii) If the answer in paragraph (a) is yes, answer the following questions:

(1) Are such foreign supplies now in the United States?

Yes ( ) No ( )

(2) Has the duty on such foreign supplies been paid?

Yes ( ) No ( )

(3) If the answer to paragraph (b)(2) is no, what amount is included in the offer to cover such duty?$_____

(c) If the duty has not been paid, the Government may elect to make award on a duty-free basis. If so, the offered price will be reduced in the contract award by the amount specified in paragraph (b)(3). The Offeror agrees to identify, at the request of the Contracting Officer, the foreign supplies which are subject to duty-free entry.

(End of clause)

252.225-7017 PROHIBITION ON AWARD TO COMPANIES OWNED BY THE PEOPLE’S REPUBLIC OF CHINA (FEB 2000)

(a) Definition. “People's Republic of China,” as used in this provision, means the government of the People's Republic of China, including its political subdivisions, agencies, and instrumentalities.

(b) Prohibition on award. Section 8120 of the Department of Defense Appropriations Act for fiscal year 1999 (Pub. L. 105-262), as amended by Section 144 of Title I, Division C, of the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999 (Pub. L. 105-277), prohibits the award of a contract under this solicitation to any company in which the Director of Defense Procurement (Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics)) has determined that the People's Republic of China or the People's Liberation Army of the People's Republic of China owns more than 50 percent interest.

(c) Representation. By submission of an offer, the offeror represents that the People's Republic of China or the People's Liberation Army of the People's Republic of China does not own more than 50 percent interest in the offeror.

(End of provision)

252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation. The Offeror represents that it:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

Section 00700 - Contract Clauses

CLAUSES INCORPORATED BY FULL TEXT

52.202-1 DEFINITIONS (DEC 2001) --ALTERNATE I (MAY 2001)

(a) Agency head or head of the agency means the Secretary (Attorney General, Administrator, Governor, Chairperson, or other chief official, as appropriate) of the agency, unless otherwise indicated, including any deputy or assistant chief official of the executive agency.

(b) "Commercial component" means any component that is a commercial item.

(c) Any item, other than real property, that is of a type customarily used by the general public or by non-governmental entities for purposes other than governmental purposes, and that--

(i) Has been sold, leased, or licensed to the general public; or

(ii) Has been offered for sale, lease, or license to the general public;

(2) Any item that evolved from an item described in paragraph (c)(1) of this clause through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation;

(3) Any item that would satisfy a criterion expressed in paragraphs (c)(1) or (c)(2) of this clause, but for--

(i) Modifications of a type customarily available in the commercial marketplace; or

(ii) Minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements. "Minor" modifications means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts, but are not conclusive evidence that a modification is minor;

(4) Any combination of items meeting the requirements of paragraphs (c)(1), (2), (3), or (5) of this clause that are of a type customarily combined and sold in combination to the general public;

(5) Installation services, maintenance services, repair services, training services, and other services if--

(i) Such services are procured for support of an item referred to in paragraph (c)(1), (2), (3), or (4) of this definition, regardless of whether such services are provided by the same source or at the same time as the item; and

(ii) The source of such services provides similar services contemporaneously to the general public under terms and conditions similar to those offered to the Federal Government;

(6) Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed under standard commercial terms and conditions. This does not include services that are sold based on hourly rates without an established catalog or market price for a specific service performed. For purposes of these services--

(i) Catalog price means a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is either published or otherwise available for inspection by customers, and states prices at which sales are currently, or were last, made to a significant number of buyers constituting the general public; and

(ii) Market prices means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors.

(7) Any item, combination of items, or service referred to in subparagraphs (c)(1) through (c)(6), notwithstanding the fact that the item, combination of items, or service is transferred between or among separate divisions, subsidiaries, or affiliates of a Contractor; or

(8) A nondevelopmental item, if the procuring agency determines the item was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local Governments.

(d) Component means any item supplied to the Government as part of an end item or of another component, except that for use in 52.225-9, and 52.225-11 see the definitions in 52.225-9(a) and 52.225-11(a).

(e) Contracting Officer means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(f) Nondevelopmental item means--

(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;

(2) Any item described in paragraph (f)(1) of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or

(3) Any item of supply being produced that does not meet the requirements of paragraph (f)(1) or (f)(2) solely because the item is not yet in use.

(End of clause)

52.202-4001 DEFINITIONS (MAY 1995) EFARS Part 2.101

"Chief of Contracting Office" means the Chief of the Contracting Division at a District, or the Director of Contracting at a Division, Center, Laboratory, or other support activity.

"Command" means each USACE Division, each USACE District, The U.S. Army Engineering and Support Center (HNC), Transatlantic Programs Center (TAC), Transatlantic Programs Center (Europe) (TAE), Topographic Engineer Center (TEC), Cold Regions Research and Engineering Laboratory (CRREL), Construction Engineering Research Laboratory (CERL), Humphreys Engineering Center Support Activity (HECSA), and Waterways experiment Station (WES).

"Commander" means the commanding officer of each USACE district and each USACE division, and the director or commander of HNC, TAC, TAE, ETL, CRREL, CERL, HECSA and WES.

"Head of Contracting Activity (HCA)" for USACE means the Chief of Engineers.

Centers. For determining contracting authority levels for this regulation, Centers (HNC, and TAC) will equate to a Division. As a subordinate unit to TAC, TAE's contracting authority will therefore equate to that of a district.

Level higher than the contracting officer. When a District or TAE chief of contracting is the contracting officer, a "level higher than the contracting officer" means the Division or Center Director of Contracting. When an operating Division, Center or Laboratory Director/Chief of Contracting is the contracting officer a "level higher than the contracting officer" means the PARC.

Local Cooperation Agreements (LCAs). See Project Cooperation Agreements.

Project Cooperation Agreements. Formerly referred to as Local Cooperation Agreements, these are agreements under 31 U.S.C. 6305 and 42 U.S.C. 1962d-5b. They are not contracts as defined by the FAR.

"USACE and HQUSACE" means the United States Army Corps of Engineers and its headquarters, respectively.

52.203-3 GRATUITIES (APR 1984)

(a) The right of the Contractor to proceed may be terminated by written notice if, after notice and hearing, the agency head or a designee determines that the Contractor, its agent, or another representative--

(1) Offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official, or employee of the Government; and

(2) Intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

(b) The facts supporting this determination may be reviewed by any court having lawful jurisdiction.

(c) If this contract is terminated under paragraph (a) of this clause, the Government is entitled--

(1) To pursue the same remedies as in a breach of the contract; and

(2) In addition to any other damages provided by law, to exemplary damages of not less than 3 nor more than 10 times the cost incurred by the Contractor in giving gratuities to the person concerned, as determined by the agency head or a designee. (This subparagraph (c)(2) is applicable only if this contract uses money appropriated to the Department of Defense.)

(d) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-5 COVENANT AGAINST CONTINGENT FEES (APR 1984)

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) "Bona fide agency," as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

(End of clause)

52.203-7 ANTI-KICKBACK PROCEDURES. (JUL 1995)

(a) Definitions.

"Kickback," as used in this clause, means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided, directly or indirectly, to any prime Contractor, prime Contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

"Person," as used in this clause, means a corporation, partnership, business association of any kind, trust, joint-stock company, or individual.

"Prime contract," as used in this clause, means a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or services of any kind.

"Prime Contractor," as used in this clause, means a person who has entered into a prime contract with the United States.

"Prime Contractor employee," as used in this clause, means any officer, partner, employee, or agent of a prime Contractor.

"Subcontract," as used in this clause, means a contract or contractual action entered into by a prime Contractor or subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind under a prime contract.

"Subcontractor," as used in this clause, (1) means any person, other than the prime Contractor, who offers to furnish or furnishes any supplies, materials, equipment, or services of any kind under a prime contract or a subcontract entered into in connection with such prime contract, and (2) includes any person who offers to furnish or furnishes general supplies to the prime Contractor or a higher tier subcontractor.

"Subcontractor employee," as used in this clause, means any officer, partner, employee, or agent of a subcontractor.

(b) The Anti-Kickback Act of 1986 (41 U.S.C. 51-58) (the Act), prohibits any person from -

(1) Providing or attempting to provide or offering to provide any kickback;

(2) Soliciting, accepting, or attempting to accept any kickback; or

(3) Including, directly or indirectly, the amount of any kickback in the contract price charged by a prime Contractor to the United States or in the contract price charged by a subcontractor to a prime Contractor or higher tier subcontractor.

(c)(1) The Contractor shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in paragraph (b) of this clause in its own operations and direct business relationships.

(2) When the Contractor has reasonable grounds to believe that a violation described in paragraph (b) of this clause may have occurred, the Contractor shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting agency, the head of the contracting agency if the agency does not have an inspector general, or the Department of Justice.

(3) The Contractor shall cooperate fully with any Federal agency investigating a possible violation described in paragraph (b) of this clause.

(4) The Contracting Officer may (i) offset the amount of the kickback against any monies owed by the United States under the prime contract and/or (ii) direct that the Prime Contractor withhold, from sums owed a subcontractor under the prime contract, the amount of any kickback. The Contracting Officer may order the monies withheld under subdivision (c)(4)(ii) of this clause be paid over to the Government unless the Government has already offset those monies under subdivision (c)(4)(i) of this clause. In either case, the Prime Contractor shall notify the Contracting Officer when the monies are withheld.

(5) The Contractor agrees to incorporate the substance of this clause, including this subparagraph (c)(5) but excepting subparagraph (c)(1), in all subcontracts under this contract which exceed $100,000.

52.203-8 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) If the Government receives information that a contractor or a person has engaged in conduct constituting a violation of subsection (a), (b), (c), or (d) of Section 27 of the Office of Federal Procurement Policy Act (41 U.S.C. 423) (the Act), as amended by section 4304 of the 1996 National Defense Authorization Act for Fiscal Year 1996 (Pub. L. 104-106), the Government may--

(1) Cancel the solicitation, if the contract has not yet been awarded or issued; or

(2) Rescind the contract with respect to which--

(i) The Contractor or someone acting for the Contractor has been convicted for an offense where the conduct constitutes a violation of subsection 27(a) or (b) of the Act for the purpose of either--

(A) Exchanging the information covered by such subsections for anything of value; or

(B) Obtaining or giving anyone a competitive advantage in the award of a Federal agency procurement contract; or

(ii) The head of the contracting activity has determined, based upon a preponderance of the evidence, that the Contractor or someone acting for the Contractor has engaged in conduct constituting an offense punishable under subsections 27(e)(1) of the Act.

(b) If the Government rescinds the contract under paragraph (a) of this clause, the Government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.

(c) The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law, regulation, or under this contract.

(End of clause)

52.203-10 PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) The Government, at its election, may reduce the price of a fixed-price type contract and the total cost and fee under a cost-type contract by the amount of profit or fee determined as set forth in paragraph (b) of this clause if the head of the contracting activity or designee determines that there was a violation of subsection 27 (a), (b), or (c) of the Office of Federal Procurement Policy Act, as amended (41 U.S.C. 423), as implemented in section 3.104 of the Federal Acquisition Regulation.

(b) The price or fee reduction referred to in paragraph (a) of this clause shall be--

(1) For cost-plus-fixed-fee contracts, the amount of the fee specified in the contract at the time of award;

(2) For cost-plus-incentive-fee contracts, the target fee specified in the contract at the time of award, notwithstanding any minimum fee or "fee floor" specified in the contract;

(3) For cost-plus-award-fee contracts--

(i) The base fee established in the contract at the time of contract award;

(ii) If no base fee is specified in the contract, 30 percent of the amount of each award fee otherwise payable to the Contractor for each award fee evaluation period or at each award fee determination point.

(4) For fixed-price-incentive contracts, the Government may--

(i) Reduce the contract target price and contract target profit both by an amount equal to the initial target profit specified in the contract at the time of contract award; or

(ii) If an immediate adjustment to the contract target price and contract target profit would have a significant adverse impact on the incentive price revision relationship under the contract, or adversely affect the contract financing provisions, the Contracting Officer may defer such adjustment until establishment of the total final price of the contract. The total final price established in accordance with the incentive price revision provisions of the contract shall be reduced by an amount equal to the initial target profit specified in the contract at the time of contract award and such reduced price shall be the total final contract price.

(5) For firm-fixed-price contracts, by 10 percent of the initial contract price or a profit amount determined by the

Contracting Officer from records or documents in existence prior to the date of the contract award.

(c) The Government may, at its election, reduce a prime contractor's price or fee in accordance with the procedures of paragraph (b) of this clause for violations of the Act by its subcontractors by an amount not to exceed the amount of profit or fee reflected in the subcontract at the time the subcontract was first definitively priced.

(d) In addition to the remedies in paragraphs (a) and (c) of this clause, the Government may terminate this contract for default. The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.203-12 LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JUN 1997)

(a) Definitions.

"Agency," as used in this clause, means executive agency as defined in 2.101.

"Covered Federal action," as used in this clause, means any of the following Federal actions:

(1) The awarding of any Federal contract.

(2) The making of any Federal grant.

(3) The making of any Federal loan.

(4) The entering into of any cooperative agreement.

(5) The extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

"Indian tribe" and "tribal organization," as used in this clause, have the meaning provided in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) and include Alaskan Natives.

"Influencing or attempting to influence," as used in this clause, means making, with the intent to influence, any communication to or appearance before an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any covered Federal action.

"Local government," as used in this clause, means a unit of government in a State and, if chartered, established, or otherwise recognized by a State for the performance of a governmental duty, including a local public authority, a special district, an intrastate district, a council of governments, a sponsor group representative organization, and any other instrumentality of a local government.

"Officer or employee of an agency," as used in this clause, includes the following individuals who are employed by an agency:

(1) An individual who is appointed to a position in the Government under Title 5, United States Code, including a position under a temporary appointment.

(2) A member of the uniformed services, as defined in subsection 101(3), Title 37, United States Code.

(3) A special Government employee, as defined in section 202, Title 18, United States Code.

(4) An individual who is a member of a Federal advisory committee, as defined by the Federal Advisory Committee Act, Title 5, United States Code, appendix 2.

"Person," as used in this clause, means an individual, corporation, company, association, authority, firm, partnership, society, State, and local government, regardless of whether such entity is operated for profit, or not for profit. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Reasonable compensation," as used in this clause, means, with respect to a regularly employed officer or employee of any person, compensation that is consistent with the normal compensation for such officer or employee for work that is not furnished to, not funded by, or not furnished in cooperation with the Federal Government.

"Reasonable payment," as used in this clause, means, with respect to professional and other technical services, a payment in an amount that is consistent with the amount normally paid for such services in the private sector.

"Recipient," as used in this clause, includes the Contractor and all subcontractors. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Regularly employed," as used in this clause, means, with respect to an officer or employee of a person requesting or receiving a Federal contract, an officer or employee who is employed by such person for at least 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person for receipt of such contract. An officer or employee who is employed by such person for less than 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person shall be considered to be regularly employed as soon as he or she is employed by such person for 130 working days.

"State," as used in this clause, means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, a territory or possession of the United States, an agency or instrumentality of a State, and multi-State, regional, or interstate entity having governmental duties and powers.

(b) Prohibitions.

(1) Section 1352 of Title 31, United States Code, among other things, prohibits a recipient of a Federal contract, grant, loan, or cooperative agreement from using appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

(2) The Act also requires Contractors to furnish a disclosure if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

(3) The prohibitions of the Act do not apply under the following conditions:

(i) Agency and legislative liaison by own employees.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of a payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action if the payment is for agency and legislative liaison activities not directly related to a covered Federal action.

(B) For purposes of subdivision (b)(3)(i)(A) of this clause, providing any information specifically requested by an agency or Congress is permitted at any time.

(C) The following agency and legislative liaison activities are permitted at any time where they are not related to a specific solicitation for any covered Federal action:

(1) Discussing with an agency the qualities and characteristics (including individual demonstrations) of the person's products or services, conditions or terms of sale, and service capabilities.

(2) Technical discussions and other activities regarding the application or adaptation of the person's products or services for an agency's use.

(D) The following agency and legislative liaison activities are permitted where they are prior to formal solicitation of any covered Federal action--

(1) Providing any information not specifically requested but necessary for an agency to make an informed decision about initiation of a covered Federal action;

(2) Technical discussions regarding the preparation of an unsolicited proposal prior to its official submission; and

(3) Capability presentations by persons seeking awards from an agency pursuant to the provisions of the Small Business Act, as amended by Pub. L. 95-507, and subsequent amendments.

(E) Only those services expressly authorized by subdivision (b)(3)(i)(A) of this clause are permitted under this clause.

(ii) Professional and technical services.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of--

(1) A payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action, if payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action.

(2) Any reasonable payment to a person, other than an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action if the payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action. Persons other than officers or employees of a person requesting or receiving a covered Federal action include consultants and trade associations.

(B) For purposes of subdivision (b)(3)(ii)(A) of this clause, "professional and technical services" shall be limited to advice and analysis directly applying any professional or technical discipline. For example, drafting of a legal document accompanying a bid or proposal by a lawyer is allowable. Similarly, technical advice provided by an engineer on the performance or operational capability of a piece of equipment rendered directly in the negotiation of a contract is allowable. However, communications with the intent to influence made by a professional (such as a

licensed lawyer) or a technical person (such as a licensed accountant) are not allowable under this section unless they provide advice and analysis directly applying their professional or technical expertise and unless the advice or analysis is rendered directly and solely in the preparation, submission or negotiation of a covered Federal action. Thus, for example, communications with the intent to influence made by a lawyer that do not provide legal advice or analysis directly and solely related to the legal aspects of his or her client's proposal, but generally advocate one proposal over another are not allowable under this section because the lawyer is not providing professional legal services. Similarly, communications with the intent to influence made by an engineer providing an engineering analysis prior to the preparation or submission of a bid or proposal are not allowable under this section since the engineer is providing technical services but not directly in the preparation, submission or negotiation of a covered Federal action.

(C) Requirements imposed by or pursuant to law as a condition for receiving a covered Federal award include those required by law or regulation and any other requirements in the actual award documents.

(D) Only those services expressly authorized by subdivisions (b)(3)(ii)(A)(1) and (2) of this clause are permitted under this clause.

(E) The reporting requirements of FAR 3.803(a) shall not apply with respect to payments of reasonable compensation made to regularly employed officers or employees of a person.

(F) Disclosure.

(1) The Contractor who requests or receives from an agency a Federal contract shall file with that agency a disclosure form, OMB standard form LLL, Disclosure of Lobbying Activities, if such person has made or has agreed to make any payment using nonappropriated funds (to include profits from any covered Federal action), which would be prohibited under subparagraph (b)(1) of this clause, if paid for with appropriated funds.

(2) The Contractor shall file a disclosure form at the end of each calendar quarter in which there occurs any event that materially affects the accuracy of the information contained in any disclosure form previously filed by such person under subparagraph (c)(1) of this clause. An event that materially affects the accuracy of the information reported includes--

(i) A cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or

(ii) A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or

(iii) A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

(3) The Contractor shall require the submittal of a certification, and if required, a disclosure form by any person who requests or receives any subcontract exceeding $100,000 under the Federal contract.

(4) All subcontractor disclosure forms (but not certifications) shall be forwarded from tier to tier until received by the prime Contractor. The prime Contractor shall submit all disclosures to the Contracting Officer at the end of the calendar quarter in which the disclosure form is submitted by the subcontractor. Each subcontractor certification shall be retained in the subcontract file of the awarding Contractor.

(d) Agreement. The Contractor agrees not to make any payment prohibited by this clause.

(e) Penalties.

(1) Any person who makes an expenditure prohibited under paragraph (a) of this clause or who fails to file or amend the disclosure form to be filed or amended by paragraph (b) of this clause shall be subject to civil penalties as provided for by 31 U.S.C. 1352. An imposition of a civil penalty does not prevent the Government from seeking any other remedy that may be applicable.

(2) Contractors may rely without liability on the representation made by their subcontractors in the certification and disclosure form.

(f) Cost allowability. Nothing in this clause makes allowable or reasonable any costs which would otherwise be unallowable or unreasonable. Conversely, costs made specifically unallowable by the requirements in this clause will not be made allowable under any other provision.

(End of clause)

52.204-4 PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER (AUG 2000)

(a) Definitions. As used in this clause--

“Postconsumer material” means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of “recovered material.” For paper and paper products, postconsumer material means “postconsumer fiber” defined by the U.S. Environmental Protection Agency (EPA) as--

(1) Paper, paperboard, and fibrous materials from retail stores, office buildings, homes, and so forth, after they have passed through their end-usage as a consumer item, including: used corrugated boxes; old newspapers; old magazines; mixed waste paper; tabulating cards; and used cordage; or

(2) All paper, paperboard, and fibrous materials that enter and are collected from municipal solid waste; but not

(3) Fiber derived from printers' over-runs, converters' scrap, and over-issue publications.

“Printed or copied double-sided” means printing or reproducing a document so that information is on both sides of a sheet of paper.

“Recovered material,” for paper and paper products, is defined by EPA in its Comprehensive Procurement Guideline as “recovered fiber” and means the following materials:

(1) Postconsumer fiber; and

(2) Manufacturing wastes such as--

(i) Dry paper and paperboard waste generated after completion of the papermaking process (that is, those manufacturing operations up to and including the cutting and trimming of the paper machine reel into smaller rolls or rough sheets) including: envelope cuttings, bindery trimmings, and other paper and paperboard waste resulting from printing, cutting, forming, and other converting operations; bag, box, and carton manufacturing wastes; and butt rolls, mill wrappers, and rejected unused stock; and

(ii) Repulped finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters, or others.

(b) In accordance with Section 101 of Executive Order 13101 of September 14, 1998, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition, the Contractor is encouraged to submit paper documents, such as offers, letters, or reports, that are printed or copied double-sided on recycled paper that meet minimum content standards specified in Section 505 of Executive Order 13101, when not using electronic commerce methods to submit information or data to the Government.

(c) If the Contractor cannot purchase high-speed copier paper, offset paper, forms bond, computer printout paper, carbonless paper, file folders, white wove envelopes, writing and office paper, book paper, cotton fiber paper, and cover stock meeting the 30 percent postconsumer material standard for use in submitting paper documents to the Government, it should use paper containing no less than 20 percent postconsumer material. This lesser standard should be used only when paper meeting the 30 percent postconsumer material standard is not obtainable at a reasonable price or does not meet reasonable performance standards.

(End of clause)

52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUL 1995)

(a) The Government suspends or debars Contractors to protect the Government's interests. The Contractor shall not enter into any subcontract in excess of the $25,000 with a Contractor that is debarred, suspended, or proposed for debarment unless there is a compelling reason to do so.

(b) The Contractor shall require each proposed first-tier subcontractor, whose subcontract will exceed $25,000, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principles, is or is not debarred, suspended, or proposed for debarment by the Federal Government.

(c) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is debarred, suspended, or proposed for debarment (see FAR 9.404 for information on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs). The notice must include the following:

(1) The name of the subcontractor.

(2) The Contractor's knowledge of the reasons for the subcontractor being on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(3) The compelling reason(s) for doing business with the subcontractor notwithstanding its inclusion on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, or proposed debarment.

(End of clause)

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) - ALTERNATE I (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 30 April 2004.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed by 28 March 2003. The completion date will be extended by the number of calendar days after the above date that the Contractor receives the notice to proceed, except to the extent that the delay in issuance of the notice to proceed results from the failure of the Contractor to execute the contract and give the required performance and payment bonds within the time specified in the offer.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of $640.00 for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.211-13 TIME EXTENSIONS (SEP 2000)

Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

(End of clause)

52.211-18 VARIATION IN ESTIMATED QUANTITY (APR 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgement of the Contracting Officer, is justified.

52.214-26 AUDIT AND RECORDS--SEALED BIDDING. (OCT 1997)

(a) As used in this clause, records includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form.

(b) Cost or pricing data. If the Contractor has been required to submit cost or pricing data in connection with the pricing of any modification to this contract, the Contracting Officer, or an authorized representative of the Contracting Officer, in order to evaluate the accuracy, completeness, and currency of the cost or pricing data, shall have the right to examine and audit all of the Contractor's records, including computations and projections, related to--

(1) The proposal for the modification;

(2) The discussions conducted on the proposal(s), including those related to negotiating;

(3) Pricing of the modification; or

(4) Performance of the modification.

(c) Comptroller General. In the case of pricing any modification, the Comptroller General of the United States, or an authorized representative, shall have the same rights as specified in paragraph (b) of this clause.

(d) Availability. The Contractor shall make available at its office at all reasonable times the materials described in reproduction, until 3 years after final payment under this contract, or for any other period specified in Subpart 4.7 of the Federal Acquisition Regulation (FAR). FAR Subpart 4.7, Contractor Records Retention, in effect on the data of this contract, is incorporated by reference in its entirety and made a part of this contract.

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement.

(2) Records pertaining to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to the performance of this contract shall be made available until disposition of such appeals, litigation, or claims.

(e) The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (e), in all subcontracts expected to exceed the threshold in FAR 15.403-4(a)(1) for submission of cost or pricing data.

(End of clause)

52.214-27 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - MODIFICATIONS - SEALED BIDDING. (OCT 1997)

(a) This clause shall become operative only for any modification to this contract involving aggregate increases and/or decreases in costs, plus applicable profits, expected to exceed the threshold for the submission of cost or pricing data at FAR 15.403-4(a)(1), except that this clause does not apply to a modification if an exception under FAR 15.403-1(b) applies.

(1) Based on adequate price competition;

(2) Based on established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(3) Set by law or regulation.

(b) If any price, including profit, negotiated in connection with any modification under this clause, was increased by any significant amount because

(1) the Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data;

(2) a subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data; or

(3) any of these parties furnished data of any description that were not accurate, the price shall be reduced accordingly and the contract shall be modified to reflect the reduction. This right to a price reduction is limited to that resulting from defects in data relating to modifications for which this clause becomes operative under paragraph (a) above.

(c) Any reduction in the contract price under paragraph (b) above due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which:

(1) the actual subcontract; or

(2) the actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.

(d) If the Contracting Officer determines under paragraph (b) of this clause that a price or cost reduction should be made:

(1) the Contractor agrees not to raise the following matters as a defense:

(i) The Contractor or subcontractor was a sole source supplier or otherwise was in a superior bargaining position and thus the price of the contract would not have been modified even if accurate, complete, and current cost or pricing data had been submitted;

(ii) The Contracting Officer should have known that the cost or pricing data in issue were defective even though the Contractor or subcontractor took no affirmative action to bring the character of the data to the attention of the Contracting Officer;

(iii) The contract was based on an agreement about the total cost of the contract and there was no agreement about the cost of each item procured under the contract; or

(iv) The Contractor or subcontractor did not submit a Certificate of Current Cost or Pricing Data.

(2) Except as prohibited by subdivision (d)(2)(ii) of this clause:

(i) an offset in an amount determined appropriate by the Contracting Officer based upon the facts shall be allowed against the amount of a contract price reduction if:

(A) The Contractor certifies to the Contracting Officer that, to the best of the Contractor's knowledge and belief, the Contractor is entitled to the offset in the amount requested; and

(B) The Contractor proves that the cost or pricing data were available before the date of agreement on the price of the contract (or price of the modification) and that the data were not submitted before such date.

(ii) An offset shall not be allowed if:

(A) The understated data was known by the Contractor to be understated when the Certificate of Current Cost or Pricing Data was signed; or (B) The Government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the date of agreement on price.

(e) If any reduction in the contract price under this clause reduces the price of items for which payment was made prior to the date of the modification reflecting the price reduction, the Contractor shall be liable to and shall pay the United States at the time such overpayment is repaid:

(1) Simple interest on the amount of such overpayment to be computed from the date(s) of overpayment to the Contractor to the date the Government is repaid by the Contractor at the applicable underpayment rate effective for each quarter prescribed by the Secretary of the Treasury under 26 U.S.C. 6621(a)(2); and

(2) A penalty equal to the amount of the overpayment, if the Contractor or subcontractor knowingly submitted cost or pricing data which were incomplete, inaccurate, or noncurrent.

(End of clause)

52.214-28 SUBCONTRACTOR COST OR PRICING DATA - MODIFICATIONS - SEALED BIDDING. (OCT 1997)

(a) The requirements of paragraphs (b) and (c) of this clause shall:

(1) become operative only for any modification to this contract involving aggregate increases and/or decreases in costs, plus applicable profits, expected to exceed the threshold for submission of cost or pricing data at (FAR) 48 CFR 15.403-4(a)(1); and

(2) be limited to such modifications.

(b) Before awarding any subcontract expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4(a)(1), on the date of agreement on price or the date of award, whichever is later; or before pricing any subcontract modifications involving aggregate increases and/or decreases in costs, plus applicable profits, expected to exceed the threshold for submission of cost or pricing data at FAR 15.403-4(a)(1), the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless an exception under FAR 15.403-1(b) applies.

(1) Based on adequate price competition;

(2) Based on established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(3) Set by law or regulation.

(c) The Contractor shall require the subcontractor to certify in substantially the form prescribed in subsection 15.406-2 of the Federal Acquisition Regulation that, to the best of its knowledge and belief, the data submitted under paragraph (b) above were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(d) The Contractor shall insert the substance of this clause, including this paragraph (d), in each subcontract that, when entered into, exceeds the threshold for submission of cost or pricing data at FAR 15.403-4(a)(1).

(End of clause)

52.217-4000 OPTION FOR ADDITIONAL WORK (Construction) (AUG 2000)

The Government may require the Contractor to perform the work identified as optional item(s): Option 1 (CLIN(s) 0057 and 0058) for work identified as Option 1at the price stated in the Schedule. The Contracting Officer may exercise the option(s) by written notice to the Contractor at any time before the required completion date stated in Section 00700 or any extensions thereto. The Contracting Officer shall provide the Contractor notice of the Government's intent to exercise the option at least thirty (30) days in advance of exercising the option. Notice of intent to exercise the option shall not constitute an exercise of the option and shall not bind the government to exercise the option. If the Government should exercise the option(s) within 60 days of the required completion date or any extension thereto, the Government shall extend the required contract completion date to sixty (60) days after the date of the exercise of the option.

Exercise of the option shall be evidenced on Standard Form 30, citing this Section as the authority for exercising the option. Notice of intent to exercise the option shall be considered to have been given at the earlier of the occurrence of any of the following events: deposit of written notification in the mail, receipt by the Contractor of a facsimile notifying it of the Government's intent to exercise the option, or receipt by the Contractor of an e-mail notifying the Contractor of the Government's intent to exercise the option. The option shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mail or, if earlier, at the time written notice is delivered to the Contractor.

52.219-4 NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS (JAN 1999)

(a) Definition. HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

(b) Evaluation preference. (1) Offers will be evaluated by adding a factor of 10 percent to the price of all offers, except--

(i) Offers from HUBZone small business concerns that have not waived the evaluation preference;

(ii) Otherwise successful offers from small business concerns;

(iii) Otherwise successful offers of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is exceeded (see 25.402 of the Federal Acquisition Regulation (FAR)); and

(iv) Otherwise successful offers where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government.

(2) The factor of 10 percent shall be applied on a line item basis or to any group of items on which award may be made. Other evaluation factors described in the solicitation shall be applied before application of the factor.

(3) A concern that is both a HUBZone small business concern and a small disadvantaged business concern will receive the benefit of both the HUBZone small business price evaluation preference and the small disadvantaged business price evaluation adjustment (see FAR clause 52.219-23). Each applicable price evaluation preference or adjustment shall be calculated independently against an offeror's base offer.

These individual preference amounts shall be added together to arrive at the total evaluated price for that offer.

(c) Waiver of evaluation preference. A HUBZone small business concern may elect to waive the evaluation preference, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply if the offeror has waived the evaluation preference.

___ Offeror elects to waive the evaluation preference.

(d) Agreement. A HUBZone small business concern agrees that in the performance of the contract, in the case of a contract for

(1) Services (except construction), at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern or employees of other HUBZone small business concerns;

(2) Supplies (other than procurement from a nonmanufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern or other HUBZone small business concerns;

(3) General construction, at least 15 percent of the cost of the contract performance incurred for personnel will be will be spent on the concern's employees or the employees of other HUBZone small business concerns; or

(4) Construction by special trade contractors, at least 25 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns.

(e) A HUBZone joint venture agrees that in the performance of the contract, the applicable percentage specified in paragraph (d) of this clause will be performed by the HUBZone small business participant or participants.

(f) A HUBZone small business concern nonmanufacturer agrees to furnish in performing this contract only end items manufactured or produced by HUBZone small business manufacturer concerns. This paragraph does not apply in connection with construction or service contracts.

(End of clause)

52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS (OCT 2000)

(a) It is the policy of the United States that small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, HUBZone small business concerns, small disadvantaged business concerns, and women-owned small business concerns.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

Definitions. As used in this contract--

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

Small business concern means a small business as defined pursuant to Section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

Small disadvantaged business concern means a small business concern that represents, as part of its offer that--

(1) It has received certification as a small disadvantaged business concern consistent with 13 CFR part 124, subpart B;

(2) No material change in disadvantaged ownership and control has occurred since its certification;

(3) Where the concern is owned by one or more individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(4) It is identified, on the date of its representation, as a certified small disadvantaged business in the database maintained by the Small Business Administration (PRO-Net).

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern--

(1) That is at least 51 percent owned by one or more women, or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as a small business concern, a veteran-owned small business concern, a service-disabled veteran-owned small business concern, a HUBZone small business concern, a small disadvantaged business concern, or a women-owned small business concern.

(End of clause)

52.219-9 SMALL BUSINESS SUBCONTRACTING PLAN (JAN 2002)--ALTERNATE I (OCT 2001).

(a) This clause does not apply to small business concerns.

(b) Definitions. As used in this clause--

Commercial item means a product or service that satisfies the definition of commercial item in section 2.101 of the Federal Acquisition Regulation.

Commercial plan means a subcontracting plan (including goals) that covers the offeror's fiscal year and that applies to the entire production of commercial items sold by either the entire company or a portion thereof (e.g., division, plant, or product line).

Individual contract plan means a subcontracting plan that covers the entire contract period (including option periods), applies to a specific contract, and has goals that are based on the offeror's planned subcontracting in

support of the specific contract, except that indirect costs incurred for common or joint purposes may be allocated on a prorated basis to the contract.

Master plan means a subcontracting plan that contains all the required elements of an individual contract plan, except goals, and may be incorporated into individual contract plans, provided the master plan has been approved.

Subcontract means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) The apparent low bidder, upon request by the Contracting Officer, shall submit a subcontracting plan, where applicable, that separately addresses subcontracting with small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns. If the bidder is submitting an individual contract plan, the plan must separately address subcontracting with small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns, with a separate part for the basic contract and separate parts for each option (if any). The plan shall be included in and made a part of the resultant contract. The subcontracting plan shall be submitted within the time specified by the Contracting Officer. Failure to submit the subcontracting plan shall make the bidder ineligible for the award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns as subcontractors. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted for an individual contract plan; or the offeror's total projected sales, expressed in dollars, and the total value of projected subcontracts to support the sales for a commercial plan;

(ii) Total dollars planned to be subcontracted to small business concerns;

(iii) Total dollars planned to be subcontracted to veteran-owned small business concerns;

(iv) Total dollars planned to be subcontracted to HUBZone small business concerns;

(v) Total dollars planned to be subcontracted to small disadvantaged business concerns; and

(vi) Total dollars planned to be subcontracted to women-owned small business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to--

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(4) A description of the method used to develop the subcontracting goals in paragraph (d)(1) of this clause.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source lists, the Procurement Marketing and Access Network (PRO-Net) of the Small Business Administration (SBA), veterans service organizations, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small, HUBZone, small disadvantaged, and women-owned small business trade associations). A firm may rely on the information contained in PRO-Net as an accurate representation of a concern's size and ownership characteristics for the purposes of maintaining a small, veteran-owned small, HUBZone small, small disadvantaged, and women-owned small business source list. Use of PRO-Net as its source list does not relieve a firm of its responsibilities (e.g., outreach, assistance, counseling, or publicizing subcontracting opportunities) in this clause.

(6) A statement as to whether or not the offeror in included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with—

(i) Small business concerns;

(ii) Veteran-owned small business concerns;

(iii) HUBZone small business concerns;

(iv) Small disadvantaged business concerns; and

(v) Women-owned small business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.

(8) A description of the efforts the offeror will make to assure that small business, veteran-owned small business, HUBZone small business, small disadvantaged business and women-owned small business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause of this contract entitled ``Utilization of Small Business Concerns'' in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) that receive subcontracts in excess of $500,000 ($1,000,000 for construction of any public facility) to adopt a subcontracting plan that complies with the requirements of this clause.

(10) Assurances that the offeror will--

(i) Cooperate in any studies or surveys as may be required;

(ii) Submit periodic reports so that the Government can determine the extent of compliance by the offeror with the subcontracting plan;

(iii) Submit Standard Form (SF) 294, Subcontracting Report for Individual Contracts, and/or SF 295, Summary Subcontract Report, in accordance with paragraph (j) of this clause. The reports shall provide information on subcontract awards to small business concerns, veteran-owned small business concerns, service-disabled veteran-owned small business concerns, small disadvantaged business concerns, women-owned small business concerns, and Historically Black Colleges and Universities and Minority Institutions. Reporting shall be in accordance with the instructions on the forms or as provided in agency regulations.

(iv) Ensure that its subcontractors agree to submit SF 294 and SF 295.

(11) A description of the types of records that will be maintained concerning procedures that have been adopted to comply with the requirements and goals in the plan, including establishing source lists; and a description of the offeror's efforts to locate small business, veteran-owned small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns and award subcontracts to them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated)

(i) Source lists (e.g., PRO-Net), guides, and other data that identify small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small business, veteran-owned small business, HUBZone small business, small disadvantaged business, or women-owned small business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than $100,000, indicating--

(A) Whether small business concerns were solicited and, if not, why not;

(B) Whether veteran-owned small business concerns were solicited and, if not, why not;

(C) Whether HUBZone small business concerns were solicited and, if not, why not;

(D) Whether small disadvantaged business concerns were solicited and, if not, why not;

(E) Whether women-owned small business concerns were solicited and, if not, why not; and

(F) If applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact--

(A) Trade associations;

(B) Business development organizations;

(C) Conferences and trade fairs to locate small, HUBZone small, small disadvantaged, and women-owned small business sources; and

(D) Veterans service organizations.

(v) Records of internal guidance and encouragement provided to buyers through--

(A) Workshops, seminars, training, etc.; and

(B) Monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having commercial plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business concerns in all ``make-or-buy'' decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small business, veteran-owner small business, HUBZone small business, small disadvantaged business, and women-owned small business firms.

(4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as small, veteran-owner small business, HUBZone small, small disadvantaged, or women-owned small business for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the Contractor's subcontracting plan.

(f) A master plan on a plant or division-wide basis that contains all the elements required by paragraph (d) of this clause, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause; provided--
(1) the master plan has been approved, (2) the offeror ensures that the master plan is updated as necessary and provides copies of the approved master plan, including evidence of its approval, to the Contracting Officer, and (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) A commercial plan is the preferred type of subcontracting plan for contractors furnishing commercial items. The commercial plan shall relate to the offeror's planned subcontracting generally, for both commercial and Government business, rather than solely to the Government contract. Commercial plans are also preferred for subcontractors that provide commercial items under a prime contract, whether or not the prime contractor is supplying a commercial item.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization Of Small Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

(j) The Contractor shall submit the following reports:

(1) Standard Form 294, Subcontracting Report for Individual Contracts. This report shall be submitted to the Contracting Officer semiannually and at contract completion. The report covers subcontract award data related to this contract. This report is not required for commercial plans.

(2) Standard Form 295, Summary Subcontract Report. This report encompasses all of the contracts with the awarding agency. It must be submitted semi-annually for contracts with the Department of Defense and annually for contracts with civilian agencies. If the reporting activity is covered by a commercial plan, the reporting activity must report annually all subcontract awards under that plan. All reports submitted at the close of each fiscal year (both individual and commercial plans) shall include a breakout, in the Contractor's format, of subcontract awards, in whole dollars, to small disadvantaged business concerns by North American Industry Classification System (NAICS) Industry Subsector. For a commercial plan, the Contractor may obtain from each of its subcontractors a predominant NAICS Industry Subsector and report all awards to that subcontractor under its predominant NAICS Industry Subsector.

(End of clause)

52.219-16 LIQUIDATED DAMAGES-SUBCONTRACTING PLAN (JAN 1999)

(a) Failure to make a good faith effort to comply with the subcontracting plan, as used in this clause, means a willful or intentional failure to perform in accordance with the requirements of the subcontracting plan approved under the clause in this contract entitled "Small Business Subcontracting Plan," or willful or intentional action to frustrate the plan.

(b) Performance shall be measured by applying the percentage goals to the total actual subcontracting dollars or, if a commercial plan is involved, to the pro rata share of actual subcontracting dollars attributable to Government contracts covered by the commercial plan. If, at contract completion or, in the case of a commercial plan, at the close of the fiscal year for which the plan is applicable, the Contractor has failed to meet its subcontracting goals and the Contracting Officer decides in accordance with paragraph (c) of this clause that the Contractor failed to make a good faith effort to comply with its subcontracting plan, established in accordance with the clause in this contract entitled “Small Business Subcontracting Plan,” the Contractor shall pay the Government liquidated damages in an amount stated. The amount of probable damages attributable to the Contractor's failure to comply shall be an amount equal to the actual dollar amount by which the Contractor failed to achieve each subcontract goal.

(c) Before the Contracting Officer makes a final decision that the Contractor has failed to make such good faith effort, the Contracting Officer shall give the Contractor written notice specifying the failure and permitting the Contractor to demonstrate what good faith efforts have been made and to discuss the matter. Failure to respond to the notice may be taken as an admission that no valid explanation exists. If, after consideration of all the pertinent data, the Contracting Officer finds that the Contractor failed to make a good faith effort to comply with the subcontracting plan, the Contracting Officer shall issue a final decision to that effect and require that the Contractor pay the Government liquidated damages as provided in paragraph (b) of this clause.

(d) With respect to commercial plans, the Contracting Officer who approved the plan will perform the functions of the Contracting Officer under this clause on behalf of all agencies with contracts covered by the commercial plan.

(e) The Contractor shall have the right of appeal, under the clause in this contract entitled Disputes, from any final decision of the Contracting Officer.

(f) Liquidated damages shall be in addition to any other remedies that the Government may have.

(End of clause)

52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FEB 1997)

If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

(End of clause)

52.222-3 CONVICT LABOR (AUG 1996)

The Contractor agrees not to employ in the performance of this contract any person undergoing a sentence of imprisonment which has been imposed by any court of a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands. This limitation, however, shall not prohibit the employment by the Contractor in the performance of this contract of persons on parole or probation to work at paid employment during the term of their sentence or persons who have been pardoned or who have served their terms. Nor shall it prohibit the employment by the Contractor in the performance of this contract of persons confined for violation of the laws of any of the States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or the Trust Territory of the Pacific Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if--

(a)(1) The worker is paid or is in an approved work training program on a voluntary basis;

(2) Representatives of local union central bodies or similar labor union organizations have been consulted;

(3) Such paid employment will not result in the displacement of employed workers, or be applied in skills, crafts, or trades in which there is a surplus of available gainful labor in the locality, or impair existing contracts for services; and

(4) The rates of pay and other conditions of employment will not be less than those paid or provided for work of a similar nature in the locality in which the work is being performed; and

(b) The Attorney General of the United States has certified that the work-release laws or regulations of the jurisdiction involved are in conformity with the requirements of Executive Order 11755, as amended by Executive Orders 12608 and 12943.

(End of clause)

52.222-4 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION. (SEP 2000)

(a) Overtime requirements. No Contractor or subcontractor employing laborers or mechanics (see Federal Acquisition Regulation 22.300) shall require or permit them to work over 40 hours in any workweek unless they are paid at least 1 and 1/2 times the basic rate of pay for each hour worked over 40 hours.

(b) Violation; liability for unpaid wages; liquidated damages. The responsible Contractor and subcontractor are liable for unpaid wages if they violate the terms in paragraph (a) of this clause. In addition, the Contractor and subcontractor are liable for liquidated damages payable to the Government. The Contracting Officer will assess liquidated damages at the rate of $10 per affected employee for each calendar day on which the employer required or permitted the employee to work in excess of the standard workweek of 40 hours without paying overtime wages required by the Contract Work Hours and Safety Standards Act.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer will withhold from payments due under the contract sufficient funds required to satisfy any Contractor or subcontractor liabilities for unpaid wages and liquidated damages. If amounts withheld under the contract are insufficient to satisfy Contractor or subcontractor liabilities, the Contracting Officer will withhold payments from other Federal or Federally assisted contracts held by the same Contractor that are subject to the Contract Work Hours and Safety Standards Act.

(d) Payrolls and basic records.

(1) The Contractor and its subcontractors shall maintain payrolls and basic payroll records for all laborers and mechanics working on the contract during the contract and shall make them available to the Government until 3 years after contract completion. The records shall contain the name and address of each employee, social security number, labor classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records need not duplicate those required for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The Contractor and its subcontractors shall allow authorized representatives of the Contracting Officer or the Department of Labor to inspect, copy, or transcribe records maintained under paragraph (d)(1) of this clause. The Contractor or subcontractor also shall allow authorized representatives of the Contracting Officer or Department of Labor to interview employees in the workplace during working hours.

(e) Subcontracts. The Contractor shall insert the provisions set forth in paragraphs (a) through (d) of this clause in subcontracts exceeding $100,000 and require subcontractors to include these provisions in any lower tier subcontracts. The Contractor shall be responsible for compliance by any subcontractor or lower-tier subcontractor with the provisions set forth in paragraphs (a) through (d) of this clause.

(End of clause)

52.222-6 DAVIS-BACON ACT (FEB 1995)

(a) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (d) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period. Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (b) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(b)(1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii) The classification is utilized in the area by the construction industry.

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (b)(2) and (b)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(c) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(d) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(End of clause)

52.222-7 WITHHOLDING OF FUNDS (FEB 1988)

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other Federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on

the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(End of clause)

52.222-8 PAYROLLS AND BASIC RECORDS (FEB 1988)

(a) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)(1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify--

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (b)(2) of this clause.

(4) The falsification of any of the certifications in this clause may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(c) The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(End of clause)

52.222-9 APPRENTICES AND TRAINEES (FEB 1988)

(a) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(b) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour

Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(End of clause)

52.222-10 COMPLIANCE WITH COPELAND ACT REQUIREMENTS (FEB 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

(End of clause)

52.222-11 SUBCONTRACTS (LABOR STANDARDS (FEB 1988)

(a) The Contractor or subcontractor shall insert in any subcontracts the clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act-Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Withholding of Funds, Subcontracts (Labor Standards), Contract Termination-Debarment, Disputes Concerning Labor Standards, Compliance with Davis-Bacon and Related Act Regulations, and Certification of Eligibility, and such other clauses as the Contracting Officer may, by appropriate instructions, require, and also a clause requiring subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all the contract clauses cited in this paragraph.

(b)(1) Within 14 days after award of the contract, the Contractor shall deliver to the Contracting Officer a completed Statement and Acknowledgment Form (SF 1413) for each subcontract, including the subcontractor's signed and dated acknowledgment that the clauses set forth in paragraph (a) of this clause have been included in the subcontract.

(2) Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

(End of clause)

52.222-12 CONTRACT TERMINATION--DEBARMENT (FEB 1988)

A breach of the contract clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act--Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

(End of clause)

52.222-13 COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS (FEB 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are hereby incorporated by reference in this contract.

(End of clause)

52.222-14 DISPUTES CONCERNING LABOR STANDARDS (FEB 1988)

The United States Department of Labor has set forth in 29 CFR Parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(End of clause)

52.222-15 CERTIFICATION OF ELIGIBILITY (FEB 1988)

(a) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(End of clause)

52.222-21 PROHIBITION OF SEGREGATED FACILITIES (FEB 1999)

(a) Segregated facilities, as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national

origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(b) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

(End of clause)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
0.7%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Wahpeton (Richland County), North Dakota [Contracting Officer shall insert description of the geographical areas where the contract is to be performed, giving the State, county, and city].

(End of provision)

52.222-26 EQUAL OPPORTUNITY (APR 2002)

(a) Definition. United States, as used in this clause, means the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.

(b) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with paragraphs (b)(1) through (b)(11) of this clause, except for work performed outside the United States by employees who were not recruited within the United States. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. However, it shall not be a violation of this clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(8) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of Labor; or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraphs (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

52.222-27 AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (FEB 1999)

(a) Definitions. "Covered area," as used in this clause, means the geographical area described in the solicitation for this contract.

"Deputy Assistant Secretary," as used in this clause, means Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, or a designee.

"Employer's identification number," as used in this clause, means the Federal Social Security number used on the

employer's quarterly federal tax return, U.S. Treasury Department Form 941.

"Minority," as used in this clause, means--

(1) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(2) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands);

(3) Black (all persons having origins in any of the black African racial groups not of Hispanic origin); and

(4) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race).

(b) If the Contractor, or a subcontractor at any tier, subcontracts a portion of the work involving any construction trade, each such subcontract in excess of $10,000 shall include this clause and the Notice containing the goals for minority and female participation stated in the solicitation for this contract.

(c) If the Contractor is participating in a Hometown Plan (41 CFR 60-4) approved by the U.S. Department of Labor in a covered area, either individually or through an association, its affirmative action obligations on all work in the plan area (including goals) shall comply with the plan for those trades that have unions participating in the plan. Contractors must be able to demonstrate participation in, and compliance with, the provisions of the plan. Each Contractor or subcontractor participating in an approved plan is also required to comply with its obligations under the Equal Opportunity clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good-faith performance by other Contractors or subcontractors toward a goal in an approved plan does not excuse any Contractor's or subcontractor's failure to make good-faith efforts to achieve the plan's goals.

(d) The Contractor shall implement the affirmative action procedures in subparagraphs (g)(1) through (16) of this clause. The goals stated in the solicitation for this contract are expressed as percentages of the total hours of employment and training of minority and female utilization that the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for the geographical area where that work is actually performed. The Contractor is expected to make substantially uniform progress toward its goals in each craft.

(e) Neither the terms and conditions of any collective bargaining agreement, nor the failure by a union with which the Contractor has a collective bargaining agreement, to refer minorities or women shall excuse the Contractor's obligations under this clause, Executive Order 11246, as amended, or the regulations thereunder.

(f) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(g) The Contractor shall take affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with this clause shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and implement affirmative action steps at least as extensive as the following:

(1) Ensure a working environment free of harassment, intimidation, and coercion at all sites and in all facilities where

the Contractor's employees are assigned to work. The Contractor, if possible, will assign two or more women to each construction project. The Contractor shall ensure that foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at these sites or facilities.

(2) Establish and maintain a current list of sources for minority and female recruitment. Provide written notification to minority and female recruitment sources and community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Establish and maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant, referrals of minorities or females from unions, recruitment sources, or community organizations, and the action taken with respect to each individual. If an individual was sent to the union hiring hall for referral and not referred back to the Contractor by the union or, if referred back, not employed by the Contractor, this shall be documented in the file, along with whatever additional actions the Contractor may have taken.

(4) Immediately notify the Deputy Assistant Secretary when the union or unions with which the Contractor has a collective bargaining agreement has not referred back to the Contractor a minority or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area that expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under subparagraph (g)(2) of this clause.

(6) Disseminate the Contractor's equal employment policy by--

(i) Providing notice of the policy to unions and to training, recruitment, and outreach programs, and requesting their cooperation in assisting the Contractor in meeting its contract obligations;

(ii) Including the policy in any policy manual and in collective bargaining agreements;

(iii) Publicizing the policy in the company newspaper, annual report, etc.;

(iv) Reviewing the policy with all management personnel and with all minority and female employees at least once a year; and

(v) Posting the policy on bulletin boards accessible to employees at each location where construction work is performed.

(7) Review, at least annually, the Contractor's equal employment policy and affirmative action obligations with all employees having responsibility for hiring, assignment, layoff, termination, or other employment decisions. Conduct review of this policy with all on-site supervisory personnel before initiating construction work at a job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate the Contractor's equal employment policy externally by including it in any advertising in the news media, specifically including minority and female news media. Provide written notification to, and discuss this policy with, other Contractors and subcontractors with which the Contractor does or anticipates doing business.

(9) Direct recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the

Contractor's recruitment area and employment needs. Not later than 1 month before the date for acceptance of applications for apprenticeship or training by any recruitment source, send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit minority persons and women. Where reasonable, provide after-school, summer, and vacation employment to minority and female youth both on the site and in other areas of the Contractor's workforce.

(11) Validate all tests and other selection requirements where required under 41 CFR 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities. Encourage these employees to seek or to prepare for, through appropriate training, etc., opportunities for promotion.

(13) Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the Contractor's obligations under this contract are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated except that separate or single-user rest rooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

(15) Maintain a record of solicitations for subcontracts for minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's equal employment policy and affirmative action obligations.

(h) The Contractor is encouraged to participate in voluntary associations that may assist in fulfilling one or more of the affirmative action obligations contained in subparagraphs (g)(1) through (16) of this clause. The efforts of a contractor association, joint contractor-union, contractor-community, or similar group of which the contractor is a member and participant may be asserted as fulfilling one or more of its obligations under subparagraphs (g)(1) through (16) of this clause, provided the Contractor--

(1) Actively participates in the group;

(2) Makes every effort to ensure that the group has a positive impact on the employment of minorities and women in the industry;

(3) Ensures that concrete benefits of the program are reflected in the Contractor's minority and female workforce participation;

(4) Makes a good-faith effort to meet its individual goals and timetables; and

(5) Can provide access to documentation that demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply is the Contractor's, and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

(i) A single goal for minorities and a separate single goal for women shall be established. The Contractor is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of Executive Order 11246, as amended, if a particular group is employed in a substantially disparate manner.

(j) The Contractor shall not use goals or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

(k) The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts under Executive Order 11246, as amended.

(l) The Contractor shall carry out such sanctions and penalties for violation of this clause and of the Equal Opportunity clause, including suspension, termination, and cancellation of existing subcontracts, as may be imposed or ordered under Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any failure to carry out these sanctions and penalties as ordered shall be a violation of this clause and Executive Order 11246, as amended.

(m) The Contractor in fulfilling its obligations under this clause shall implement affirmative action procedures at least as extensive as those prescribed in paragraph (g) of this clause, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of Executive Order 11246, as amended, the implementing regulations, or this clause, the Deputy Assistant Secretary shall take action as prescribed in 41 CFR 60-4.8.

(n) The Contractor shall designate a responsible official to--

(1) Monitor all employment-related activity to ensure that the Contractor's equal employment policy is being carried out;

(2) Submit reports as may be required by the Government; and

(3) Keep records that shall at least include for each employee the name, address, telephone number, construction trade, union affiliation (if any), employee identification number, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, separate records are not required to be maintained.

Nothing contained herein shall be construed as a limitation upon the application of other laws that establish different standards of compliance or upon the requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(End of clause)

52.222-30 DAVIS-BACON ACT--PRICE ADJUSTMENT (NONE OR SEPARATELY SPECIFIED METHOD) (DEC 2001)

(a) The wage determination issued under the Davis-Bacon Act by the Administrator, Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, that is effective for an option to extend the term of the contract, will apply to that option period.

(b) The Contracting Officer will make no adjustment in contract price, other than provided for elsewhere in this contract, to cover any increases or decreases in wages and benefits as a result of-- (1) Incorporation of the Department of Labor's wage determination applicable at the exercise of the option to extend the term of the contract;

(2) Incorporation of a wage determination otherwise applied to the contract by operation of law; or

(3) An increase in wages and benefits resulting from any other requirement applicable to workers subject to the Davis-Bacon Act.

(End of clause)

52.222-35 AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (APR 1998)

(a)) Definitions. As used in this clause--

All employment openings includes all positions except executive and top management, those positions that will be filled from within the contractor's organization, and positions lasting 3 days or less. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment.

Appropriate office of the State employment service system means the local office of the Federal-State national system of public employment offices with assigned responsibility to serve the area where the employment opening is to be filled, including the District of Columbia, Guam, the Commonwealth of Puerto Rico, and the Virgin Islands.

Positions that will be filled from within the Contractor's organization means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and parent companies) and includes any openings that the Contractor proposes to fill from regularly established “recall” lists. The exception does not apply to a particular opening once an employer decides to consider applicants outside of its organization.

Veteran of the Vietnam era means a person who--

(1) Served on active duty for a period of more than 180 days, any part of which occurred between August 5, 1964, and May 7, 1975, and was discharged or released therefrom with other than a dishonorable discharge; or

(2) Was discharged or released from active duty for a service-connected disability if any part of such active duty was performed between August 5, 1964, and May 7, 1975.

(b) General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against the individual because the individual is a disabled veteran or a veteran of the Vietnam era. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans' status in all employment practices such as--

(i) Employment;

(ii) Upgrading;

(iii) Demotion or transfer;

(iv) Recruitment;

(v) Advertising;

(vi) Layoff or termination;

(vii) Rates of pay or other forms of compensation; and

(viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended.

(c) Listing openings. (1) The Contractor agrees to list all employment openings existing at contract award or occurring during contract performance, at an appropriate office of the State employment service system in the locality where the opening occurs. These openings include those occurring at any Contractor facility, including one not connected with performing this contract. An independent corporate affiliate is exempt from this requirement.

(2) State and local government agencies holding Federal contracts of $10,000 or more shall also list all their employment openings with the appropriate office of the State employment service.

(3) The listing of employment openings with the State employment service system is required at least concurrently with using any other recruitment source or effort and involves the obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(4) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State employment service system, in each State where it has establishments, of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these terms and has so advised the State system, it need not advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(d) Applicability. This clause does not apply to the listing of employment openings that occur and are filled outside the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, and the Virgin Islands.

(e) Postings. (1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era, and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance Programs, Department of Labor (Deputy Assistant Secretary), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ, and advance in employment, qualified disabled veterans and veterans of the Vietnam Era.

(f) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(g) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Deputy Assistant Secretary to enforce the terms, including action for noncompliance.

(End of clause)

52.222-36 AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES (JUN 1998)

(a) General. (1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against any employee or applicant because of physical or mental disability. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified individuals with disabilities without discrimination based upon their physical or mental disability in all employment practices such as--

(i) Recruitment, advertising, and job application procedures;

(ii) Hiring, upgrading, promotion, award of tenure, demotion, transfer, layoff, termination, right of return from layoff, and rehiring;

(iii) Rates of pay or any other form of compensation and changes in compensation;

(iv) Job assignments, job classifications, organizational structures, position descriptions, lines of progression, and seniority lists;

(v) Leaves of absence, sick leave, or any other leave;

(vi) Fringe benefits available by virtue of employment, whether or not administered by the Contractor;

(vii) Selection and financial support for training, including apprenticeships, professional meetings, conferences, and other related activities, and selection for leaves of absence to pursue training;

(viii) Activities sponsored by the Contractor, including social or recreational programs; and

(ix) Any other term, condition, or privilege of employment.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Rehabilitation Act of 1973 (29 U.S.C. 793) (the Act), as amended.

(b) Postings. (1) The Contractor agrees to post employment notices stating--

(i) The Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified individuals with disabilities; and

(ii) The rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. The Contractor shall ensure that applicants and employees with disabilities are informed of the contents of the notice (e.g., the Contractor may have the notice read to a visually disabled individual, or may lower the posted notice so that it might be read by a person in a wheelchair). The notices shall be in a form prescribed by the Deputy Assistant Secretary for Federal Contract Compliance of the U.S. Department of Labor (Deputy Assistant Secretary) and shall be provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Act and is

committed to take affirmative action to employ, and advance in employment, qualified individuals with physical or mental disabilities.

(c) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(d) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of $10,000 unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Deputy Assistant Secretary to enforce the terms, including action for noncompliance.

(End of clause)

52.222-37 EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (JAN 1999)

(a) Unless the Contractor is a State or local government agency, the Contractor shall report at least annually, as required by the Secretary of Labor, on--

(1) The number of disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and

(2) The total number of new employees hired during the period covered by the report, and of that total, the number of disabled veterans, and the number of veterans of the Vietnam era.

(b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100."

(c) Reports shall be submitted no later than September 30 of each year beginning September 30, 1988.

(d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100).

(e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each Contractor subject to the reporting requirements at 38 U.S.C. 4212 shall invite all disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 4212 to identify themselves to the Contractor. The invitation shall state that the information is voluntarily provided; that the information will be kept confidential; that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment; and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 4212.

(f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

(End of clause)

52.223-5 POLLUTION PREVENTION AND RIGHT-TO-KNOW INFORMATION (APR 1998)

(a) Executive Order 12856 of August 3, 1993, requires Federal facilities to comply with the provisions of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)(42 U.S.C. 11001-11050) and the Pollution Prevention Act of 1990 (PPA)(42 U.S.C. 13101-13109).

(b) The Contractor shall provide all information needed by the Federal facility to comply with the emergency planning reporting requirements of Section 302 of EPCRA; the emergency notice requirements of Section 304 of EPCRA; the list of Material Safety Data Sheets required by Section 311 of EPCRA; the emergency and hazardous chemical inventory forms of Section 312 of EPCRA; the toxic chemical release inventory of Section 313 of EPCRA, which includes the reduction and recycling information required by Section 6607 of PPA; and the toxic chemical reduction goals requirements of Section 3-302 of Executive Order 12856.

(End of clause)

52.223-6 DRUG-FREE WORKPLACE (MAY 2001)

(a) Definitions. As used in this clause --

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defined in regulation at 21 CFR 1308.11 - 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to deter- mine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession, or use of any controlled substance.

"Drug-free workplace" means the site(s) for the performance of work done by the Contractor in connection with a specific contract at which employees of the Contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract. "Directly engaged" is defined to include all direct cost employees and any other Contractor employee who has other than a minimal impact or involvement in contract performance.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

(b) The Contractor, if other than an individual, shall-- within 30 days after award (unless a longer period is agreed to in writing for contracts of 30 days or more performance duration), or as soon as possible for contracts of less than 30 days performance duration--

(1) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

(2) Establish an ongoing drug-free awareness program to inform such employees about--

(i) The dangers of drug abuse in the workplace;

(ii) The Contractor's policy of maintaining a drug-free workplace;

(iii) Any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (b)(1) of this clause;

(4) Notify such employees in writing in the statement required by subparagraph (b)(1) of this clause that, as a condition of continued employment on this contract, the employee will--

(i) Abide by the terms of the statement; and

(ii) Notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than 5 days after such conviction.

(5) Notify the Contracting Officer in writing within 10 days after receiving notice under subdivision (b)(4)(ii) of this clause, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

(6) Within 30 days after receiving notice under subdivision (b)(4)(ii) of this clause of a conviction, take one of the following actions with respect to any employee who is convicted of a drug abuse violation occurring in the workplace:

(i) Taking appropriate personnel action against such employee, up to and including termination; or

(ii) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency; and

(7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (b)(1) though (b)(6) of this clause.

(c) The Contractor, if an individual, agrees by award of the contract or acceptance of a purchase order, not to engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance while performing this contract.

(d) In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraph (b) or (c) of this clause may, pursuant to FAR 23.506, render the Contractor subject to suspension of contract payments, termination of the contract for default, and suspension or debarment.

(End of clause)

52.223-14 TOXIC CHEMICAL RELEASE REPORTING (OCT 2000)

(a) Unless otherwise exempt, the Contractor, as owner or operator of a facility used in the performance of this contract, shall file by July 1 for the prior calendar year an annual Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023(a) and (g)), and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106). The

Contractor shall file, for each facility subject to the Form R filing and reporting requirements, the annual Form R throughout the life of the contract.

(b) A Contractor owned or operated facility used in the performance of this contract is exempt from the requirement to file an annual Form R if--

(1) The facility does not manufacture, process, or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

(2) The facility does not have 10 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

(3) The facility does not meet the reporting thresholds of toxic chemicals established under of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

(4) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

(5) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

(c) If the Contractor has certified to an exemption in accordance with one or more of the criteria in paragraph (b) of this clause, and after award of the contract circumstances change so that any of its owned or operated facilities used in the performance of this contract is no longer exempt--

(1) The Contractor shall notify the Contracting Officer; and

(2) The Contractor, as owner or operator of a facility used in the performance of this contract that is no longer exempt, shall (i) submit a Toxic Chemical Release Inventory Form (Form R) on or before July 1 for the prior calendar year during which the facility becomes eligible; and (ii) continue to file the annual Form R for the life of the contract for such facility.

(d) The Contracting Officer may terminate this contract or take other action as appropriate, if the Contractor fails to comply accurately and fully with the EPCRA and PPA toxic chemical release filing and reporting requirements.

(e) Except for acquisitions of commercial items, as defined in FAR Part 2, the Contractor shall--

(1) For competitive subcontracts expected to exceed $100,000 (including all options), include a solicitation provision substantially the same as the provision at FAR 52.223-13, Certification of Toxic Chemical Release Reporting; and

(2) Include in any resultant subcontract exceeding $100,000 (including all options), the substance of this clause, except this paragraph (e).

(End of clause)

52.225-9 BUY AMERICAN ACT—CONSTRUCTION MATERIALS (MAY 2002)

(a) Definitions. As used in this clause--

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or a subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the end product.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

Foreign construction material means a construction material other than a domestic construction material.

United States means the 50 States and the District of Columbia, U.S. territories and possessions, Puerto Rico, the Northern Mariana Islands, and any other place subject to U.S. jurisdiction, but does not include leased bases.

(b) Domestic preference. (1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. The Contractor shall use only domestic construction material in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) This requirement does not apply to the construction material or components listed by the Government as follows: None.

(3) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(2) of this clause if the Government determines that

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the requirements of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act. (1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(3) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(3)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1			

Foreign construction material.... ....
Domestic construction material... ....
Item 2
Foreign construction material.... ....
Domestic construction material... ....

Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).
List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.
Include other applicable supporting information.

(End of clause)

52.225-13 RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (JUL 2000)

(a) The Contractor shall not acquire, for use in the performance of this contract, any supplies or services originating from sources within, or that were located in or transported from or through, countries whose products are banned from importation into the United States under regulations of the Office of Foreign Assets Control, Department of the Treasury. Those countries are Cuba, Iran, Iraq, Libya, North Korea, Sudan, the territory of Afghanistan controlled by the Taliban, and Serbia (excluding the territory of Kosovo).

(b) The Contractor shall not acquire for use in the performance of this contract any supplies or services from entities controlled by the government of Iraq.

(c) The Contractor shall insert this clause, including this paragraph (c), in all subcontracts.

(End of clause)

52.226-1 UTILIZATION OF INDIAN ORGANIZATIONS AND INDIAN-OWNED ECONOMIC ENTERPRISES (JUN 2000)

(a) Definitions. As used in this clause:

"Indian" means any person who is a member of any Indian tribe, band, group, pueblo or community that is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs (BIA) in accordance with 25 U.S.C. 1452(c) and any ``Native" as defined in the Alaska Native Claims Settlement Act (43 U.S.C. 1601).

"Indian organization" means the governing body of any Indian tribe or entity established or recognized by the governing body of an Indian tribe for the purposes of 25 U.S.C., chapter 17.

"Indian-owned economic enterprise" means any Indian-owned (as determined by the Secretary of the Interior) commercial, industrial, or business activity established or organized for the purpose of profit, provided that Indian ownership constitutea not less than 51 percent of the enterprise.

"Indian tribe" means any Indian tribe, band, group, pueblo or community, including native villages and native groups

(including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, that is recognized by the Federal Government as eligible for services from BIA in accordance with 25 U.S.C. 1542(c).

"Interested party" means a prime contractor or an actual or prospective offeror whose direct economic interest would be affected by the award of a subcontract or by the failure to award a subcontract.

(b) The Contractor shall use its best efforts to give Indian organizations and Indian-owned economic enterprises (25 U.S.C. 1544) the maximum practicable opportunity to participate in the subcontracts it awards to the fullest extent consistent with efficient performance of its contract.

(1) The Contracting Officer and the Contractor, acting in good faith, may rely on the representation of an Indian organization or Indian-owned economic enterprise as to its eligibility, unless an interested party challenges its status or the Contracting Officer has independent reason to question that status. In the event of a challenge to the representation of a subcontractor, the Contracting Officer will refer the matter to the U.S. Department of the Interior, Bureau of Indian Affairs (BIA), Attn: Chief, Division of Contracting and Grants Administration, 1849 C Street, NW., MS 2626-MIB, Washington, DC 20240-4000.

The BIA will determine the eligibility and notify the Contracting Officer. No incentive payment will be made within 50 working days of subcontract award or while a challenge is pending. If a subcontractor is determined to be an ineligible participant, no incentive payment will be made under the Indian Incentive Program.

(2) The Contractor may request an adjustment under the Indian Incentive Program to the following:

(i) The estimated cost of a cost-type contract.

(ii) The target cost of a cost-plus-incentive-fee prime contract.

(iii) The target cost and ceiling price of a fixed-price incentive prime contract.

(iv) The price of a firm-fixed-price prime contract.

(3) The amount of the adjustment to the prime contract is 5 percent of the estimated cost, target cost, or firm-fixed-price included in the subcontract initially awarded to the Indian organization or Indian-owned economic enterprise.

(4) The Contractor has the burden of proving the amount claimed and must assert its request for an adjustment prior to completion of contract performance.

(c) The Contracting Officer, subject to the terms and conditions of the contract and the availability of funds, will authorize an incentive payment of 5 percent of the amount paid to the subcontractor. The Contracting Officer will seek funding in accordance with agency procedures.

(End of clause)

52.227-1 AUTHORIZATION AND CONSENT (JUL 1995)

(a) The Government authorizes and consents to all use and manufacture, in performing this contract or any subcontract at any tier, of any invention described in and covered by a United States patent (1) embodied in the

structure or composition of any article the delivery of which is accepted by the Government under this contract or (2) used in machinery, tools, or methods whose use necessarily results from compliance by the Contractor or a subcontractor with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clause, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for supplies or services (including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services expected to exceed the simplified acquisition threshold (however, omission of this clause from any subcontract, including those at or below the simplified acquisition threshold, does not affect this authorization and consent.)

(End of clause)

52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (AUG 1996)

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(e) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the simplified acquisition threshold at (FAR) 2.101.to exceed the dollar amount set forth in 13.000 of the Federal Acquisition Regulation (FAR).

(End of clause)

52.227-4 PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984)

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. 181) arising out of performing this contract or out of the use or disposal by or for the account of the Government of supplies furnished or work performed under this contract.

(End of clause)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be 20 percent of the bid price or $3,000,000, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of clause)

52.228-2 ADDITIONAL BOND SECURITY (OCT 1997)

The Contractor shall promptly furnish additional security required to protect the Government and persons supplying labor or materials under this contract if--

(a) Any surety upon any bond, or issuing financial institution for other security, furnished with this contract becomes unacceptable to the Government.

(b) Any surety fails to furnish reports on its financial condition as required by the Government;

(c) The contract price is increased so that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer; or

(d) An irrevocable letter of credit (ILC) used as security will expire before the end of the period of required security. If the Contractor does not furnish an acceptable extension or replacement ILC, or other acceptable substitute, at least 30 days before an ILC's scheduled expiration, the Contracting officer has the right to immediately draw on the ILC.

(End of clause)

52.228-11 PLEDGES OF ASSETS (FEB 1992)

(a) Offerors shall obtain from each person acting as an individual surety on a bid guarantee, a performance bond, or a payment bond--

(1) Pledge of assets; and

(2) Standard Form 28, Affidavit of Individual Surety.

(b) Pledges of assets from each person acting as an individual surety shall be in the form of--

(1) Evidence of an escrow account containing cash, certificates of deposit, commercial or Government securities, or other assets described in FAR 28.203-2 (except see 28.203-2(b)(2) with respect to Government securities held in book entry form) and/or;

(2) A recorded lien on real estate. The offeror will be required to provide--

(i) Evidence of title in the form of a certificate of title prepared by a title insurance company approved by the United States Department of Justice. This title evidence must show fee simple title vested in the surety along with any concurrent owners; whether any real estate taxes are due and payable; and any recorded encumbrances against the property, including the lien filed in favor of the Government as required by FAR 28.203-3(d);

(ii) Evidence of the amount due under any encumbrance shown in the evidence of title;

(iii) A copy of the current real estate tax assessment of the property or a current appraisal dated no earlier than 6 months prior to the date of the bond, prepared by a professional appraiser who certifies that the appraisal has been conducted in accordance with the generally accepted appraisal standards as reflected in the Uniform Standards of Professional Appraisal Practice, as promulgated by the Appraisal Foundation.

(End of clause)

52.228-14 IRREVOCABLE LETTER OF CREDIT (DEC 1999)

(a) “Irrevocable letter of credit” (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without

amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to the Miller Act, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d) Only federally insured financial institutions rated investment grade or higher shall issue or confirm the ILC. The offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institution has the required rating(s) as of the date of issuance of the ILC. Unless the financial institution issuing the ILC had letter of credit business of less than $25 million in the past year, ILCs over $5 million must be confirmed by another acceptable financial institution that had letter of credit business of less than $25 million in the past year.

(e) The following format shall be used by the issuing financial institution to create an ILC:

_____

[Issuing Financial Institution's Letterhead or Name and Address]

Issue Date _____

IRREVOCABLE LETTER OF CREDIT NO. _____

Account party's name _____

Account party's address _____

For Solicitation No. _____(for reference only)

TO: [U.S. Government agency]

[U.S. Government agency's address]

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States $_____. This Letter of Credit is payable at [issuing financial institution's and, if any, confirming financial institution's] office at [issuing financial institution's address and, if any, confirming financial institution's address] and expires with our close of business on _____, or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution, for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically

extended expiration date.

3. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution, if any, otherwise state of issuing financial institution].

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Issuing financial institution]

(f) The following format shall be used by the financial institution to confirm an ILC:

_____
[Confirming Financial Institution's Letterhead or Name and Address]

(Date) _____

Our Letter of Credit Advice Number _____

Beneficiary: _____ [U.S. Government agency]

Issuing Financial Institution: _____

Issuing Financial Institution's LC No.: _____

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by _____ [name of issuing financial institution] for drawings of up to United States dollars _____/U.S. $_____ and expiring with our close of business on _____ [the expiration date], or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at _____.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this Confirmation at our offices as specified herein.

4. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution].

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17 of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Confirming financial institution]

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

_____

[City, State]

(Date) _____

[Name and address of financial institution]

Pay to the order of _____ [Beneficiary Agency] _____ the sum of United States $_____. This draft is drawn under Irrevocable Letter of Credit No. _____.

_____

[Beneficiary Agency]

By: _____

(End of clause)

52.228-15 PERFORMANCE AND PAYMENT BONDS--CONSTRUCTION (JUL 2000)-

(a) Definitions. As used in this clause--

Original contract price means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) Amount of required bonds. Unless the resulting contract price is $100,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) Performance bonds (Standard Form 25). The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) Payment Bonds (Standard Form 25-A). The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) Additional bond protection. (i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) Furnishing executed bonds. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) Surety or other security for bonds. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register or may be obtained from the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch, 401 14th Street, NW, 2nd Floor, West Wing, Washington, DC 20227.

(e) Notice of subcontractor waiver of protection (40 U.S.C. 270b(c). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of clause)

52.228-4022 REQUIREMENT FOR BID GUARANTEE (FAR 28.101-2)

Each bidder shall submit with its bid a Bid Bond (Standard Form 24) with good and sufficient surety or sureties acceptable to the Government or other security as provided in the clause BID GUARANTEE in the form of twenty

percent (20%) of the bid price or $3,000,000 whichever is lesser. The bid bond penalty may be expressed in terms of a percentage of the bid price or may be expressed in dollars and cents.

52.229-3 FEDERAL, STATE, AND LOCAL TAXES (JAN 1991)

(a) "Contract date," as used in this clause, means the date set for bid opening or, if this is a negotiated contract or a modification, the effective date of this contract or modification.

"All applicable Federal, State, and local taxes and duties," as used in this clause, means all taxes and duties, in effect on the contract date, that the taxing authority is imposing and collecting on the transactions or property covered by this contract.

"After-imposed Federal tax," as used in this clause, means any new or increased Federal excise tax or duty, or tax that was exempted or excluded on the contract date but whose exemption was later revoked or reduced during the contract period, on the transactions or property covered by this contract that the Contractor is required to pay or bear as the result of legislative, judicial, or administrative action taking effect after the contract date. It does not include social security tax or other employment taxes.
"After-relieved Federal tax," as used in this clause, means any amount of Federal excise tax or duty, except social security or other employment taxes, that would otherwise have been payable on the transactions or property covered by this contract, but which the Contractor is not required to pay or bear, or for which the Contractor obtains a refund or drawback, as the result of legislative, judicial, or administrative action taking effect after the contract date.

(b) The contract price includes all applicable Federal, State, and local taxes and duties.

(c) The contract price shall be increased by the amount of any after-imposed Federal tax, provided the Contractor warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price, as a contingency reserve or otherwise.

(d) The contract price shall be decreased by the amount of any after-relieved Federal tax.

(e) The contract price shall be decreased by the amount of any Federal excise tax or duty, except social security or other employment taxes, that the Contractor is required to pay or bear, or does not obtain a refund of, through the Contractor's fault, negligence, or failure to follow instructions of the Contracting Officer.

(f) No adjustment shall be made in the contract price under this clause unless the amount of the adjustment exceeds $250.

(g) The Contractor shall promptly notify the Contracting Officer of all matters relating to any Federal excise tax or duty that reasonably may be expected to result in either an increase or decrease in the contract price and shall take appropriate action as the Contracting Officer directs.

(h) The Government shall, without liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax when the Contractor requests such evidence and a reasonable basis exists to sustain the exemption.

(End of clause)

52.229-5 TAXES--CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO (APR 1984)

The term "local taxes," as used in the Federal, State, and local taxes clause of this contract, includes taxes imposed by a possession of the United States or by Puerto Rico.

(End of clause)

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (MAY 1997)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if--

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that--

(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold

or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

_____

(Name)

_____

(Title)

_____

(Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall--

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until--

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as--

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full

payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after--

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against
the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under subparagraph (d)(2) of this clause shall be--

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

(End of clause)

52.232-17 INTEREST (JUNE 1996)

(a) Except as otherwise provided in this contract under a Price Reduction for Defective Cost or Pricing Data clause or a Cost Accounting Standards clause, all amounts that become payable by the Contractor to the Government under this contract (net of any applicable tax credit under the Internal Revenue Code (26 U.S.C. 1481)) shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid. reproduce, prepare derivative works, distribute copies to the public, and (b) Amounts shall be due at the earliest of the following dates:

(1) The date fixed under this contract.

(2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination.

(3) The date the Government transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt.

(4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification.

(c) The interest charge made under this clause may be reduced under the procedures prescribed in 32.614-2 of the Federal Acquisition Regulation in effect on the date of this contract.

(End of clause)

52.232-23 ASSIGNMENT OF CLAIMS (JAN 1986) - ALTERNATE I (APR 1984)

(a) The Contractor, under the Assignment of Claims Act, as amended, 31 U.S.C. 3727, 41 U.S.C. 15 (hereafter referred to as "the Act"), may assign its rights to be paid amounts due or to become due as a result of the performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency. The assignee under such an assignment may thereafter further assign or reassign its right under the original assignment to any type of financing institution described in the preceding sentence. Unless otherwise stated in this contract, payments to an assignee of any amounts due or to become due under this contract shall not, to the extent specified in the Act, be subject to reduction or setoff.

(b) Any assignment or reassignment authorized under the Act and this clause shall cover all unpaid amounts payable under this contract, and shall not be made to more than one party, except that an assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in the financing of this contract.

(c) The Contractor shall not furnish or disclose to any assignee under this contract any classified document (including this contract) or information related to work under this contract until the Contracting Officer authorizes such action in writing.

(End of clause)

52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (FEB 2002)

Notwithstanding any other payment terms in this contract, the Government will make invoice payments under the terms and conditions specified in this clause. The Government considers payment as being made on the day a check is dated or the date of an electronic funds transfer. Definitions of pertinent terms are set forth in sections 2.101, 32.001, and 32.902 of the Federal Acquisition Regulation. All days referred to in this clause are calendar days, unless otherwise specified. (However, see paragraph (a)(3) concerning payments due on Saturdays, Sundays, and legal holidays.)

(a) Invoice payments--(1) Types of invoice payments. For purposes of this clause, there are several types of invoice payments that may occur under this contract, as follows:

(i) Progress payments, if provided for elsewhere in this contract, based on Contracting Officer approval of the estimated amount and value of work or services performed, including payments for reaching milestones in any project.

(A) The due date for making such payments is 14 days after the designated billing office receives a proper payment request. If the designated billing office fails to annotate the payment request with the actual date of receipt at the time of receipt, the payment due date is the 14th day after the date of the Contractor's payment request, provided the designated billing office receives a proper payment request and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(B) The due date for payment of any amounts retained by the Contracting Officer in accordance with the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts, is as specified in the contract or, if not specified, 30 days after approval by the Contracting Officer for release to the Contractor.

(ii) Final payments based on completion and acceptance of all work and presentation of release of all claims against the Government arising by virtue of the contract, and payments for partial deliveries that have been accepted by the Government (e.g., each separate building, public work, or other division of the contract for which the price is stated separately in the contract).

(A) The due date for making such payments is the later of the following two events:

(1) The 30th day after the designated billing office receives a proper invoice from the Contractor.

(2) The 30th day after Government acceptance of the work or services completed by the Contractor. For a final invoice when the payment amount is subject to contract settlement actions (e.g., release of claims), acceptance is deemed to occur on the effective date of the contract settlement.

(B) If the designated billing office fails to annotate the invoice with the date of actual receipt at the time of receipt, the invoice payment due date is the 30th day after the date of the Contractor's invoice, provided the designated billing office receives a proper invoice and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(2) Contractor's invoice. The Contractor shall prepare and submit invoices to the designated billing office specified in the contract. A proper invoice must include the items listed in paragraphs (a)(2)(i) through (a)(2)(xi) of this clause. If the invoice does not comply with these requirements, the designated billing office must return it within 7 days after receipt, with the reasons why it is not a proper invoice. When computing any interest penalty owed the Contractor, the Government will take into account if the Government notifies the Contractor of an improper invoice in an untimely manner.

(i) Name and address of the Contractor.

(ii) Invoice date and invoice number. (The Contractor should date invoices as close as possible to the date of mailing or transmission.)

(iii) Contract number or other authorization for work or services performed (including order number and contract line item number).

(iv) Description of work or services performed.

(v) Delivery and payment terms (e.g., discount for prompt payment terms).

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number, and mailing address of person to notify in the event of a defective invoice.

(viii) For payments described in paragraph (a)(1)(i) of this clause, substantiation of the amounts requested and certification in accordance with the requirements of the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts.

(ix) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision (e.g., 52.232-38, Submission of Electronic Funds Transfer Information with Offer), contract clause (e.g., 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(xi) Any other information or documentation required by the contract.

(3) Interest penalty. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if payment is not made by the due date and the conditions listed in paragraphs (a)(3)(i) through (a)(3)(iii) of this clause are met, if applicable. However, when the due date falls on a Saturday, Sunday, or legal holiday, the designated payment office may make payment on the following working day without incurring a late payment interest penalty.

(i) The designated billing office received a proper invoice.

(ii) The Government processed a receiving report or other Government documentation authorizing payment and there was no disagreement over quantity, quality, Contractor compliance with any contract term or condition, or requested progress payment amount.

(iii) In the case of a final invoice for any balance of funds due the Contractor for work or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(4) Computing penalty amount. The Government will compute the interest penalty in accordance with the Office of Management and Budget prompt payment regulations at 5 CFR part 1315.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor for payments described in paragraph (a)(1)(ii) of this clause, Govemment acceptance or approval is deemed to occur constructively on the 7th day after the Contractor has completed the work or services in accordance with the terms and conditions of the contract. If actual acceptance or approval occurs within the constructive acceptance or approval period, the Government will base the determination of an interest penalty on the actual date of acceptance or approval. Constructive acceptance or constructive approval requirements do not apply if there is a disagreement over quantity, quality, or Contractor compliance with a contract provision. These requirements also do not compel Government officials to accept work or services, approve Contractor estimates, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The prompt payment regulations at 5 CFR 1315.10(c) do not require the Government to pay interest penalties if payment delays are due to disagreement between the Government and the Contractor over the payment amount or other issues involving contract compliance, or on amounts temporarily withheld or retained in accordance with the

terms of the contract. The Government and the Contractor shall resolve claims involving disputes, and any interest that may be payable in accordance with the clause at FAR 52.233-1, Disputes.

(5) Discounts for prompt payment. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if the Government takes a discount for prompt payment improperly. The Government will calculate the interest penalty in accordance with the prompt payment regulations at 5 CFR part 1315.

(6) Additional interest penalty. (i) The designated payment office will pay a penalty amount, calculated in accordance with the prompt payment regulations at 5 CFR part 1315 in addition to the interest penalty amount only if--

(A) The Government owes an interest penalty of $1 or more;

(B) The designated payment office does not pay the interest penalty within 10 days after the date the invoice amount is paid; and

(C) The Contractor makes a written demand to the designated payment office for additional penalty payment, in accordance with paragraph (a)(6)(ii) of this clause, postmarked not later than 40 days after the date the invoice amount is paid.

(ii)(A) The Contractor shall support written demands for additional penalty payments with the following data. The Government will not request any additional data. The Contractor shall--

(1) Specifically assert that late payment interest is due under a specific invoice, and request payment of all overdue late payment interest penalty and such additional penalty as may be required;

(2) Attach a copy of the invoice on which the unpaid late payment interest was due; and

(3) State that payment of the principal has been received, including the date of receipt.

(B) If there is no postmark or the postmark is illegible--

(1) The designated payment office that receives the demand will annotate it with the date of receipt provided the demand is received on or before the 40th day after payment was made; or

(2) If the designated payment office fails to make the required annotation, the Government will determine the demand's validity based on the date the Contractor has placed on the demand, provided such date is no later than the 40th day after payment was made.

(b) Contract financing payments. If this contract provides for contract financing, the Government will make contract financing payments in accordance with the applicable contract financing clause.

(c) Subcontract clause requirements. The Contractor shall include in each subcontract for property or services (including a material supplier) for the purpose of performing this contract the following:

(1) Prompt payment for subcontractors. A payment clause that obligates the Contractor to pay the subcontractor for satisfactory performance under its subcontract not later than 7 days from receipt of payment out of such amounts as are paid to the Contractor under this contract.

(2) Interest for subcontractors. An interest penalty clause that obligates the Contractor to pay to the subcontractor an interest penalty for each payment not made in accordance with the payment clause--

(i) For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and

(ii) Computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(3) Subcontractor clause flowdown. A clause requiring each subcontractor to use:

(i) Include a payment clause and an interest penalty clause conforming to the standards set forth in paragraphs (c)(1) and (c)(2) of this clause in each of its subcontracts; and

(ii) Require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

(d) Subcontract clause interpretation. The clauses required by paragraph (c) of this clause shall not be construed to impair the right of the Contractor or a subcontractor at any tier to negotiate, and to include in their subcontract, provisions that--

(1) Retainage permitted. Permit the Contractor or a subcontractor to retain (without cause) a specified percentage of each progress payment otherwise due to a subcontractor for satisfactory performance under the subcontract without incurring any obligation to pay a late payment interest penalty, in accordance with terms and conditions agreed to by the parties to the subcontract, giving such recognition as the parties deem appropriate to the ability of a subcontractor to furnish a performance bond and a payment bond;

(2) Withholding permitted. Permit the Contractor or subcontractor to make a determination that part or all of the subcontractor's request for payment may be withheld in accordance with the subcontract agreement; and

(3) Withholding requirements. Permit such withholding without incurring any obligation to pay a late payment penalty if--

(i) A notice conforming to the standards of paragraph (g) of this clause previously has been furnished to the subcontractor; and

(ii) The Contractor furnishes to the Contracting Officer a copy of any notice issued by a Contractor pursuant to paragraph (d)(3)(i) of this clause.

(e) Subcontractor withholding procedures. If a Contractor, after making a request for payment to the Government but before making a payment to a subcontractor for the subcontractor's performance covered by the payment request, discovers that all or a portion of the payment otherwise due such subcontractor is subject to withholding from the subcontractor in accordance with the subcontract agreement, then the Contractor shall--

(1) Subcontractor notice. Furnish to the subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon ascertaining the cause giving rise to a withholding, but prior to the due date for subcontractor payment;

(2) Contracting Officer notice. Furnish to the Contracting Officer, as soon as practicable, a copy of the notice furnished to the subcontractor pursuant to paragraph (e)(1) of this clause;

(3) Subcontractor progress payment reduction. Reduce the subcontractor's progress payment by an amount not to exceed the amount specified in the notice of withholding furnished under paragraph (e)(1) of this clause;

(4) Subsequent subcontractor payment. Pay the subcontractor as soon as practicable after the correction of the identified subcontract performance deficiency, and--

(i) Make such payment within--

(A) Seven days after correction of the identified subcontract performance deficiency (unless the funds therefor must be recovered from the Government because of a reduction under paragraph
(e)(5)(i)) of this clause; or

(B) Seven days after the Contractor recovers such funds from the Government; or

(ii) Incur an obligation to pay a late payment interest penalty computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments under section 12 of the Contracts Disputes Act of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty;

(5) Notice to Contracting Officer. Notify the Contracting Officer upon--

(i) Reduction of the amount of any subsequent certified application for payment; or

(ii) Payment to the subcontractor of any withheld amounts of a progress payment, specifying--

(A) The amounts withheld under paragraph (e)(1) of this clause; and

(B) The dates that such withholding began and ended; and

(6) Interest to Government. Be obligated to pay to the Government an amount equal to interest on the withheld payments (computed in the manner provided in 31 U.S.C. 3903(c)(1)), from the 8th day after receipt of the withheld amounts from the Government until--

(i) The day the identified subcontractor performance deficiency is corrected; or

(ii) The date that any subsequent payment is reduced under paragraph (e)(5)(i) of this clause.

(f) Third-party deficiency reports--(1) Withholding from subcontractor. If a Contractor, after making payment to a first-tier subcontractor, receives from a supplier or subcontractor of the first-tier subcontractor (hereafter referred to as a “second-tier subcontractor”) a written notice in accordance with section 2 of the Act of August 24, 1935 (40 U.S.C. 270b, Miller Act), asserting a deficiency in such first-tier subcontractor's performance under the contract for which the Contractor may be ultimately liable, and the Contractor determines that all or a portion of future payments otherwise due such first-tier subcontractor is subject to withholding in accordance with the subcontract agreement, the Contractor may, without incurring an obligation to pay an interest penalty under paragraph (e)(6) of this clause--

(i) Furnish to the first-tier subcontractor a notice conforming to the standards of paragraph (g) of this clause as soon as practicable upon making such determination; and

(ii) Withhold from the first-tier subcontractor's next available progress payment or payments an amount not to exceed the amount specified in the notice of withholding furnished under paragraph (f)(1)(i) of this clause.

(2) Subsequent payment or interest charge. As soon as practicable, but not later than 7 days after receipt of satisfactory written notification that the identified subcontract performance deficiency has been corrected, the Contractor shall--

(i) Pay the amount withheld under paragraph (f)(1)(ii) of this clause to such first-tier subcontractor; or

(ii) Incur an obligation to pay a late payment interest penalty to such first-tier subcontractor computed at the rate of interest established by the Secretary of the Treasury, and published in the Federal Register, for interest payments

under section 12 of the Contracts DisputesAct of 1978 (41 U.S.C. 611) in effect at the time the Contractor accrues the obligation to pay an interest penalty.

(g) Written notice of subcontractor withholding. The Contractor shall issue a written notice of any withholding to a subcontractor (with a copy furnished to the Contracting Officer), specifying--

(1) The amount to be withheld;

(2) The specific causes for the withholding under the terms of the subcontract; and

(3) The remedial actions to be taken by the subcontractor in order to receive payment of the amounts withheld.

(h) Subcontractor payment entitlement. The Contractor may not request payment from the Government of any amount withheld or retained in accordance with paragraph (d) of this clause until such time as the Contractor has determined and certified to the Contracting Officer that the subcontractor is entitled to the payment of such amount.

(i) Prime-subcontractor disputes. A dispute between the Contractor and subcontractor relating to the amount or entitlement of a subcontractor to a payment or a late payment interest penalty under a clause included in the subcontract pursuant to paragraph (c) of this clause does not constitute a dispute to which the Government is a party. The Government may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

(j) Preservation of prime-subcontractor rights. Except as provided in paragraph (i) of this clause, this clause shall not limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or a subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or nonperformance by a subcontractor.

(k) Non-recourse for prime contractor interest penalty. The Contractor's obligation to pay an interest penalty to a subcontractor pursuant to the clauses included in a subcontract under paragraph (c) of this clause shall not be construed to be an obligation of the Government for such interest penalty. A cost-reimbursement claim may not include any amount for reimbursement of such interest penalty.

(l) Overpayments. If the Contractor becomes aware of a duplicate payment or that the Government has otherwise overpaid on an invoice payment, the Contractor shall immediately notify the Contracting Officer and request instructions for disposition of the overpayment.

(End of clause)

52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER—CENTRAL CONTRACTOR REGISTRATION (MAY 1999)

(a) Method of payment. (1) All payments by the Government under this contract shall be made by electronic funds transfer (EFT), except as provided in paragraph (a)(2) of this clause. As used in this clause, the term “EFT” refers to the funds transfer and may also include the payment information transfer.

(2) In the event the Government is unable to release one or more payments by EFT, the Contractor agrees to either--

(i) Accept payment by check or some other mutually agreeable method of payment; or

(ii) Request the Government to extend the payment due date until such time as the Government can make payment by EFT (but see paragraph (d) of this clause).

(b) Contractor's EFT information. The Government shall make payment to the Contractor using the EFT information contained in the Central Contractor Registration (CCR) database. In the event that the EFT information changes, the Contractor shall be responsible for providing the updated information to the CCR database.

(c) Mechanisms for EFT payment. The Government may make payment by EFT through either the Automated Clearing House (ACH) network, subject to the rules of the National Automated Clearing House Association, or the Fedwire Transfer System. The rules governing Federal payments through the ACH are contained in 31 CFR part 210.

(d) Suspension of payment. If the Contractor's EFT information in the CCR database is incorrect, then the Government need not make payment to the Contractor under this contract until correct EFT information is entered into the CCR database; and any invoice or contract financing request shall be deemed not to be a proper invoice for the purpose of prompt payment under this contract. The prompt payment terms of the contract regarding notice of an improper invoice and delays in accrual of interest penalties apply.

(e) Contractor EFT arrangements. If the Contractor has identified multiple payment receiving points (i.e., more than one remittance address and/or EFT information set) in the CCR database, and the Contractor has not notified the Government of the payment receiving point applicable to this contract, the Government shall make payment to the first payment receiving point (EFT information set or remittance address as applicable) listed in the CCR database.

(f) Liability for uncompleted or erroneous transfers. (1) If an uncompleted or erroneous transfer occurs because the Government used the Contractor's EFT information incorrectly, the Government remains responsible for--

(i) Making a correct payment;

(ii) Paying any prompt payment penalty due; and

(iii) Recovering any erroneously directed funds.

(2) If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 days of Government release of the EFT payment transaction instruction to the Federal Reserve System, and--

(i) If the funds are no longer under the control of the payment office, the Government is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or

(ii) If the funds remain under the control of the payment office, the Government shall not make payment, and the provisions of paragraph (d) of this clause shall apply.

(g) EFT and prompt payment. A payment shall be deemed to have been made in a timely manner in accordance with the prompt payment terms of this contract if, in the EFT payment transaction instruction released to the Federal Reserve System, the date specified for settlement of the payment is on or before the prompt payment due date, provided the specified payment date is a valid date under the rules of the Federal Reserve System.

(h) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the assignment of claims terms of this contract, the Contractor shall require as a condition of any such assignment, that the assignee shall register in the CCR database and shall be paid by EFT in accordance with the terms of this clause. In all respects, the requirements of this clause shall apply to the assignee as if it were the Contractor. EFT information that shows the ultimate recipient of the transfer to be other than the Contractor, in the absence of a proper assignment of claims acceptable to the Government, is incorrect EFT information within the meaning of paragraph (d) of this clause.

(i) Liability for change of EFT information by financial agent. The Government is not liable for errors resulting from changes to EFT information made by the Contractor's financial agent.

(j) Payment information. The payment or disbursing office shall forward to the Contractor available payment information that is suitable for transmission as of the date of release of the EFT instruction to the Federal Reserve System. The Government may request the Contractor to designate a desired format and method(s) for delivery of payment information from a list of formats and methods the payment office is capable of executing. However, the Government does not guarantee that any particular format or method of delivery is available at any particular payment office and retains the latitude to use the format and delivery method most convenient to the Government. If the Government makes payment by check in accordance with paragraph (a) of this clause, the Government shall mail the payment information to the remittance address contained in the CCR database.

(End of Clause)

52.232-35 DESIGNATION OF OFFICE FOR GOVERNMENT RECEIPT OF ELECTRONIC FUNDS TRANSFER INFORMATION (MAY 1999)

(a) As provided in paragraph (b) of the clause at 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration, the Government has designated the office cited in paragraph (c) of this clause as the office to receive the Contractor's electronic funds transfer (EFT) information, in lieu of the payment office of this contract.

(b) The Contractor shall send all EFT information, and any changes to EFT information to the office designated in paragraph (c) of this clause. The Contractor shall not send EFT information to the payment office, or any other office than that designated in paragraph (c). The Government need not use any EFT information sent to any office other than that designated in paragraph (c).

(c) Designated Office:

Name:

U.S. Army Corps of Engineers
St. Paul District
190 East Fifth Street
St. Paul, Minnesota 55101-1638

Telephone Number:

651-290-5233

Person to Contact:

Mr. Wayne Sheffel, CEMVP-RM-F

Electronic Address:

wayne.sheffel@usace.army.mil

(End of clause)

52.233-1 DISPUTES. (DEC 1998)

(a) This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under the Act until certified as required by subparagraph (d)(2) of this clause. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d)(1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2)(i) The contractors shall provide the certification specified in subparagraph (d)(2)(iii) of this clause when submitting any claim -

(A) Exceeding $100,000; or

(B) Regardless of the amount claimed, when using -

(1) Arbitration conducted pursuant to 5 U.S.C. 575-580; or

(2) Any other alternative means of dispute resolution (ADR) technique that the agency elects to handle in accordance with the Administrative Dispute Resolution Act (ADRA).

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am duly authorized to certify the claim on behalf of the Contractor.

(3) The certification may be executed by any person duly authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer

must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use alternative disput resolution (ADR). If the Contractor refuses an offer for ADR, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the request.

(h) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in (FAR) 48 CFR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(i) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract, and comply with any decision of the Contracting Officer.

(End of clause)

52.233-3 PROTEST AFTER AWARD (AUG. 1996)

(a) Upon receipt of a notice of protest (as defined in FAR 33.101) or a determination that a protest is likely (see FAR 33.102(d)), the Contracting Officer may, by written order to the Contractor, direct the Contractor to stop performance of the work called for by this contract. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Upon receipt of the final decision in the protest, the Contracting Officer shall either--

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

(b) If a stop-work order issued under this clause is canceled either before or after a final decision in the protest, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, and the contract shall be modified, in writing, accordingly, if--

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor asserts its right to an adjustment within 30 days after the end of the period of work stoppage; provided, that if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon a proposal at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(e) The Government's rights to terminate this contract at any time are not affected by action taken under this clause.

(f) If, as the result of the Contractor's intentional or negligent misstatement, misrepresentation, or miscertification, a protest related to this contract is sustained, and the Government pays costs, as provided in FAR 33.102(b)(2) or 33.104(h)(1), the Government may require the Contractor to reimburse the Government the amount of such costs. In addition to any other remedy available, and pursuant to the requirements of Subpart 32.6, the Government may collect this debt by offsetting the amount against any payment due the Contractor under any contract between the Contractor and the Government.

(End of clause)

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least twenty (20) percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of clause)

52.236-2 DIFFERING SITE CONDITIONS (APR 1984)

As prescribed in 36.502, insert the following clause in solicitations and contracts when a fixed-price construction contract or a fixed-price dismantling, demolition, or removal of improvements contract is contemplated and the contract amount is expected to exceed the small purchase limitation. The Contracting Officer may insert the clause in solicitations and contracts when a fixed-price construction or a fixed-price contract for dismantling, demolition, or removal of improvements is contemplated and the contract amount is expected to be within the small purchase limitation.

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or

(2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving

written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

(End of clause)

52.236-3 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to

(1) conditions bearing upon transportation, disposal, handling, and storage of materials;

(2) the availability of labor, water, electric power, and roads;

(3) uncertainties of weather, river stages, tides, or similar physical conditions at the site;

(4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(b) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

(End of clause)

52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by results of surveys, soil borings and soil testing (both in the fields and in the laboratory) noted on the boring logs, record drawings, photograph and site visits. Graphic logs of borings located within the area of work under this contract are shown on the drawings. The borings are representative of subsurface conditions at their respective locations and for their respective reaches. Variations in the stratigraphy and characteristics of the soil and rock are known to occur between borings. Normal variations in site geology will not be considered as differing materially within the purview of Contract Clause FAR 52.236-3, Differing Site Conditions. Ground water elevations

measured in borings are not constant and will fluctuate.

(b) Weather conditions: Before submitting a bid, bidders should satisfy themselves as to the potential hazards from weather conditions. Complete weather records and reports may be obtained from the local US Weather Service.

(c) Transportation facilities: Before Submitting a bid bidder should obtain necessary data as to access of highway and railroad facilities. The unavailability of transportation facilities shall not become a basis for claims for damages or time extensions to complete the work.

(d) River Conditions: Hydrographs of the river stages are indicated on the drawings. These hydrographs include historic water levels and/or flows at the gauging stations. The contractor has the responsibility to schedule its operations to take advantage the most favorable river stages.

(End of clause)

52.236-5 MATERIAL AND WORKMANSHIP (APR 1984)

(a) All equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

(c) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may require, in writing, that the Contractor remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

(End of clause)

52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

(End of clause)

52.236-7 PERMITS AND RESPONSIBILITIES (NOV 1991)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

(End of clause)

52.236-8 OTHER CONTRACTS (APR 1984)

The Government may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with Government employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by Government employees.

(End of clause)

52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS (APR 1984)

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage all existing improvements and utilities

(1) at or near the work site, and

(2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(End of clause)

52.236-10 OPERATIONS AND STORAGE AREAS (APR 1984)

(a) The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

(b) Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

(c) The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

(End of clause)

52.236-11 USE AND POSSESSION PRIOR TO COMPLETION (APR 1984)

(a) The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the Government has such possession or use, the Contractor shall be relieved of the responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

(End of clause)

52.236-12 CLEANING UP (APR 1984)

The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work and premises any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government. Upon completing the work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer.

(End of clause)

52.236-13 ACCIDENT PREVENTION (NOV 1991) – ALTERNATE I (NOV 1991)

(a) The Contractor shall provide and maintain work environments and procedures which will

(1) safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;

(2) avoid interruptions of Government operations and delays in project completion dates; and

(3) control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall-

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

(f) If this contract is for construction or dismantling, demolition or removal of improvements with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the latest version of U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation.

(iii) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

(e) The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

(f) Before commencing the work, the Contractor shall-

(1) Submit a written proposed plan for implementing this clause. The plan shall include an analysis of the significant hazards to life, limb, and property inherent in contract work performance and a plan for controlling these hazards; and

(2) Meet with representatives of the Contracting Officer to discuss and develop a mutual understanding relative to administration of the overall safety program.

(End of clause)

52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

(End of clause)

52.236-16 QUANTITY SURVEYS (APR 1984) - ALTERNATE I (APR 1984)

(a) Quantity surveys shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

(b) The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed or finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.

(c) Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer, who shall use them as necessary to determine the amount of progress payments. The

Contractor shall retain copies of all such material furnished to the Contracting Officer.

(End of clause)

52.236-17 LAYOUT OF WORK (APR 1984)

The Contractor shall lay out its work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(End of clause)

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by," or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown," as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is "furnished and installed".

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (i.e., fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor.

Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(g) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor.

(End of clause)

52.236-26 PRECONSTRUCTION CONFERENCE (FEB 1995)

If the Contracting Officer decides to conduct a preconstruction conference, the successful offeror will be notified and will be required to attend. The Contracting Officer's notification will include specific details regarding the date, time, and location of the conference, any need for attendance by subcontractors, and information regarding the items to be discussed.

(End of clause)

52.242-13 BANKRUPTCY (JUL 1995)

In the event the Contractor enters into proceedings relating to bankruptcy, whether voluntary or involuntary, the Contractor agrees to furnish, by certified mail or electronic commerce method authorized by the contract, written notification of the bankruptcy to the Contracting Officer responsible for administering the contract. This notification shall be furnished within five days of the initiation of the proceedings relating to bankruptcy filing. This notification shall include the date on which the bankruptcy petition was filed, the identity of the court in which the bankruptcy petition was filed, and a listing of Government contract numbers and contracting offices for all Government contracts against which final payment has not been made. This obligation remains in effect until final payment under this contract.

(End of clause)

52.242-14 SUSPENSION OF WORK (APR 1984)

(a) The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting

Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract. (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

(End of clause)

52.243-4 CHANGES (AUG 1987)

(a) The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract, including changes--

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Government-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

(b) Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating

(1) the date, circumstances, and source of the order and

(2) that the Contractor regards the order as a change order.

(c) Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

(e) The Contractor must assert its right to an adjustment under this clause within 30 days after

(1) receipt of a written change order under paragraph (a) of this clause or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting to the Contracting Officer a written statement describing the general

nature and amount of the proposal, unless this period is extended by the Government. The statement of proposal for adjustment may be included in the notice under paragraph (b) above.

(f) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

(End of clause)

52.244-6 SUBCONTRACTS FOR COMMERCIAL ITEMS (MAY 2002)

(a) Definitions.

"Commercial item", has the meaning contained in the clause at 52.202-1, Definitions.

"Subcontract", includes a transfer of commercial items between divisions, subsidiaries, or affiliates of the Contractor or subcontractor at any tier.

(b) To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial items or nondevelopmental items as components of items to be supplied under this contract.

(c) (1) The Contractor shall insert the following clauses in subcontracts for commercial items:

(i) 52.219-8, Utilization of Small Business Concerns (OCT 2000) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $500,000 ($1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (Apr 2002) (E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212(a)).

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (JUN 1998) (29 U.S.C. 793).

(v) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (JUN 2000) (46 U.S.C. Appx 1241) (flowdown not required for subcontracts awarded beginning May 1, 1996).

(2) While not required, the Contractor may flow down to subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(d) The Contractor shall include the terms of this clause, including this paragraph (d), in subcontracts awarded under this contract.

(End of clause)

52.245-2 GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS) (DEC 1989)

(a) Government-furnished property. (1) The Government shall deliver to the Contractor, for use in connection with and under the terms of this contract, the Government-furnished property described in the Schedule or specifications together with any related data and information that the Contractor may request and is reasonably required for the intended use of the property (hereinafter referred to as "Government-furnished property").

(2) The delivery or performance dates for this contract are based upon the expectation that Government-furnished property suitable for use (except for property furnished "as is") will be delivered to the Contractor at the times stated in the Schedule or, if not so stated, in sufficient time to enable the Contractor to meet the contract's delivery or performance dates.

(3) If Government-furnished property is received by the Contractor in a condition not suitable for the intended use, the Contractor shall, upon receipt of it, notify the Contracting Officer, detailing the facts, and, as directed by the Contracting Officer and at Government expense, either repair, modify, return, or otherwise dispose of the property. After completing the directed action and upon written request of the Contractor, the Contracting Officer shall make an equitable adjustment as provided in paragraph (h) of this clause.

(4) If Government-furnished property is not delivered to the Contractor by the required time, the Contracting Officer shall, upon the Contractor's timely written request, make a determination of the delay, if any, caused the Contractor and shall make an equitable adjustment in accordance with paragraph (h) of this clause.

(b) Changes in Government-furnished property. (1) The Contracting Officer may, by written notice, (i) decrease the Government-furnished property provided or to be provided under this contract, or (ii) substitute other Government-furnished property for the property to be provided by the Government, or to be acquired by the Contractor for the Government, under this contract. The Contractor shall promptly take such action as the Contracting Officer may direct regarding the removal, shipment, or disposal of the property covered by such notice.

(2) Upon the Contractor's written request, the Contracting Officer shall make an equitable adjustment to the contract in accordance with paragraph (h) of this clause, if the Government has agreed in the Schedule to make the property available for performing this contract and there is any--

(i) Decrease or substitution in this property pursuant to subparagraph (b)(1) of this clause; or

(ii) Withdrawal of authority to use this property, if provided under any other contract or lease.

(c) Title in Government property. (1) The Government shall retain title to all Government-furnished property.

(2) All Government-furnished property and all property acquired by the Contractor, title to which vests in the Government under this paragraph (collectively referred to as "Government property"), are subject to the provisions of this clause. However, special tooling accountable to this contract is subject to the provisions of the Special Tooling clause and is not subject to the provisions of this clause. Title to Government property shall not be affected by its incorporation into or attachment to any property not owned by the Government, nor shall Government property become a fixture or lose its identity as personal property by being attached to any real property.

(3) Title to each item of facilities and special test equipment acquired by the Contractor for the Government under this contract shall pass to and vest in the Government when its use in performing this contract commences or when the Government has paid for it, whichever is earlier, whether or not title previously vested in the Government.

(4) If this contract contains a provision directing the Contractor to purchase material for which the Government will reimburse the Contractor as a direct item of cost under this contract--

(i) Title to material purchased from a vendor shall pass to and vest in the Government upon the vendor's delivery of such material; and

(ii) Title to all other material shall pass to and vest in the Government upon--

(A) Issuance of the material for use in contract performance;

(B) Commencement of processing of the material or its use in contract performance; or

(C) Reimbursement of the cost of the material by the Government, whichever occurs first.

(d) Use of Government property. The Government property shall be used only for performing this contract, unless otherwise provided in this contract or approved by the Contracting Officer.

(e) Property administration. (1) The Contractor shall be responsible and accountable for all Government property provided under this contract and shall comply with Federal Acquisition Regulation (FAR) Subpart 45.5, as in effect on the date of this contract.

(2) The Contractor shall establish and maintain a program for the use, maintenance, repair, protection, and preservation of Government property in accordance with sound industrial practice and the applicable provisions of Subpart 45.5 of the FAR.

(3) If damage occurs to Government property, the risk of which has been assumed by the Government under this contract, the Government shall replace the items or the Contractor shall make such repairs as the Government directs. However, if the Contractor cannot effect such repairs within the time required, the Contractor shall dispose of the property as directed by the Contracting Officer. When any property for which the Government is responsible is replaced or repaired, the Contracting Officer shall make an equitable adjustment in accordance with paragraph (h) of this clause.

(4) The Contractor represents that the contract price does not include any amount for repairs or replacement for which the Government is responsible. Repair or replacement of property for which the Contractor is responsible shall be accomplished by the Contractor at its own expense.

(f) Access. The Government and all its designees shall have access at all reasonable times to the premises in which any Government property is located for the purpose of inspecting the Government property.

(g) Risk of loss. Unless otherwise provided in this contract, the Contractor assumes the risk of, and shall be responsible for, any loss or destruction of, or damage to, Government property upon its delivery to the Contractor or upon passage of title to the Government under paragraph (c) of this clause. However, the Contractor is not responsible for reasonable wear and tear to Government property or for Government property properly consumed in performing this contract.

(h) Equitable adjustment. When this clause specifies an equitable adjustment, it shall be made to any affected contract provision in accordance with the procedures of the Changes clause. When appropriate, the Contracting Officer may initiate an equitable adjustment in favor of the Government. The right to an equitable adjustment shall be the Contractor's exclusive remedy. The Government shall not be liable to suit for breach of contract for--

(1) Any delay in delivery of Government-furnished property;

(2) Delivery of Government-furnished property in a condition not suitable for its intended use;

(3) A decrease in or substitution of Government-furnished property; or

(4) Failure to repair or replace Government property for which the Govemment is responsible.

(i) Final accounting and disposition of Government property. Upon completing this contract, or at such earlier dates as may be fixed by the Contracting Officer, the Contractor shall submit, in a form acceptable to the Contracting Officer, inventory schedules covering all items of Government property (including any resulting scrap) not consumed in performing this contract or delivered to the Government. The Contractor shall prepare for shipment, deliver f.o.b. origin, or dispose of the Government property as may be directed or authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or shall be paid to the Government as the Contracting Officer directs.

(j) Abandonment and restoration of Contractor's premises. Unless otherwise provided herein, the Government--

(1) May abandon any Government property in place, at which time all obligations of the Government regarding such abandoned property shall cease; and

(2) Has no obligation to restore or rehabilitate the Contractor's premises under any circumstances (e.g., abandonment, disposition upon completion of need, or upon contract completion). However, if the Government-furnished property (listed in the Schedule or specifications) is withdrawn or is unsuitable for the intended use, or if other Government property is substituted, then the equitable adjustment under paragraph (h) of this clause may properly include restoration or rehabilitation costs.

(k) Communications. All communications under this clause shall be in writing.

(l) Overseas contracts. If this contract is to be performed outside of the United States of America, its territories, or possessions, the words "Government" and "Government-furnished" (wherever they appear in this clause) shall be construed as "United States Government" and "United States Government-furnished," respectively.

(End of clause)

52.245-3 IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (APR 1984)

(a) The Government will furnish to the Contractor the property identified in the Schedule to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished f.o.b. railroad cars at the place specified in the contract Schedule or f.o.b. truck at the project site. The Contractor is required to accept delivery, pay any demurrage or detention charges, and unload and transport the property to the job site at its own expense. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract.

(b) Each item of property to be furnished under this clause shall be identified in the Schedule by quantity, item, and description.

(End of clause)

52.245-19 GOVERNMENT PROPERTY FURNISHED "AS IS" (APR 1984)

(a) The Government makes no warranty whatsoever with respect to Government property furnished "as is," except

that the property is in the same condition when placed at the f.o.b. point specified in the solicitation as when inspected by the Contractor pursuant to the solicitation or, if not inspected by the Contractor, as when last available for inspection under the solicitation.

(b) The Contractor may repair any property made available on an "as is" basis. Such repair will be at the Contractor's expense except as otherwise provided in this clause. Such property may be modified at the Contractor's expense, but only with the written permission of the Contracting Officer. Any repair or modification of property furnished "as is" shall not affect the title of the Government.

(c) If there is any change in the condition of Government property furnished "as is" from the time inspected or last available for inspection under the solicitation to the time placed on board at the location specified in the solicitation, and such change will adversely affect the Contractor, the Contractor shall, upon receipt of the property, notify the Contracting Officer detailing the facts and, as directed by the Contracting Officer, either (1) return such property at the Government's expense or otherwise dispose of the property or (2) effect repairs to return the property to its condition when inspected under the solicitation or, if not inspected, last available for inspection under the solicitation. After completing the directed action and upon written request of the Contractor, the Contracting Officer shall equitably adjust any contractual provisions affected by the return, disposition, or repair in accordance with the procedures provided for in the Changes clause of this contract. The foregoing provisions for adjustment are the exclusive remedy available to the Contractor, and the Government shall not be otherwise liable for any delivery of Government property furnished "as is" in a condition other than that in which it was originally offered.

(d) Except as otherwise provided in this clause, Government property furnished "as is" shall be governed by the Government Property clause of this contract.

(End of clause)

52.245-4002 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION AND LOCATION

a) The Government will furnish to the Contractor the property listed below to be incorporated or installed into the work or used in performing the contract. The Contractor shall arrange for pickup of the Government furnished property. The contractor shall arrange pickup of the property by contacting Mike Evenson at (701) 451-0888. When the property is picked up, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of pickup any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract.

b) The following is a list of Government-Furnished Property:

SEE TECHNICAL SECTION 01000-GENERAL

(1) Quantities indicated for the above-listed items which are marked with an asterisk are estimated. It is the intention of the Government to furnish all of these items required to complete the work as specified and the various quantities will be adjusted when necessary.

(2) Quantities stated for the above items which are not marked with an asterisk are all that will be furnished by the Government. These quantities are not to be considered as indications or warranties that the amounts stated will either be sufficient or insufficient. The Contractor will be required to furnish any additional quantities required.

52.246-12 INSPECTION OF CONSTRUCTION (AUG 1996)

(a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.

(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

(c) Government inspections and tests are for the sole benefit of the Government and do not--

(1) Relieve the Contractor of responsibility for providing adequate quality control measures;

(2) Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

(3) Constitute or imply acceptance; or

(4) Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) of this section.

(d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

(e) The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(g) If the Contractor does not promptly replace or correct rejected work, the Government may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor or (2) terminate for default the Contractor's right to proceed.

(h) If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(i) Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after

completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

(End of clause)

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of clause)

52.247-34 F.O.B. DESTINATION (NOV 1991)

(a) The term "f.o.b. destination," as used in this clause, means--

(1) Free of expense to the Government, on board the carrier's conveyance, at a specified delivery point where the consignee's facility (plant, warehouse, store, lot, or other location to which shipment can be made) is located; and

(2) Supplies shall be delivered to the destination consignee's wharf (if destination is a port city and supplies are for export), warehouse unloading platform, or receiving dock, at the expense of the Contractor. The Government shall not be liable for any delivery, storage, demurrage, accessorial, or other charges involved before the actual delivery (or "constructive placement" as defined in carrier tariffs) of the supplies to the destination, unless such charges are caused by an act or order of the Government acting in its contractual capacity. If rail carrier is used, supplies shall be delivered to the specified unloading platform of the consignee. If motor carrier (including "piggyback") is used, supplies shall be delivered to truck tailgate at the unloading platform of the consignee, except when the supplies delivered meet the requirements of Item 568 of the National Motor Freight Classification for "heavy or bulky freight." When supplies meeting the requirements of the referenced Item 568 are delivered, unloading (including movement to the tailgate) shall be performed by the consignee, with assistance from the truck driver, if requested. If the contractor uses rail carrier or freight forwarded for less than carload shipments, the contractor shall ensure that the carrier will furnish tailgate delivery, when required, if transfer to truck is required to complete delivery to consignee.

(b) The Contractor shall--

(1)(i) Pack and mark the shipment to comply with contract specifications; or

(ii) In the absence of specifications, prepare the shipment in conformance with carrier requirements;

(2) Prepare and distribute commercial bills of lading;

(3) Deliver the shipment in good order and condition to the point of delivery specified in the contract;

(4) Be responsible for any loss of and/or damage to the goods occurring before receipt of the shipment by the consignee at the delivery point specified in the contract;

(5) Furnish a delivery schedule and designate the mode of delivering carrier; and

(6) Pay and bear all charges to the specified point of delivery.

(End of clause)

52.247-55 F.O.B. POINT FOR DELIVERY OF GOVERNMENT-FURNISHED PROPERTY (APR 1984)

(a) Unless otherwise specified in this solicitation, any Government property furnished to the Contractor for use within the United States (excluding Alaska and Hawaii) or Canada will be delivered by the Government at a point to be specified by the Contractor in the offer. Should the Government elect to make delivery by railroad, the f.o.b. point shall be private siding, Contractor's plant. If the Contractor's plant is not served by rail, the f.o.b. point shall be railroad cars in the same or nearest city having rail service. All line-haul transportation costs to the specified destination shall be borne by the Government. The Government may choose the mode of transportation and the carriers.

(b) If the destination of such Government-furnished property is a Contractor's plant located outside the 48 contiguous states, the District of Columbia or Canada, the f.o.b. point for Government delivery of Government-furnished property shall be a location in the United States (excluding Alaska and Hawaii) specified by the Contractor. If the Contractor fails to name a point, then the f.o.b. point shall be the port city in the United States nearest to the Government source of the Government-furnished property that has regular commercial water transportation services to the offshore port nearest Contractor's plant.

(c) Unless otherwise directed by the Contracting Officer or provided in the contract, the Contractor shall return all Government-furnished equipment, supplies, and property, including all property not returned in the form of acceptable end items, to the point at which the Government property was originally furnished to the Contractor under the contract. Notwithstanding the fact that the Government may have furnished the property at the Contractor's plant, the Contracting Officer may direct the Contractor to deliver the Government property being returned to, and load, block, and brace it in, railway cars in the city in which the Contractor's plant is located, or, if the Contractor's city is not served by rail service, in the nearest city having rail service. Unless otherwise specified in the contract, all property shall be packed in containers conforming with the rules of common carrier published tariffs so as to be free of penalty charges by the carrier designated for shipment by the Government.

(End of clause)

52.248-3 VALUE ENGINEERING--CONSTRUCTION (FEB 2000)

(a) General. The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP's) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP's, in accordance with paragraph (f) below.

(b) Definitions. "Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

"Collateral savings," as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

"Contractor's development and implementation costs," as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

"Government costs," as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

"Instant contract savings," as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) below).

"Value engineering change proposal (VECP)" means a proposal that--

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change--

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) VECP preparation. As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.

(3) A separate, detailed cost estimate for

(i) the affected portions of the existing contract requirement and

(ii) the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) below.

(4) A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submission. The Contractor shall submit VECP's to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) Government action.

(1) The Contracting Officer will notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer will notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will process VECP's expeditiously; however, it shall not be liable for any delay in acting upon a VECP.

If the VECP is not accepted, the Contracting Officer will notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

Any VECP may be accepted, in whole or in part, by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The decision to accept or reject all or part of any VECP is a unilateral decision made solely at the discretion of the Contracting Officer.

(f) Sharing.

(1) Rates. The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by

(i) 45 percent for fixed-price contracts or

(ii) 75 percent for cost-reimbursement contracts.

(2) Payment. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to--

(i) Accept the VECP;

(ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and

(iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) Collateral savings. If a VECP is accepted, the Contracting Officer will increase the instant contract amount by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However, the Contractor's share of collateral savings will not exceed the contract's firm-fixed-price or estimated cost, at the time the VECP is accepted, or $100,000, whichever is greater. The Contracting Officer is the sole determiner of the amount of collateral savings.

(h) Subcontracts. The Contractor shall include an appropriate value engineering clause in any subcontract of $50,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value engineering incentive payments to a subcontractor. The Contractor may choose any arrangement for subcontractor value engineering incentive payments; provided, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) Data. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

"These data, furnished under the Value Engineering-- Construction clause of contract . . . . . , shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations." If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the data. (The terms "unlimited rights" and "limited rights" are defined in Part 27 of the Federal Acquisition Regulation.)

(End of clause)

52.249-2 TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE) (SEP 1996) - ALTERNATE I (SEP 1996)

(a) The Govemment may terminate performance of work under this contract in whole or, from time to time, in part if the Contracting Officer determines that a termination is in the Government's interest. The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

(b) After receipt of a Notice of Termination, and except as directed by the Contracting Officer, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this clause:

(1) Stop work as specified in the notice.

(2) Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete the continued portion of the contract.

(3) Terminate all subcontracts to the extent they relate to the work terminated.

(4) Assign to the Government, as directed by the Contracting Officer, all right, title, and interest of the Contractor under the subcontracts terminated, in which case the Government shall have the right to settle or to pay any termination settlement proposal arising out of those terminations.

(5) With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this clause.

(6) As directed by the Contracting Officer, transfer title and deliver to the Government (i) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated, and (ii) the completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to the Government.

(7) Complete performance of the work not terminated.

(8) Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

(9) Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in subparagraph (b)(6) of this clause; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

(c) The Contractor shall submit complete termination inventory schedules no later than 120 days from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 120-day period.

(d) After expiration of the plant clearance period as defined in Subpart 45.6 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept title to those items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

(e) After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 1-year period. However, if the Contracting Officer determines that the facts justify it, a termination settlement proposal may be received and acted on after 1 year or any extension. If the Contractor fails to submit the proposal within the time allowed, the Contracting Officer may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

(f) Subject to paragraph (e) of this clause, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount to be paid or remaining to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount, whether under this paragraph (g) or paragraph (g) of this clause, exclusive of costs shown in subparagraph (g)(3) of this clause, may not exceed the total contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The contract shall be modified, and the Contractor paid the agreed amount. Paragraph (g) of this clause shall not limit, restrict, or affect the amount that may be agreed upon to be paid under this paragraph.

(g) If the Contractor and Contracting Officer fail to agree on the whole amount to be paid the Contractor because of the termination of work, the Contracting Officer shall pay the Contractor the amounts determined as follows, but without duplication of any amounts agreed upon under paragraph (f) of this clause:

(1) For contract work performed before the effective date of termination, the total (without duplication of any items) of--

(i) The cost of this work;

(ii) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subdivision (g)(1)(i) of this clause; and

(iii) A sum, as profit on subdivision (g)(1)(i) of this clause, determined by the Contracting Officer under 49.202 of the Federal Acquisition Regulation, in effect on the date of this contract, to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, the Contracting Officer shall allow no profit under this subdivision (iii) and shall reduce the settlement to reflect the indicated rate of loss.

(2) The reasonable costs of settlement of the work terminated, including--

(i) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;

(ii) The termination and settlement of subcontracts (excluding the amounts of such settlements); and

(iii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

(h) Except for normal spoilage, and except to the extent that the Government expressly assumed the risk of loss, the Contracting Officer shall exclude from the amounts payable to the Contractor under paragraph (g) of this clause, the fair value, as determined by the Contracting Officer, of property that is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government or to a buyer.

(i) The cost principles and procedures of Part 31 of the Federal Acquisition Regulation, in effect on the date of this contract, shall govern all costs claimed, agreed to, or determined under this clause.

(j) The Contractor shall have the right of appeal, under the Disputes clause, from any determination made by the Contracting Officer under paragraph (e), (g), or (l) of this clause, except that if the Contractor failed to submit the termination settlement proposal or request for equitable adjustment within the time provided in paragraph (e) or (l), respectively, and failed to request a time extension, there is no right of appeal.

(k) In arriving at the amount due the Contractor under this clause, there shall be deducted--

(1) All unliquidated advance or other payments to the Contractor under the terminated portion of this contract;

(2) Any claim which the Government has against the Contractor under this contract; and

(3) The agreed price for, or the proceeds of sale of, materials, supplies, or other things acquired by the Contractor or sold under the provisions of this clause and not recovered by or credited to the Government.

(l) If the termination is partial, the Contractor may file a proposal with the Contracting Officer for an equitable adjustment of the price(s) of the continued portion of the contract. The Contracting Officer shall make any equitable adjustment agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within 90 days from the effective date of termination unless extended in writing by the Contracting Officer.

(m)(1) The Government may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the contract, if the Contracting Officer believes the total of these payments will not exceed the amount to which the Contractor will be entitled.

(2) If the total payments exceed the amount finally determined to be due, the Contractor shall repay the excess to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury under 50 U.S.C. App. 1215(b)(2). Interest shall be computed for the period from the date the excess payment is received by the Contractor to the date the excess is repaid. Interest shall not be charged on any excess payment due to a reduction in the Contractor's termination settlement proposal because of retention or other disposition of termination inventory until 10 days after the date of the retention or disposition, or a later date determined by the Contracting Officer because of the circumstances.

(n) Unless otherwise provided in this contract or by statute, the Contractor shall maintain all records and documents relating to the terminated portion of this contract for 3 years after final settlement. This includes all books and other evidence bearing on the Contractor's costs and expenses under this contract. The Contractor shall make these

records and documents available to the Government, at the Contractor's office, at all reasonable times, without any direct charge. If approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions may be maintained instead of original records and documents.

(End of clause)

52.249-10 DEFAULT (FIXED-PRICE CONSTRUCTION) (APR 1984)

(a) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may, by written notice to the Contractor, terminate the right to proceed with the work (or the separable part of the work) that has been delayed. In this event, the Government may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Government resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Government in completing the work.

(b) The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause, if--

(1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include

(i) acts of God or of the public enemy,

(ii) acts of the Government in either its sovereign or contractual capacity,

(iii) acts of another Contractor in the performance of a contract with the Government,

(iv) fires,

(v) floods,

(vi) epidemics,

(vii) quarantine restrictions,

(viii) strikes,

(ix) freight embargoes,

(x) unusually severe weather, or delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any delay (unless extended by the Contracting Officer), notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, the time for completing the work shall be extended. The findings of the Contracting Officer shall be final and conclusive on the parties, but subject to appeal under the Disputes clause.

(c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was exc usable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Government.

The rights and remedies of the Government in this clause are in addition to any other rights and remedies provided by law or under this contract.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

www.arnet/gov/far

(End of clause)

52.253-1 COMPUTER GENERATED FORMS (JAN 1991)

(a) Any data required to be submitted on a Standard or Optional Form prescribed by the Federal Acquisition Regulation (FAR) may be submitted on a computer generated version of the form, provided there is no change to the name, content, or sequence of the data elements on the form, and provided the form carries the Standard or Optional Form number and edition date.

(b) Unless prohibited by agency regulations, any data required to be submitted on an agency unique form prescribed by an agency supplement to the FAR may be submitted on a computer generated version of the form provided there is no change to the name, content, or sequence of the data elements on the form and provided the form carries the agency form number and edition date.

(c) If the Contractor submits a computer generated version of a form that is different than the required form, then the rights and obligations of the parties will be determined based on the content of the required form.

(End of clause)

252.201-7000 CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991)

(a) "Definition. Contracting officer's representative" means an individual designated in accordance with subsection 201.602-2 of the Defense Federal Acquisition Regulation Supplement and authorized in writing by the contracting officer to perform specific technical or administrative functions.

(b) If the Contracting Officer designates a contracting officer's representative (COR), the Contractor will receive a copy of the written designation. It will specify the extent of the COR's authority to act on behalf of the contracting

officer. The COR is not authorized to make any commitments or changes that will affect price, quality, quantity, delivery, or any other term or condition of the contract.

(End of clause)

252.203-7001 PROHIBITION ON PERSONS CONVICTED OF FRAUD OR OTHER DEFENSE-CONTRACT-RELATED FELONIES (MAR 1999)

(a) Definitions. As used in this clause—

(1) "Arising out of a contract with the DoD" means any act in connection with—

(i) Attempting to obtain;

(ii) Obtaining, or

(iii) Performing a contract or first-tier subcontract of any agency, department, or component of the Department of Defense (DoD).

(2) "Conviction of fraud or any other felony" means any conviction for fraud or a felony in violation of state or Federal criminal statutes, whether entered on a verdict or plea, including a plea of *nolo contendere*, for which sentence has been imposed.

(3) "Date of conviction" means the date judgment was entered against the individual.

(b) Any individual who is convicted after September 29, 1988, of fraud or any other felony arising out of a contract with the DoD is prohibited from serving--

(1) In a management or supervisory capacity on any DoD contract or first-tier subcontract;

(2) On the board of directors of any DoD contractor or first-tier subcontractor;

(3) As a consultant, agent, or representative for any DoD contractor or first-tier subcontractor; or

(4) In any other capacity with the authority to influence, advise, or control the decisions of any DoD contractor or subcontractor with regard to any DoD contract or first-tier subcontract.

(c) Unless waived, the prohibition in paragraph (b) of this clause applies for not less than 5 years from the date of conviction.

(d) 10 U.S.C. 2408 provides that a defense contractor or first-tier subcontractor shall be subject to a criminal penalty of not more than $500,000 if convicted of knowingly—

(1) Employing a person under a prohibition specified in paragraph (b) of this clause; or

(2) Allowing such a person to serve on the board of directors of the contractor or first-tier subcontractor.

(e) In addition to the criminal penalties contained in 10 U.S.C. 2408, the Government may consider other available remedies, such as—

(1) Suspension or debarment;

(2) Cancellation of the contract at no cost to the Government; or

(3) Termination of the contract for default.

(f) The Contractor may submit written requests for waiver of the prohibition in paragraph (b) of this clause to the Contracting Officer. Requests shall clearly identify—

(1) The person involved;

(2) The nature of the conviction and resultant sentence or punishment imposed;

(3) The reasons for the requested waiver; and

(4) An explanation of why a waiver is in the interest of national security.

(g) The Contractor agrees to include the substance of this clause, appropriately modified to reflect the identity and relationship of the parties, in all first-tier subcontracts exceeding the simplified acquisition threshold in Part 2 of the Federal Acquisition Regulation, except those for commercial items or components.

(h) Pursuant to 10 U.S.C. 2408(c), defense contractors and subcontractors may obtain information as to whether a particular person has been convicted of fraud or any other felony arising out of a contract with the DoD by contacting The Office of Justice Programs, The Denial of Federal Benefits Office, U.S. Department of Justice, telephone (202) 616-3507.

(End of clause)

252.204-7003 CONTROL OF GOVERNMENT PERSONNEL WORK PRODUCT (APR 1992)

The Contractor's procedures for protecting against unauthorized disclosure of information shall not require Department of Defense employees or members of the Armed Forces to relinquish control of their work products, whether classified or not, to the contractor.

(End of clause)

252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION (NOV 2001)

(a) Definitions.

As used in this clause--

(1) Central Contractor Registration (CCR) database means the primary DoD repository for contractor information required for the conduct of business with DoD.

(2) Data Universal Numbering System (DUNS) number means the 9-digit number assigned by Dun and Bradstreet Information Services to identify unique business entities.

(3) Data Universal Numbering System +4 (DUNS+4) number means the DUNS number assigned by Dun and Bradstreet plus a 4-digit suffix that may be assigned by a parent (controlling) business concern. This 4-digit suffix may be assigned at the discretion of the parent business concern for such purposes as identifying subunits or affiliates of the parent business concern.

(4) Registered in the CCR database means that all mandatory information, including the DUNS number or the DUNS+4 number, if applicable, and the corresponding Commercial and Government Entity (CAGE) code, is in the CCR database; the DUNS number and the CAGE code have been validated; and all edits have been successfully completed.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee must be registered in the CCR database prior to award, during performance, and through final payment of any contract resulting from this solicitation, except for awards to foreign vendors for work to be performed outside the United States.

(2) The offeror shall provide its DUNS or, if applicable, its DUNS+4 number with its offer, which will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(3) Lack of registration in the CCR database will make an offeror ineligible for award.

(4) DoD has established a goal of registering an applicant in the CCR database within 48 hours after receipt of a complete and accurate application via the Internet. However, registration of an applicant submitting an application through a method other than the Internet may take up to 30 days. Therefore, offerors that are not registered should consider applying for registration immediately upon receipt of this solicitation.

(c) The Contractor is responsible for the accuracy and completeness of the data within the CCR, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to confirm on an annual basis that its information in the CCR database is accurate and complete.

(d) Offerors and contractors may obtain information on registration and annual confirmation requirements by calling 1-888-227-2423, or via the Internet at http://www.ccr.gov.

(End of clause)

252.205-7000 PROVISION OF INFORMATION TO COOPERATIVE AGREEMENT HOLDERS (DEC 1991)

(a) Definition.

"Cooperative agreement holder" means a State or local government; a private, nonprofit organization; a tribal organization (as defined in section 4(c) of the Indian Self-Determination and Education Assistance Act (Pub. L. 93-268; 25 U.S.C. 450 (c))); or an economic enterprise (as defined in section 3(e) of the Indian Financing Act of 1974 (Pub. L. 93-362; 25 U.S.C. 1452(e))) whether such economic enterprise is organized for profit or nonprofit purposes; which has an agreement with the Defense Logistics Agency to furnish procurement technical assistance to business entities.

(b) The Contractor shall provide cooperative agreement holders, upon their request, with a list of those appropriate employees or offices responsible for entering into subcontracts under defense contracts. The list shall include the business address, telephone number, and area of responsibility of each employee or office.

(c) The Contractor need not provide the listing to a particular cooperative agreement holder more frequently than once a year.

(End of clause)

252.209-7000 ACQUISITION FROM SUBCONTRACTORS SUBJECT TO ONSITE INSPECTION UNDER THE INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY (NOV 1995)

(a) The Contractor shall not deny consideration for a subcontract award under this contract to a potential subcontractor subject to on-site inspection under the INF Treaty, or a similar treaty, solely or in part because of the actual or potential presence of Soviet inspectors at the subcontractor's facility, unless the decision is approved by the Contracting Officer.

(b) The Contractor shall incorporate this clause, including this paragraph (b), in all solicitations and contracts exceeding the simplified acquisition threshold in part 13 of the Federal Acquisition Regulation, except those for commercial items.

(End of clause)

252.209-7004 SUBCONTRACTING WITH FIRMS THAT ARE OWNED OR CONTROLLED BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) Unless the Government determines that there is a compelling reason to do so, the Contractor shall not enter into any subcontract in excess of $25,000 with a firm, or subsidiary of a firm, that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country.

(b) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is identified, on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs, as being ineligible for the award of Defense contracts or subcontracts because it is owned or controlled by the government of a terrorist country. The notice must include the name of the proposed subcontractor notwithstanding its inclusion on the List of Parties Excluded From Federal Procurement and Nonprocurement Programs.

(End of clause)

252.219-7003 SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (DOD CONTRACTS) (APR. 1996)

This clause supplements the Federal Acquisition Regulation 52.219-9, Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan, clause of this contract.

(a) *Definitions. Historically black colleges and universities,* as used in this clause, means institutions determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. The term also means any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institutions, as used in this clause, means institutions meeting the requirements of section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)). The term also includes Hispanic-serving institutions as defined in section 316(b)(1) of such Act (20 U.S.C. 1059c(b)(1)).

(b) Except for company or division-wide commercial items subcontracting plans, the term *small disadvantaged business,* when used in the FAR 52.219-9 clause, includes historically black colleges and universities and minority institutions, in addition to small disadvantaged business concerns.

(c) Work under the contract or its subcontracts shall be credited toward meeting the small disadvantaged business concern goal required by paragraph (d) of the FAR 52.219-9 clause when:

(1) It is performed on Indian lands or in joint venture with an Indian tribe or a tribally-owned corporation, and

(2) It meets the requirements of 10 U.S.C. 2323a.

(d) Subcontracts awarded to workshops approved by the Committee for Purchase from People Who are Blind or Severely Disabled (41 U.S.C. 46-48), may be counted toward the Contractor's small business subcontracting goal.

(e) A mentor firm, under the Pilot Mentor-Protege Program established under Section 831 of Pub. L. 101-510, as amended, may count toward its small disadvantaged business goal, subcontracts awarded--

(f) The master plan approval referred to in paragraph (f) of the FAR 52.219-9 clause is approval by the Contractor's cognizant contract administration activity.

(g) In those subcontracting plans which specifically identify small, small disadvantaged, and women-owned small businesses, the Contractor shall notify the Administrative Contracting Officer of any substitutions of firms that are not small, small disadvantaged, or women-owned small businesses for the firms listed in the subcontracting plan. Notifications shall be in writing and shall occur within a reasonable period of time after award of the subcontract. Contractor-specified formats shall be acceptable.

(End of clause)

252.223-7004 DRUG-FREE WORK FORCE (SEP 1988)

(a) Definitions.

(1) "Employee in a sensitive position," as used in this clause, means an employee who has been granted access to classified information; or employees in other positions that the Contractor determines involve national security; health or safety, or functions other than the foregoing requiring a high degree of trust and confidence.

(2) "Illegal drugs," as used in this clause, means controlled substances included in Schedules I and II, as defined by section 802(6) of title 21 of the United States Code, the possession of which is unlawful under chapter 13 of that Title. The term "illegal drugs" does not mean the use of a controlled substance pursuant to a valid prescription or other uses authorized by law.

(b) The Contractor agrees to institute and maintain a program for achieving the objective of a drug-free work force. While this clause defines criteria for such a program, contractors are encouraged to implement alternative approaches comparable to the criteria in paragraph (c) that are designed to achieve the objectives of this clause.

(c) Contractor programs shall include the following, or appropriate alternatives:

(1) Employee assistance programs emphasizing high level direction, education, counseling, rehabilitation, and coordination with available community resources;

(2) Supervisory training to assist in identifying and addressing illegal drug use by Contractor employees;

(3) Provision for self-referrals as well as supervisory referrals to treatment with maximum respect for individual confidentiality consistent with safety and security issues;

(4) Provision for identifying illegal drug users, including testing on a controlled and carefully monitored basis. Employee drug testing programs shall be established taking account of the following:

(i) The Contractor shall establish a program that provides for testing for the use of illegal drugs by employees in sensitive positions. The extent of and criteria for such testing shall be determined by the Contractor based on considerations that include the nature of the work being performed under the contract, the employee's duties, and efficient use of Contractor resources, and the risks to health, safety, or national security that could result from the failure of an employee adequately to discharge his or her position.

(ii) In addition, the Contractor may establish a program for employee drug testing--

(A) When there is a reasonable suspicion that an employee uses illegal drugs; or

(B) When an employees has been involved in an accident or unsafe practice;

(C) As part of or as a follow-up to counseling or rehabilitation for illegal drug use;

(D) As part of a voluntary employee drug testing program.

(iii) The Contractor may establish a program to test applicants for employment for illegal drug use.

(iv) For the purpose of administering this clause, testing for illegal drugs may be limited to those substances for which testing is prescribed by section 2..1 of subpart B of the "Mandatory Guidelines for Federal Workplace Drug Testing Programs" (53 FR 11980 (April 11, 1988), issued by the Department of Health and Human Services.

(d) Contractors shall adopt appropriate personnel procedures to deal with employees who are found to be using drugs illegally. Contractors shall not allow any employee to remain on duty or perform in a sensitive position who is found to use illegal drugs until such times as the Contractor, in accordance with procedures established by the Contractor, determines that the employee may perform in such a position.

(e) The provisions of this clause pertaining to drug testing program shall not apply to the extent that are inconsistent with state or local law, or with an existing collective bargaining agreement; provided that with respect to the latter, the Contractor agrees those issues that are in conflict will be a subject of negotiation at the next collective bargaining session.

(End of clause)

252.223-7006 PROHIBITION ON STORAGE AND DISPOSAL OF TOXIC AND HAZARDOUS

MATERIALS (APR 1993)

(a) "Definitions".

As used in this clause --

(1) "Storage" means a non-transitory, semi-permanent or permanent holding, placement, or leaving of material. It does not include a temporary accumulation of a limited quantity of a material used in or a waste generated or resulting from authorized activities, such as servicing, maintenance, or repair of Department of Defense (DoD) items, equipment, or facilities.

(2) "Toxic or hazardous materials" means:

(i) Materials referred to in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. 9601(14)) and materials designated under section 102 of CERCLA (42 U.S.C. 9602) (40 CFR part 302);

(ii) Materials that are of an explosive, flammable, or pyrotechnic nature; or

(iii) Materials otherwise identified by the Secretary of Defense as specified in DoD regulations.

(b) In accordance with 10 U.S.C. 2692, the Contractor is prohibited from storing or disposing of non-DoD-owned toxic or hazardous materials on a DoD installation, except to the extent authorized by a statutory exception to 10 U.S.C. 2692 or as authorized by the Secretary of Defense or his designee.

(End of clause)

252.225-7012 PREFERENCE FOR CERTAIN DOMESTIC COMMODITIES (APR 2002)

(a) Definitions. As used in this clause--

(1) Component means any item supplied to the Government as part of an end product or of another component.

(2) End product means supplies delivered under a line item of this contract.

(b) The Contractor shall deliver under this contract only such of the following items, either as end products or components, that have been grown, reprocessed, reused, or produced in the United States, its possessions, or Puerto Rico:

(1) Food.

(2) Clothing.

(3) Tents, tarpaulins, or covers.

(4) Cotton and other natural fiber products.

(5) Woven silk or woven silk blends.

(6) Spun silk yarn for cartridge cloth.

(7) Synthetic fabric, and coated synthetic fabric, including all textile fibers and yarns that are for use in such fabrics.

(8) Canvas products.

(9) Wool (whether in the form of fiber or yarn or contained in fabrics, materials, or manufactured articles).

(10) Any item of individual equipment (Federal Supply Class 8465) manufactured from or containing fibers, yarns, fabrics, or materials listed in this paragraph (b).

(c) This clause does not apply--

(1) To items listed in section 25.104(a) of the Federal Acquisition Regulation (FAR), or other items for which the Government has determined that a satisfactory quality and sufficient quantity cannot be acquired as and when needed at U.S. market prices;

(2) To end products incidentally incorporating cotton, other natural fibers, or wool, for which the estimated value of the cotton, other natural fibers, or wool--

(i) Is not more than 10 percent of the total price of the end product; and (ii) Does not exceed the simplified acquisition threshold in FAR part 2;

(3) To foods that have been manufactured or processed in the United States, its possessions, or Puerto Rico, regardless of where the foods (and any component if applicable) were grown or produced;

(4) To chemical warfare protective clothing produced in the countries listed in subsection 225.872-1 of the Defense FAR Supplement; or

(5) To fibers and yarns that are for use in synthetic fabric or coated synthetic fabric (but does apply to the synthetic or coated synthetic fabric itself), if--

(i) The fabric is to be used as a component of an end product that is not a textile product. Examples of textile products, made in whole or in part of fabric, include--

(A) Draperies, floor coverings, furnishings, and bedding (Federal Supply Group 72, Household and Commercial Furnishings and Appliances);

(B) Items made in whole or in part of fabric in Federal Supply Group 83, Textile/leather/furs/apparel/findings/ tents/flags, or Federal Supply Group 84, Clothing, Individual Equipment and Insignia;

(C) Upholstered seats (whether for household, office, or other use); and

(D) Parachutes (Federal Supply Class 1670); or

(ii) The fibers and yarns are para-aramid fibers and yarns manufactured in the Netherlands.

(End of clause)

252.225-7014 PREFERENCE FOR DOMESTIC SPECIALTY METALS (MAR 1998)

(a) Definitions.

As used in this clause--

(1) Qualifying country means any country set forth in subsection 225.872-1 of the Defense Federal Acquisition Regulation Supplement.

(2) Specialty metals means--

(i) Steel--

(A) Where the maximum alloy content exceeds one or more of the following limits: manganese, 1.65 percent; silicon, 0.60 percent; or copper, 0.60 percent; or

(B) That contains more than 0.25 percent of any of the following elements: aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, or vanadium;

(ii) Metal alloys consisting of nickel, iron-nickel, and cobalt base alloys containing a total of other alloying metals (except iron) in excess of 10 percent;

(iii) Titanium and titanium alloys; or

(b) The Contractor agrees that any specialty metals incorporated in articles delivered under this contract will be melted in the United States, its possessions, or Puerto Rico.

(c) This clause does not apply to the extent that--

(1) The Secretary or designee determines that a satisfactory quality and sufficient quantity of such articles cannot be acquired when needed at U.S. market prices;

(2) The specialty metal is melted in a qualifying country or is incorporated in an article manufactured in a qualifying country;

(3) The acquisition is necessary to comply with agreements with foreign governments requiring the United States to purchase supplies from foreign sources to offset sales made by the U.S. Government or U.S. firms under approved programs; or

(4) The specialty metal is purchased by a subcontractor at any tier.

(End of clause)

252.225-7031 SECONDARY ARAB BOYCOTT OF ISRAEL (JUN 1992)

(a) Definitions. As used in this clause--

(1) "Foreign person" means any person other than a United States person as defined in Section 16(2) of the Export Administration Act of 1979 (50 U.S.C. App. Sec 2415).

(2) "United States person" is defined in Section 16(2) of the Export Administration Act of 1979 and means any United States resident or national (other than an individual resident outside the United States and employed by other than a United States person), any domestic concern (including any permanent domestic establishment of any foreign concern), and any foreign subsidiary or affiliate (including any permanent foreign establishment) of any domestic concern which is controlled in fact by such domestic concerns, as determined under regulations of the President.

(b) Certification. By submitting this offer, the Offeror, if a foreign person, company or entity, certifies that it--

(1) Does not comply with the Secondary Arab Boycott of Israel; and

(2) Is not taking or knowingly agreeing to take any action, with respect to the Secondary Boycott of Israel by Arab countries, which 50 U.S.C. App. Sec 2407(a) prohibits a United States person from taking.

(End of clause)

252.227-7033 RIGHTS IN SHOP DRAWINGS (APR 1966)

(a) Shop drawings for construction means drawings, submitted to the Government by the Construction Contractor, subcontractor or any lower-tier subcontractor pursuant to a construction contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(b) This clause, including this paragraph (b), shall be included in all subcontracts hereunder at any tier.

252.231-7000 SUPPLEMENTAL COST PRINCIPLES (DEC 1991)

When the allowability of costs under this contract is determined in accordance with part 31 of the Federal Acquisition Regulation (FAR), allowability shall also be determined in accordance with part 231 of the Defense FAR Supplement, in effect on the date of this contract.

(End of clause)

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

Title	File	Drawing No.

See Drawings, Sheet Title “List of Drawings”.

(End of clause)

252.236-7002 OBSTRUCTION OF NAVIGABLE WATERWAYS. (DEC 1991)

(a) The Contractor shall --

(1) Promptly recover and remove any material, plant, machinery, or appliance which the contractor loses, dumps, throws overboard, sinks, or misplaces, and which, in the opinion of the Contracting Officer, may be dangerous to or obstruct navigation;

(2) Give immediate notice, with description and locations of any such obstructions, to the Contracting Officer; and

(3) When required by the Contracting Officer, mark or buoy such obstructions until the same are removed.

(b) The Contracting Officer may --

(1) Remove the obstructions by contract or otherwise should the Contractor refuse, neglect, or delay compliance with paragraph (a) of this clause; and

(2) Deduct the cost of removal from any monies due or to become due to the Contractor; or

(3) Recover the cost of removal under the Contractor's bond.

(c) The Contractor's liability for the removal of a vessel wrecked or sunk without fault or negligence is limited to that provided in sections 15, 19, and 20 of the River and Harbor Act of March 3, 1899 (33 U.S.C. 410 et. seq.).

252.236-7008 CONTRACT PRICES - BIDDING SCHEDULES. (DEC 1991)

(a) The Government's payment for the items listed in the Bidding Schedule shall constitute full compensation to the Contractor for --

(1) Furnishing all plant, labor, equipment, appliances, and materials; and

(2) Performing all operations required to complete the work in conformity with the drawings and specifications.

(b) The Contractor shall include in the prices for the items listed in the Bidding Schedule all costs for work in the specifications, whether or not specifically listed in the Bidding Schedule.

252.242-7000 POSTAWARD CONFERENCE (DEC 1991)

The Contractor agrees to attend any postaward conference convened by the contracting activity or contract administration office in accordance with Federal Acquisition Regulation subpart 42.5.

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

252.243-7002 REQUESTS FOR EQUITABLE ADJUSTMENT (MAR 1998)

(a) The amount of any request for equitable adjustment to contract terms shall accurately reflect the contract adjustment for which the Contractor believes the Government is liable. The request shall include only costs for performing the change, and shall not include any costs that already have been reimbursed or that have been separately claimed. All indirect costs included in the request shall be properly allocable to the change in accordance with applicable acquisition regulations.

(b) In accordance with 10 U.S.C. 2410(a), any request for equitable adjustment to contract terms that exceeds the simplified acquisition threshold shall bear, at the time of submission, the following certificate executed by an individual authorized to certify the request on behalf of the Contractor:

I certify that the request is made in good faith, and that the supporting data are accurate and complete to the best of my knowledge and belief.

(Official's Name)

(Title)

(c) The certification in paragraph (b) of this clause requires full disclosure of all relevant facts, including--

(1) Cost or pricing data if required in accordance with subsection 15.403-4 of the Federal Acquisition Regulation (FAR); and

(2) Information other than cost or pricing data, in accordance with subsection 15.403-3 of the FAR, including actual cost data and data to support any estimated costs, even if cost or pricing data are not required.

(d) The certification requirement in paragraph (b) of this clause does not apply to----

(1) Requests for routine contract payments; for example, requests for payment for accepted supplies and services, routine vouchers under a cost-reimbursement type contract, or progress payment invoices; or

(2) Final adjustment under an incentive provision of the contract.

252.244-7000 SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (DOD) (MAR 2000)

In addition to the clauses listed in paragraph (c) of the Subcontracts for Commercial Items and Commercial Components clause of this contract (Federal Acquisition Regulation 52.244-6), the Contractor shall include the terms of the following clauses, if applicable, in subcontracts for commercial items or commercial components, awarded at any tier under this contract:

(End of clause)

252.246-7000 MATERIAL INSPECTION AND RECEIVING REPORT (DEC 1991)

At the time of each delivery of supplies or services under this contract, the Contractor shall prepare and furnish to the Government a Material Inspection and Receiving Report in the manner and to the extent required by Appendix F, Material Inspection and Receiving Report, of the Defense FAR Supplement.

(End of clause)

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002)

(a) Definitions. As used in this clause --

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

(1) No ocean transportation was used in the performance of this contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY

_____
_____
_____
_____
TOTAL_____

(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) In the award of subcontracts for the types of supplies described in paragraph (b)(2) of this clause, the Contractor shall flow down the requirements of this clause as follows:

(1) The Contractor shall insert the substance of this clause, including this paragraph (h), in subcontracts that exceed the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(2) The Contractor shall insert the substance of paragraphs (a) through (e) of this clause, and this paragraph (h), in subcontracts that are at or below the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(End of clause)

252.247-7024 NOTIFICATION OF TRANSPORTATION OF SUPPLIES BY SEA (MAR 2000)

(a) The Contractor has indicated by the response to the solicitation provision, Representation of Extent of Transportation by Sea, that it did not anticipate transporting by sea any supplies. If, however, after the award of this contract, the Contractor learns that supplies, as defined in the Transportation of Supplies by Sea clause of this contract, will be transported by sea, the Contractor --

(1) Shall notify the Contracting Officer of that fact; and

(2) Hereby agrees to comply with all the terms and conditions of the Transportation of Supplies by Sea clause of this contract.

(b) The Contractor shall include this clause; including this paragraph (b), revised as necessary to reflect the relationship of the contracting parties--

(1) In all subcontracts under this contract, if this contract is a construction contract; or

(2) If this contract is not a construction contract, in all subcontracts under this contract that are for--

(i) Noncommercial items; or

(ii) Commercial items that--

(A) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it subcontracts for f.o.b. destination shipment);

(B) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(C) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(End of clause)

Section 00800 - Special Contract Requirements

.

CLAUSES INCORPORATED BY FULL TEXT

52.000-4004 PARTNERING

The Government proposes to form a partnering relationship with the contractor. This partnering relationship will strive to facilitate communication and draw on the strengths of each organization in an effort to achieve a quality project, within budget, and on schedule. Participation will be totally voluntary. Partnering will not alter or supersede any provision of this contract nor will it provide either party with any additional contractual rights or obligations. Participation in partnering will not affect award of this contract. Any cost associated with this partnering will be agreed to by both parties and will be shared equally, with no change in contract price.

52.212-4003 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (OCT 1989) ER 415-1-15

a. This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSES: DEFAULT (FIXED-PRICE CONSTRUCTION). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

2) The unusually severe weather must actually cause a delay to the comp letion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORKDAYS BASED ON (5) DAY WORKWEEK.

GEOGRAPHIC LOCATION -- Wahpeton, North Dakota

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Days	18	13	7	4	4	5	4	3	3	2	5	14

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled workday. The number of actual adverse weather delay days shall include days impacted by actual adverse

weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b, above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the CONTRACT CLAUSES: DEFAULT (FIXED-PRICE CONSTRUCTION).

52.214-5000 ARITHMETIC DISCREPANCIES

(a) For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of bidding schedule as submitted by the bidder:
(1) Obviously misplaced decimal points will be corrected;
Discrepancy between unit price and extended price, the unit price will govern;
Apparent errors in extension of unit prices will be corrected;
Apparent errors in addition of lump sum and extended prices will be corrected.
(b) For the purpose of bid evaluation, the government will proceed on the assumption that the bidder intends his bid to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.
These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.

(End of statement)

52.228-4002 INSURANCE

As referenced in Contract Clause: INSURANCE--WORK ON A GOVERNMENT INSTALLATION, the following types and amounts of insurance are required under this contract.

Type	Amount
Worker's Compensation and Employer's Liability Insurance:	
Coverage A Worker's Compensation	Compliance with State of North Dakota Worker's Compensation Law
Coverage B Employer's Liability	$ 100,000
General Liability Insurance:	
Bodily Injury	$1,000,000 per occurrence
Property Damage	Not Required
Automobile Liability Insurance (Comprehensive Policy Form):	

Bodily Injury $1,000,000 per occurrence	$ 500,000 per person and
Property Damage	$ 100,000 per occurrence

52.228-4022 REQUIREMENT FOR BID GUARANTEE (FAR 28.101-2)

Each bidder shall submit with its bid a Bid Bond (Standard Form 24) with good and sufficient surety or sureties acceptable to the Government or other security as provided in the clause BID GUARANTEE in the form of twenty percent (20%) of the bid price or $3,000,000 whichever is lesser. The bid bond penalty may be expressed in terms of a percentage of the bid price or may be expressed in dollars and cents.

52.231-5000 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

MAR 1995)—EFARS

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region IV. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.
(End of clause)

52.232-4004 INVOICE PROCEDURES

In accordance with CONTRACT CLAUSE titled "PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS", the contractor shall submit invoices as follows:

a. In order to qualify for a periodic payment, the Contractor must submit a proper invoice (request for payment) to the Contracting Officer's Representative (COR) and a determination must be made that supplies or services conform to the contract requirements. This determination will be made for the sole purpose of processing progress payments and will not constitute formal acceptance. The due date for making progress payments shall be as stated in the contract clause: PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS.

b. The submitted request for payment must be accompanied with documentation adequate to substantiate the amount requested. Substantiation shall be consistent will the clauses in the solicitation titled Quantity Surveys, Purchase Orders, Invoices, etc. satisfactory to the COR.

c. The Contractor must also include with the payment request a certification as described in the Clause "PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS".

d. Payment requests will be reviewed for propriety by the COR. Defective invoices will be returned to the Contractor for resolution with defects identified. Along with the returned invoice, the COR may include, at its option, an ENG FORM 93-PAYMENT ESTIMATE reflecting the substantiated and uncontested payment amount. The Contractor will then be given the option of signing and returning the FORM 93 for payment along with the original invoice and certification or resubmitting a revised invoice and certification. To expedite payment, the Contractor may request in writing that the COR retain the defective invoice and immediately process the payment request at the amount determined to be acceptable to the Government.

52.232-5002 CONTINUING CONTRACTS (ALTERNATE) (MAR 1995)--EFARS

(a) Funds are not available at the inception of this contract to cover the entire contract price. The sum of $20,000.00 has been reserved for this contract and is available for payment to the contractor during the current fiscal year. It is expected that Congress will make appropriations for future fiscal years from which additional funds, together with funds provided by one or more non-federal project sponsors will be reserved for this contract. The liability of the United States for payments beyond the funds reserved for this contract is contingent on the reservation of additional funds.

(b) Failure to make payments in excess of the amount currently reserved, or that may be reserved form time to time, shall not be considered a breach of this contract, and shall not entitle the contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs (e) and (h) below.

(c) The Government may at any time reserve additional funds for payments under the contract if there are funds available for such purpose. The contracting officer will promptly notify the contractor of any additional funds reserved for the contract by issuing an administrative modification to the contract.

(d) If earnings will be such that funds reserved for the contract will be exhausted before the end of any fiscal year, the contractor shall give written notice to the contracting officer of the estimated date of exhaustion and the amount of additional funds which will be needed to meet payments due or to become due under this contract during that fiscal year. This notice shall be given not less than 45 nor more than 60 days prior to the estimated date of exhaustion.

(e) No payments will be make after exhaustion of funds except to the extent that additional funds are reserved for the contract. If and when sufficient additional funds are reserved, the contractor shall be entitled to simple interest on

any payment that the contracting officer determines was actually earned under the terms of this contract and would have been made except for exhaustion of funds. Interest shall be computed from the time such payment would otherwise have been made until actually or constructively made, and shall be at the rate established by the Secretary of the Treasury pursuant to Public Law 92-41, 85 STAT 97, as in effect on the first day of the delay in such payment.

(f) Any suspension, delay, or interruption of work arising from exhaustion or anticipated exhaustion of funds shall not constitute a breach of this contract and shall not entitle the contractor to any price adjustment under a "Suspension of Work" or similar clause or in any other manner under this contract.

(g) An equitable adjustment in performance time shall be made for any increase in the time required for performance of any part of the work arising from exhaustion of funds or the reasonable anticipation of exhaustion of funds.

(h) If, upon the expiration of sixty (60) days after the beginning of the fiscal year following an exhaustion of funds, the Government has failed to reserve sufficient additional funds to cover payments other vise due, the contractor, by written notice delivered to the contracting officer at any time before such additional funds are reserved, may elect to treat his right to proceed with the work as having been terminated. Such a termination shall be at no cost to the Government, except that, to the extent that additional funds to make payment therefore are allocated to this contract, it may be treated as a termination for the convenience of the Government.

(i) If at any time it becomes apparent that the funds reserved for any fiscal year are in excess of the funds required to meet all payments due or to become due the contractor because of work performed and to be performed under this contract during the fiscal year, the Government reserves the right, after notice to the contractor, to reduce said reservation by the amount of such excess.

(j) The term "Reservation" means monies that have been set aside and made available for payments under this contract.

(End of clause)

52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS (APR 1984)

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be

grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

(End of clause)

52.236-4006 SAFETY AND HEALTH REQUIREMENTS MANUAL INTERIM CHANGES, EM 385-1-1 (APR 2001)

This paragraph applies to contracts and purchase orders that require the contractor to comply with EM 385-1-1 (e.g., contracts that include the Accident Prevention clause at FAR 52.236-13 and/or other safety provisions). EM 385-1-1 and its changes are available at http://www.hq.usace.army.mil (at the HQ homepage, select Safety and Occupational Health). The Contractor shall be responsible for complying with the current edition and all changes posted on the web as of the effective date of this solicitation.

52.236-4012 MATERIAL SOURCES

a. Concrete aggregate and stone protection materials meeting the requirements of these specifications can be produced from the sources listed in Section 00830 “Attachments”:

b. Materials may be furnished from any of the listed sources or at the option of the Contractor may be furnished from any other sources designated by the Contractor and approved by the Contracting Officer, subject to the conditions hereinafter stated.

c. After the award of the contract, the Contractor shall designate in writing only one source for each type of material or one combination of sources from which he proposes to furnish the materials. If the Contractor proposes to furnish materials from a source or from sources not listed, he may designate only a single source for each type of material or single combination of sources for materials. Samples for acceptance testing shall be provided as required by the TECHNICAL PROVISIONS. If a source for materials so designated by the Contractor is not approved for use by the Contracting Officer, the Contractor may not submit for approval other sources but shall furnish the materials from approved sources selected from the list at no additional cost to the Government.

d. Approval of a source of materials is not to be construed as approval of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable as determined by the Contracting Officer. Materials produced from an approved source shall meet all the requirements of the TECHNICAL PROVISIONS of these specifications.

52.236-4014 PURCHASE ORDERS

Two legible copies of each purchase order issued by the Contractor or the Contractor's subcontractors for materials and equipment to be incorporated into the project, shall be furnished the Contracting Officer as soon as issued. Each purchase order shall (1) be clearly identified with applicable Department of Army contract number, (2) carry and identifying number, (3) be in sufficient detail to identify the material being purchased, and (4) indicate a definite delivery date. At the option of the Contractor, the copies of the purchase orders may or may not indicate the price of the articles purchased.

52.239-4001 YEAR 2000 COMPLIANCE (FAR 39.106) (JUL 1998)

The contractor shall ensure that, with respect to any design, construction, goods, or services under this contract as well as any subsequent task/delivery orders issued under this contract (if applicable), all information technology contained therein shall be Year 2000 compliant. Specifically, the contractor shall perform, maintain, and provide an inventory of all major components to include structures, equipment, items, parts, and furnishings under this contract and each task/delivery order which may be affected by the Year 2000 compliance requirement.

52.245-4002 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION AND LOCATION

a) The Government will furnish to the Contractor the property listed below to be incorporated or installed into the work or used in performing the contract. The Contractor shall arrange for pickup of the Government furnished property, which is located at the City of Wahpeton Maintenace Building. When the property is picked up, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of pickup any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract.

b) The following is a list of Government-Furnished Property:

Quantity	Item	Description
		Vertical Pumps, 20 in size. Manufacturer: FPI. Each pump rated at 10,000 GPM. Each pump includes rease pressure librication system
		Electric Motors for each vertical pump. Two motors are rated for outdoor use at Stations 4 and 5. Four motors are designed for New stations 1A and 7. Manufacturer: US Motor. Each motor reated at 75 hp.

(1) Quantities indicated for the above-listed items which are marked with an asterisk are estimated. It is the intention of the Government to furnish all of these items required to complete the work as specified and the various quantities will be adjusted when necessary.

(2) Quantities stated for the above items which are not marked with an asterisk are all that will be furnished by the Government. These quantities are not to be considered as indications or warranties that the amounts stated will either be sufficient or insufficient. The Contractor will be required to furnish any additional quantities required.

52.245-4003 GOVERNMENT-FURNISHED PROPERTY IDENTIFICATION

The following Government-Furnished Property is to be used in the performance of this contract in accordance with the Clause entitled IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY.

QUANTITY	ITEM	DESCRIPTION
	All Government Furnished Equipment is listed in Section 01000.	

52.246-4001 LABORATORY AND TESTING FACILITIES

The Contractor shall provide and maintain all measuring and testing devices, laboratory equipment, instruments, transportation, and supplies necessary to accomplish the required testing. All measuring and testing devices shall be calibrated at established intervals against certified standards. The Contractor's measuring and testing equipment shall be made available for use by the Government for verification of their accuracy and condition as well as for any inspection or test desired pursuant to SECTION 0700: INSPECTION OF CONSTRUCTION. The location of the laboratory shall be convenient to the site such that test results are available prior to proceeding with the next sequential phase of the work.

52.249-5000 BASIS FOR SETTLEMENT OF PROPOSALS

“Actual costs will be used to determine equipment costs for a settlement proposal submitted on the total cost basis under FAR 49.206-2(b). In evaluating a terminations settlement proposal using the total cost basis, the following principles will be applied to determine allowable equipment costs:

(1) Actual costs for each piece of equipment, or groups of similar serial or series equipment, need not be available in the contractor's accounting records to determine total actual equipment costs.

(2) If equipment costs have been allocated to a contract using predetermined rates, those charges will be adjusted to actual costs.

(3) Recorded job costs adjusted for unallowable expenses will be used to determine equipment operating expenses.

(4) Ownership costs (depreciation) will be determined using the contractor's depreciation schedule (subject to the provisions of FAR 31.205-11).

(5) License, taxes, storage and insurance costs are normally recovered as an indirect expense and unless the contractor charges these costs directly to contracts, they will be recovered through the indirect expense rate.”

(End of Clause)

252.236-7000 MODIFICATION PROPOSALS - PRICE BREAKDOWN. (DEC 1991)

(a) The Contractor shall furnish a price breakdown, itemized as required and within the time specified by the Contracting Officer, with any proposal for a contract modification.

(b) The price breakdown --

(1) Must include sufficient detail to permit an analysis of profit, and of all costs for --

(i) Material;

(ii) Labor;

(iii) Equipment;

(iv) Subcontracts; and

(v) Overhead; and

(2) Must cover all work involved in the modification, whether the work was deleted, added, or changed.

(c) The Contractor shall provide similar price breakdowns to support any amounts claimed for subcontracts.

(d) The Contractor's proposal shall include a justification for any time extension proposed.

SECTION 00830

ATTACHMENTS

INDEX

ATTACHMENT	TITLE
A.	WAGE RATES
B.	MATERIAL SOURCES
C.	RAILROAD REQUIREMENTS

SECTION 00830

ATTACHMENT A

WAGE RATES

GENERAL DECISION NUMBER	CONSTRUCTION TYPE	PAGE
ND020015	Heavy	1 through 4

General Decision Number ND020015 Superseded General Decision No. ND010015
State: North Dakota Construction Type:
HEAVY
County(ies):

ADAMS	HETTINGER	RICHLAND
BARNES	KIDDER	ROLETTE
BENSON	LA MOURE	SARGENT
BILLINGS	LOGAN	SHERIDAN
BOTTINEAU	MCHENRY	SIOUX
BOWMAN	MCINTOSH	SLOPE
BURKE	MCKENZIE	STARK
CAVALIER	MCLEAN	STEELE
DICKEY	MERCER	STUTSMAN
DIVIDE	MOUNTRAIL	TOWNER
DUNN	NELSON	TRAILL
EDDY	OLIVER	WALSH
EMMONS	PEMBINA	WARD
FOSTER	PIERCE	WELLS
GOLDEN VALLEY	RAMSEY	WILLIAMS
GRANT	RANSOM	
GRIGGS	RENVILLE	

HEAVY CONSTRUCTION PROJECTS (including Sewer & Water Line Construction & Drainage Projects and Excluding Industrial and Processing Plants and Refineries)

Modification Number	Publication Date
0	03/01/2002
1	04/19/2002
2	06/07/2002
3	11/01/2002
4	01/03/2003

COUNTY(ies):

ADAMS	HETTINGER	RICHLAND
BARNES	KIDDER	ROLETTE
BENSON	LA MOURE	SARGENT
BILLINGS	LOGAN	SHERIDAN
BOTTINEAU	MCHENRY	SIOUX
BOWMAN	MCINTOSH	SLOPE
BURKE	MCKENZIE	STARK
CAVALIER	MCLEAN	STEELE
DICKEY	MERCER	STUTSMAN
DIVIDE	MOUNTRAIL	TOWNER
DUNN	NELSON	TRAILL
EDDY	OLIVER	WALSH
EMMONS	PEMBINA	WARD
FOSTER	PIERCE	WELLS
GOLDEN VALLEY	RAMSEY	WILLIAMS
GRANT	RANSOM	
GRIGGS	RENVILLE	

ELEC0714J 01/01/2001

	Rates	Fringes
ADAMS, BILLINGS, BOTTINEAU, BOWMAN, BURKE, DIVIDE, DUNN, EMMONS, GOLDEN VALLEY, GRANT, HETTINGER, MCHENRY, MCKENZIE,		

MCLEAN, MERCER, MOUNTRIAL, OLIVER, PIERCE, RENVILLE,
ROLLETTE, SHERIDAN, SOIUX, SLOPE, STARK, WARD, & WILLIAMS
COUNTIES:
ELECTRICIANS:

ELECTRICIAN	23.45	10.5%+a
CABLE SPLICER	23.85	10.5%+a

FOOTNOTE;
a. $5.20 per hour.

ELEC1426P 06/01/2002

	Rates	Fringes
BARNES, BENSON, CAVALIER, DICKEY, EDDY, FOSTER, GRIGGS, KIDDER, LAMOURE, LOGAN, MCINTOSH, NELSON, PEMBINA, RAMSEY, RANSOM, RICHLAND, SARGENT, STEELE, STUTSMAN, TOWNER, TRAILL, WALSH, & WELLS COUNTIES:		
ELECTRICIANS:		
ELECTRICIAN	21.47	5.20+12%
CABLE SPLICER	22.54	5.20+12%

ENGI9949B 11/01/2002

	Rates	Fringes
GROUP 1	17.85	6.85
GROUP 2	17.70	6.85
GROUP 3	17.45	6.85
GROUP 4	17.30	6.85
GROUP 5	15.15	6.85

POWER EQUIPMENT OPERATORS CLASSIFICATIONS
GROUP 1:
All Terrain Vechicle Cranes 80 tons and over,Hydro Cranes, 80 tons and over, Crane Operator with 135' boom and over Gantry Crane Operator, & Travelling Tower Crane.
GROUP 2:
All Terrain Vechicle Cranes over 20 tons and up to 80 tons, Hydro Cranes 20 tons up to 80 tons,Creter Crane, & Crane Operator up to 135' Boom.
GROUP 3:
All Terrain Vehicle Cranes thru 20 tons, Hydro Cranes thru 20 tons, Tractor with boom attachment
GROUP 4:
Push Tractor Roller
GRoup 5:
Tractor pulling Compaction or Areating Equipment

SUND2009A 05/04/2000

	Rates	Fringes
CONCRETE FINISHER/CEMENT MASON	14.37	3.67
CARPENTER(Including Form building & Concrete Forms)	13.98	
IRONWORKER REINFORCING	17.03	
LABORERS:		
Common	9.96	
Pipelayers	10.48	
PAINTERS,BRUSH,SPRAY	18.14	
POWER EQUIPMENT OPERATORS:		
Backhoes	14.00	3.74
Bobcat	12.82	2.35
Bulldozer	14.06	4.00

Excavator	12.05	
Front End Loader	13.15	3.17
Mechanic	15.16	5.31
Motor Grader	14.74	4.51
Scraper	13.85	4.25
Sheepsfoot	12.57	3.23
Skidster	11.06	2.05
Self Propelled Packer	11.55	4.25
TRUCK DRIVERS:		
Dump	11.39	3.60
Semi	11.52	.23
Tandem	11.14	1.63

TEAM0082E 11/01/2002

	Rates	Fringes
ARTICULATED OFF ROAD HAULER	16.10	6.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator

(See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

SECTION 00830

ATTACHMENT B

MATERIAL SOURCES

Wahpeton, ND

MATERIAL SOURCES (Stone Protection)

The following sources are approved for Riprap, Bedding, and Rockfill:

QUARRY NAME AND OPERATOR	QUARRY LOCATION	NOTES
Ortonville Stone Company P. O. Box 67 Ortonville MN 56278 (Crushed Rock)	S 1/2, Sec 6, T121N, R46W Bigstone County, MN	(1)
Rollog Pit Aggregate Industries, Inc P.O. Box 1036 Moorhead, MN 56561 (Fieldstone)	SE 1/4, Sec 31, T138N, R43W Becker County, MN	(1)
Glesne Pit Mark Sand and Gravel P. O. Box 67 Fergus Falls, MN 218-736-7523	Sec 10, T132N, R41W Otter Tail County, MN	

(1) Mixing fieldstone and crushed rock will not be allowed.

MATERIAL SOURCES (Fine and Coarse Concrete Aggregate)

The Contractor shall be responsible for locating sources of Concrete Aggregate conforming to ASTM C-33.

SECTION 00830

ATTACHMENT C

RAILROAD REQUIREMENTS

The following Documents are attached:

Red River Valley And Western Railroad Insurance Requirements For Permits and Contracts

Red River Valley And Western Railroad Right-Of-Way Requirements For Contractors & Subcontractors

Red River Valley And Western Railroad Company Temporary Occupancy Permit

Construction Of Pipe Lines On Railway Right Of Way

Calculating Casing Pipe Lengths For Diagonal Pipeline Crossings

B.N.Inc. Basic Requirements For Location, Design And Construction Of Pits To Be Used In Jacking Or Boring Of Pipes Under Railway Tracks

Typical Jacking Pit Details

RED RIVER VALLEY & WESTERN RAILROAD
INSURANCE REQUIREMENTS FOR PERMITS AND CONTRACTS

Permittees and contractors must at their own expense obtain and maintain in force during construction the following insurance:

1. Commercial General Liability Insurance, including contractual liability and products completed/operations, against claims arising out of bodily injury, illness and death and from damage to or destruction of property of others, including loss or use thereof, and including liability of RRVW, with minimum limits for bodily injury and property damage of $1,000,000 for each occurrence, with an aggregate of $2,000,000. This policy shall contain a "Waiver of Transfer Rights" endorsement to waive any right of recovery that the insurance company may have against RRVW because of payments made for bodily injuries and property damage.

2. Business Automobile Policy Insurance, including owned, non-owned, and hired vehicles with minimum limits for bodily injury and property damage of $1,000,000 per occurrence, on all vehicles that the Permittee or any of its agents or employees may use at any time in connection with the performance of this Agreement.

3. Worker's Compensation Insurance or coverage as required under the Worker's Compensation Act of the applicable state. The policy should include occupational disease to required statutory limits, employer's liability of $1,000,000 to include FELA, if appropriate, and an "all states" endorsement.

Evidence of the above insurance (certificate of insurance) must be provided prior to commencement of work and RRVW shall not be a named insured under the above policies.

4. A Railroad Protective Liability Insurance policy issued in the name of RRVW with limits of $2,000,000 for bodily injury and property damage per occurrence, with an aggregate of $6,000,000 must be provided when construction work will be within 50 (Fifty) feet of our tracks. The policy will remain in force during the construction phase of this project and must be provided prior to RRVW signing the permit or contract.

CONTRACTOR:		**SUBCONTRACTOR:**	
_____		_____	
Address		Address	
City, State	Zip	City, State	Zip
Project Engineer's Name		Project Engineer's Name	

If more than one Subcontractor is involved, attach additional information to this Addendum, together with insurance required.

NEITHER PERMITTEE, CONTRACTOR, OR ANY SUBCONTRACOR SHALL BEGIN ANY WORK ON RRVW'S PROPERTY AND/OR RIGHT-OF-WAY UNTIL ALL NECESSARY EVIDENCE OF INSURANCE HAS BEEN FURNISHED AND APPROVED BY RED RIVER VALLEY & WESTERN RAILROAD, NOTIFIED 48 HOURS IN ADVANCE.

Questions or clarifications of insurance requirements may be directed to:

Daniel Zink
Director of Administration
Red River Valley & Western Railroad
P.O. Box 608
Wahpeton, ND 58074

Phone: (701) 642-8257
FAX: (701) 642-3534

TRLINSURANCE.REQ

Red River Valley & Western Railroad Right-Of-Way Requirements
For Contractors & Subcontractors

In order to protect RRVW's investment in its right-of-way and for the safety of persons coming onto RRVW property, RRVW has established certain requirements. The following constitute minimum requirements for all persons coming on or near RRVW R-O-W. Contractors are encouraged to develop their own safety rules that meet or exceed the following requirements. Contractors will not be allowed to occupy or work on RRVW R-O-W prior to signing and dating this document and returning it to the Red River Valley & Western Railroad contact person listed below.

1. All permits and agreements must be in effect, required payments received and insurance certificates received and approved prior to Contractor entering Railroad R-O-W. Insurance must remain in effect during the entire project.
2. Any dewatering utilizing drains or ditches on RRVW property must be approved by a RRVW Engineer.
3. Contractor must have RRVW approved "Construction Plans" prior to commencing work on a project. No change will be made to plans without approval by all parties involved. Approved revised plan will be furnished to all parties prior to implementation of changes.
4. Road Authority or Contractor will incur all costs for track work, including flagging, etc., made necessary due to their construction operation.
5. Pursuant to Federal Regulation, flagging protection is always required when equipment crosses or is working within 25 feet of center of any live track. When deemed necessary by local RRVW officers, a flagman may be required at all times while working RRVW right-of-way in high-density rail traffic areas.
6. Crossing of any Railroad tracks must be done at approved locations and must be over full depth timbers, rubber, etc. Any equipment with steel wheels, lugs, or tracks must not cross steel rails without aid of rubber tires or other approved protection.
7. All temporary construction crossings must be covered by a Private Roadway & Crossing Agreement, and must be barricaded when not in use.
8. Contractor must furnish details on how he will perform work that may affect existing drainage and/or possible fouling of track ballast as well as removal of overhead bridges/structures. (Structures and bridge spans over tracks must be removed intact.)
9. Contractor MUST NOTIFY RRVW DISPATCHER 24 – 48 HOURS BEFORE WORK BEGINS DETAILING DATE, TIME AND LOCATION. RRVW Dispatcher available at 218-643-4994.
10. Absolutely no piling of construction materials or any other material, including dirt, sand, etc., within 15 feet of center of any secondary track (25 feet of Main Line and siding tracks) or on property of the Railroad not covered by Construction Easement, permit, lease or agreement. A 10' clear area on both sides of main track must remain unobstructed at all times to allow for stopped train inspection.
11. No construction will be allowed within 15 feet of center of any track unless authorized by Red River Valley & Western Railroad General Roadmaster and as shown on Plan approved by the Railroad. This includes any excavation, slope encroachment and driving of sheet piles.
12. No vehicles or machines shall remain unattended within 15 feet of a secondary track or within 25 feet of a Main Line track.
13. IMPORTANT: Disregard of any of these times will result in Contractor being shut down for a minimum of 48 hours on Red River Valley & Western Railroad right-of-way while infraction is investigated. Based on findings of the investigation, it will be determined if the Contractor will be allowed to work on RRVW RR right-of-way in the future.
14. Contractor safety rules, including rules regarding Personal Safety Equipment, must not conflict with RRVW safety policies or rules.
15. Articles included in Agreement should compliment this document or exceed its contents.

CONTRACTOR'S ACKNOWLEDGEMENT

_____
Name

_____
Company and Title

_____
Date

RED RIVER VALLEY & WESTERN RAILROAD CO.
PO Box 608, Wahpeton, ND 58074 701-642-8257
Daniel Zink – Director of Administration

WORK SITE LOCATION: _____

Project: _____

TRL/CONTRACT.REQ

RED RIVER VALLEY & WESTERN RAILROAD COMPANY

TEMPORARY OCCUPANCY PERMIT

RED RIVER VALLEY & WESTERN RAILROAD COMPANY, Hereinafter called **Railroad**, in consideration of _____ for the term of this permit as set forth in Paragraph 1, receipt of which is hereby acknowledged, and the covenants herein contained to be performed by _____ _____ hereinafter called Grantee, hereby grants permission to said Grantee, solely for it's accommodation to occupy temporarily an area as follows:_____ of Railroad's premises located _____ _____for the purpose of _____.

This permit is granted on the following terms and conditions:

1. Said occupancy of Railroad's premises shall continue for the period from _____ _____; however, the liability hereinafter assumed by Grantee shall continue for so long as Grantee or Grantee's property occupies said premises of Railroad.

2. (a) Grantee agrees that the use made of said premises permitted herein shall not damage the railroad or structures of Railroad or the property of other person, companies, or corporations, their successors and assigns located upon the premises of Railroad with its consent, that the use of said premises or the storage of any materials thereon shall not be a menace to the safety of Railroad's operations or any other operations conducted on or in the vicinity of said premises, or violate any federal, state or municipal laws, ordinances or regulations. Grantee hereby releases, indemnifies, and saves harmless Railroad any other person, company or corporation occupying Railroad's premises with its consent, their successors and assigns, from and against all loss, damages, claims, demands, actions, causes of action, costs, and expenses of every character which may result from any injury to or death of any person whomsoever, including, but not limited to, employees, officers, and agents of the parties hereto, or from loss of or damage to property of any kind or nature to whomsoever belonging, including, but not limited to, property owned by or in the care, custody and control of the parties hereto, when such injury, death, loss, or damage is caused or contributed to by or arises from the use of or storage of materials on Railroad's premises either by Grantee or at the direction of Grantee.

3. Grantee shall at all times keep said premises, the use of which is hereby granted, in a clean and sanitary condition.

4. Either party may terminate this permission at any time upon ten (10) days written notice to the other party. Grantee shall give its notice to the President of Railroad, located at Post Office Box 608, Wahpeton, ND 58074, by United States Mail. Railroad may give notice in the same manner to Grantee at _____, North Dakota or may serve same personally on Grantee, or post on the premises.

5. At the termination of this permission Grantee shall remove any of its property from said premises and upon failure to do so Railroad may do so at Grantee's expense or may appropriate it to its own use without compensation.

IN WITNESS WHEREOF, the parties hereto have executed these presents this _____day of _____, 20 .

RED RIVER VALLEY &
WESTERN RAILROAD COMPANY

By_____

Title_____

GRANTEE

By _____

Title _____

CONSTRUCTION OF PIPE LINES ON RAILWAY RIGHT OF WAY

GENERAL REQUIREMENTS: Pipe lines under railway tracks or across or along railway right of way shall conform to current American Railway Engineering Association Specifications if constructed in the United States and shall conform to current regulations regarding pipe line crossings under railroad as issued and amended by the Board of Transport Commissioners of Canada if constructed in Canada or where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree of protection so specified shall be adhered to.

Plans and specifications for proposed installation shall meet the approval of the railway company before construction is begun. Plans shall be drawn to scale showing the relation of the proposed pipe line, angle of crossing, location of valves, railway survey station, right of way line and general layout of tracks and railway facilities. Plan should also show a cross-section (or sections) from field survey, showing pipe in relation to actual profile of ground and tracks, complete description of material to be used, and location of jacking and receiving pits. If open cutting or tunneling is necessary, details of sheeting and method of supporting tracks or driving tunnel should be shown.

The execution of the work on the railway right of way, including the supporting of tracks, shall be subject to the inspection and direction of the Division Superintendent of the Railway Company.

Pipe lines shall be installed under tracks by boring or jacking if practicable. Boring excavation must not exceed the outside diameter of the pipe. Jacking or boring of corrugated metal pipe, or pipe with flanges, bells or couplings will not be permitted.

Pipe lines shall be located, where practicable, to cross tracks at approximately right angles thereto but preferably at not less than 45 degrees and shall not be placed within a culvert, under railway bridges or closer than 45 feet to any portion of any railway bridge, building or other important structure, except in special cases and then by special design as approved by the Director Engineering of the Railway Company.

Pipe lines laid longitudinaly on railway right of way shall be located as far as practicable from any tracks or other important structures. Pipe lines carrying flammable products or products under pressure located within 40 feet of the centerline of any track or where there is danger of damage from leakage to any bridge, building or other important structure, shall be encased or of special design as approved by the Director Engineering of the Railway Company.

Pipe lines laid longitudinally on the railway right of way, shall be buried not less than 5' from the ground surface to top of pipe.

If additional tracks are constructed in the future, or Railway Company determines that roadbed should be widened, the casing shall be extended correspondingly.

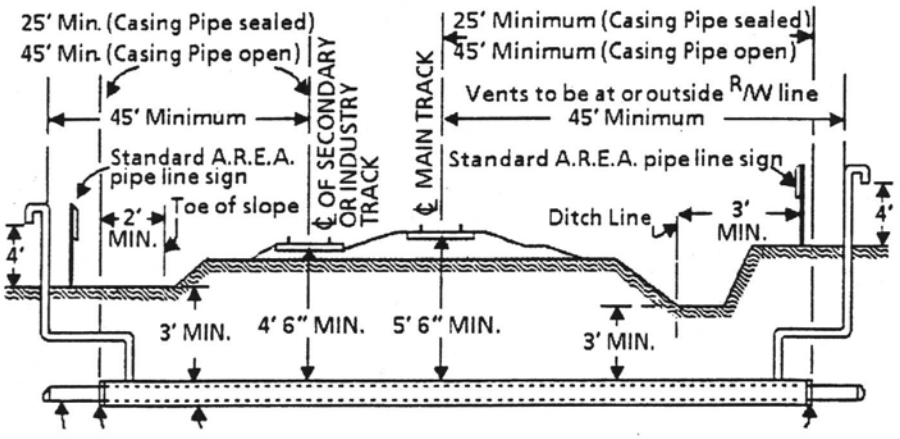
PIPE LINES CARRYING FLAMMABLE SUBSTANCES

This includes oil, gas; basoline, petroleum products or other flammable or highly volatile substance under pressure.

APPROVED CASING PIPE:

Steel for all pressures.

ALL MINIMUM DIMENSIONS MEASURED NORMAL TO ℄ OF OUTSIDE TRACK



SEAL CASING PIPE (See table for minimum wall thickness) SEAL

CARRIER PIPE TO MEET CURRENT A.R.E.A. SPECIFICATIONS

Inside diameter of casing pipe shall exceed outside diameter of carrier pipe by 2" for carrier pipe less than 8" diameter, 3½" for 8" to 16" carrier pipe and 4½" for carrier pipe greater than 16" diameter.

PIPE LINES CARRYING NON-FLAMMABLE SUBSTANCES

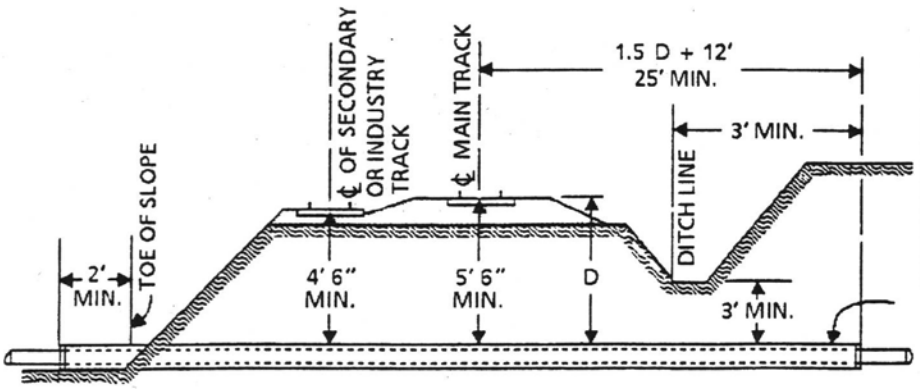
This includes steam, water or any non-flammable substance which from its nature or pressure might cause damage if escaping on or in the vicinity of railway property. Sewers and drains do not require casing pipe unless conditions exist which will endanger security of track, but should be of sufficient strength to withstand E-80 railway loading.

APPROVED CASING PIPE:

Steel for all pressures.

Reinforced Concrete or Corrugated Metal for pressures less than 100 P.S.I.

ALL MINIMUM DIMENSIONS MEASURED NORMAL TO ℄ OF OUTSIDE TRACK



CASING PIPE (See table for minimum wall thickness)

Where the ends of the casing are at or above ground surface and above high water level they may be left open, provided drainage is afforded in such manner that leakage will be conducted away from railway tracks or structures.

CARRIER PIPE TO MEET CURRENT A.R.E.A. SPECIFICATIONS

Inside diameter of casing pipe shall exceed outside diameter of carrier pipe, joints or couplings by 2" for carrier pipe less than 6" in diameter and 4" for carrier pipe 6" in diameter and larger.

CASING PIPE FOR E-80 LOADING

WALL THICKNESS FOR STEEL CASING PIPE (MINIMUM YIELD STRENGTH 35,000 P.S.I.)		
PIPE COATED & CATHODICALLY PROTECTED MIN. THICKNESS INCHES	PIPE NOT COATED & CATHODICALLY PROTECTED MIN. THICKNESS INCHES	DIAMETER OF PIPE INCHES
0.188	0.188	UNDER 14
0.219	0.281	14 AND 16
0.250	0.312	18
0.281	0.344	20
0.312	0.375	22
0.344	0.406	24
0.375	0.438	26
0.406	0.469	28 AND 30
0.438	0.500	32
0.469	0.531	34 AND 36
0.500	0.563	38, 40 AND 42
0.531	0.594	44 AND 46
0.563	0.625	48
0.594	0.656	50
0.625	0.688	52
0.656	0.719	54
0.688	0.750	56 AND 58
0.719	0.781	60
0.750	0.813	62
0.781	0.844	64
0.813	0.875	66 AND 68
0.844	0.906	70
0.875	0.938	72

REINFORCED CONCRETE PIPE:

Minimum pipe strength shall conform to current A.S.T.M. C-76 Class IV, wall "B". If no analysis is performed and fill depth ≤ 14 feet, Class V, wall "B" shall be used. For fills > 14 feet, an analysis must be performed.

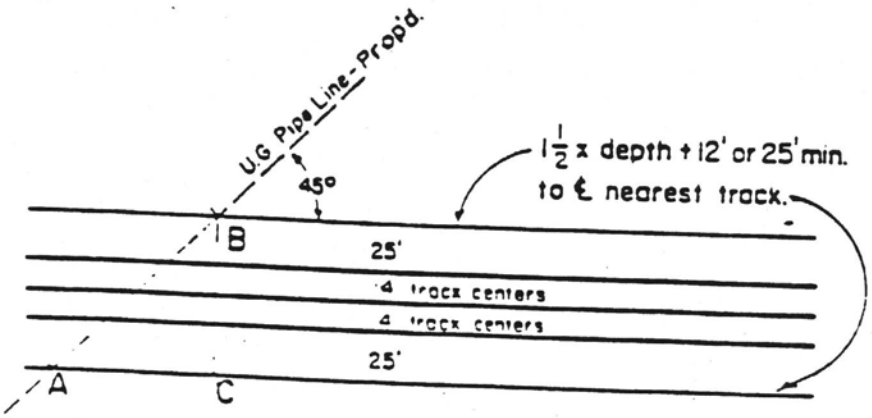
CORRUGATED METAL PIPE:

Pipe shall be galvanized, fiber bonded and asphalt coated.

GAGE OF METAL BEFORE GALVANIZING U.S. STD. GAGE	DIAMETER OF PIPE INCHES
14	18 AND UNDER
12	24, 30 AND 36
10	42 AND 48

Where the ends of the casing are below ground, they shall be suitably protected against the entrance of foreign material, but shall not be tightly sealed.

CALCULATING CASING PIPE LENGTHS FOR DIAGONAL PIPELINE CROSSINGS



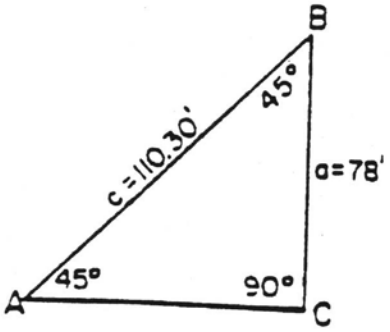
EXAMPLE

B - C Given - angle of crossing - 45°

total distance to 25' min lines - 78'

NOTE: use back side of Form 16002

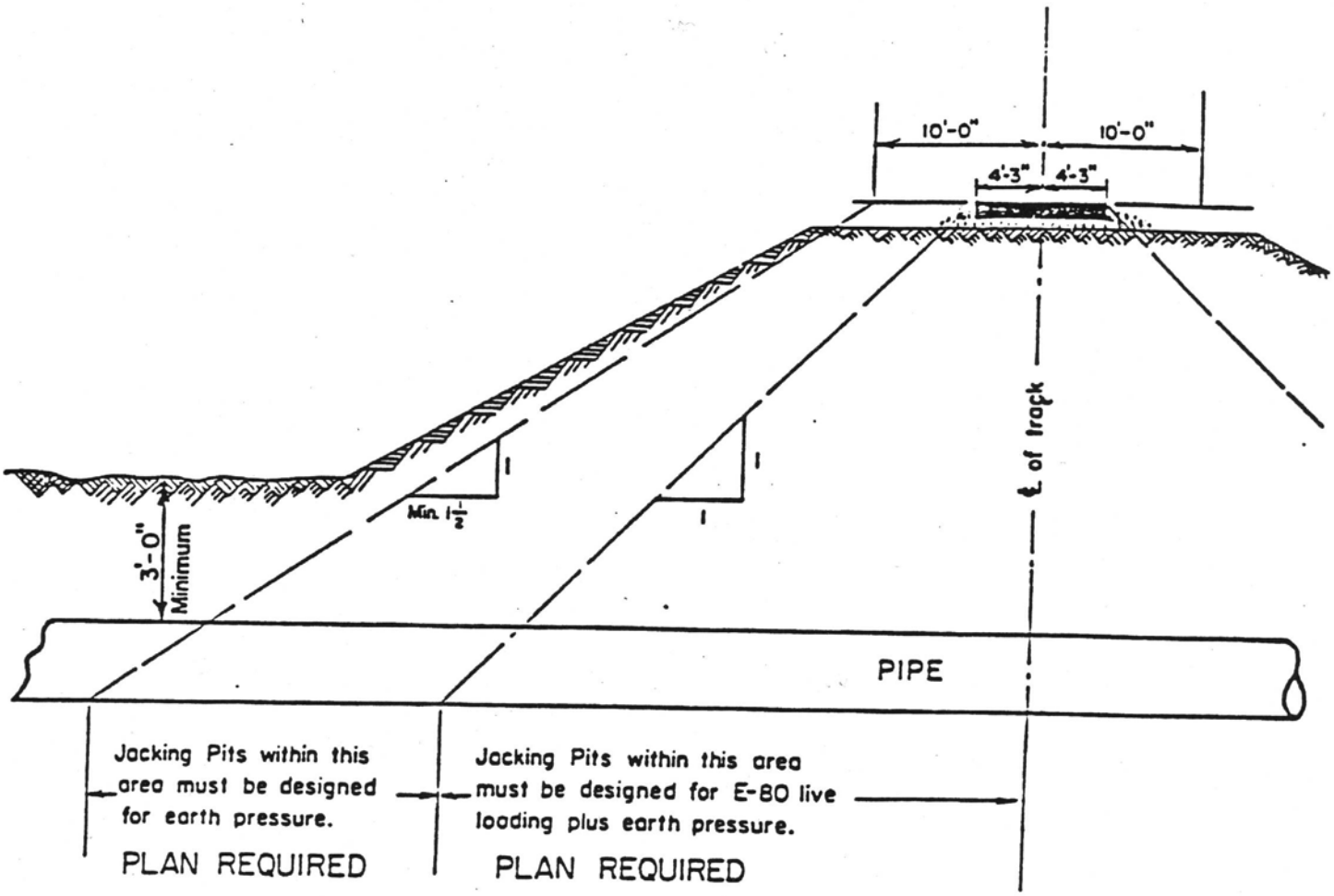
calculations of minimum distance from ℄ of track.



$$C = \frac{a}{\sin A}$$

$$C = \frac{78}{.70711}$$

$$C = 110.30'$$

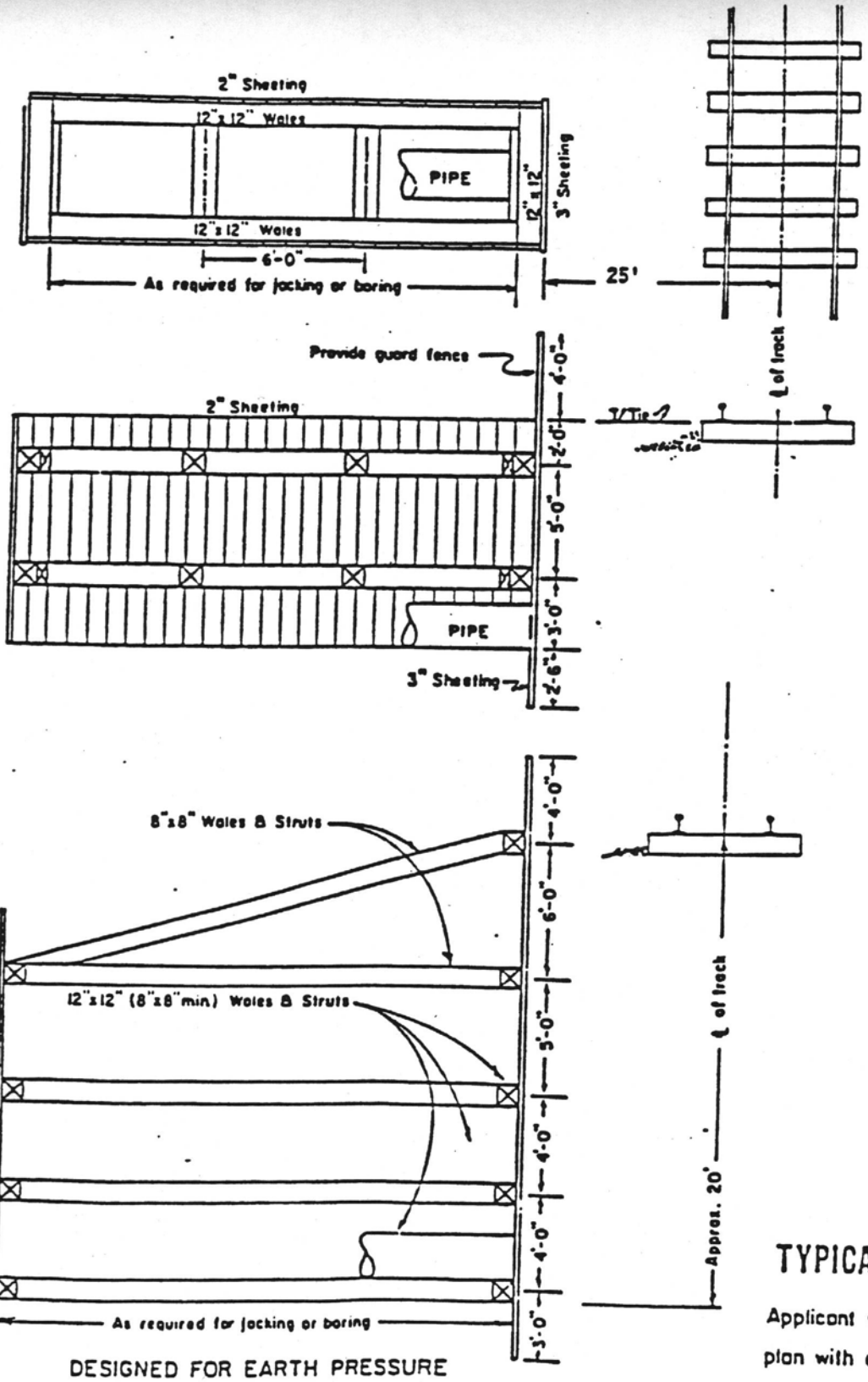


B.N. INC.

Basic requirements for Location, Design and Construction of pits to be used in jacking or boring of pipes under railway tracks

Asst Vice President Engineering St Paul, Minn.

December 1972



DESIGNED FOR EARTH PRESSURE
(R.R. Surcharge Load not included)

TYPICAL JACKING PIT DETAILS

Applicant shall submit jacking or boring pit plan with completed application form.

Plan shall be approved by B.N. Inc. prior to construction.

Reference: A.R.E.A. Manual page 1-4-19

THIS IS NOT A STANDARD PLAN

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01000

GENERAL

PART 1 GENERAL

1.1 ORGANIZATION OF SPECIFICATIONS
1.2 REFERENCES
1.3 SUBMITTALS
1.4 MEASUREMENT AND PAYMENT

PART 2 PRODUCTS

2.1 RECYLED/RECOVERED MATERIALS

PART 3 EXECUTION

3.1 GROUNDS AND ROADWAYS
3.1.1 Availability of Grounds
3.1.2 Drainage Facilities
3.1.3 Roadways
3.1.3.1 Traffic Control Plan
3.1.3.2 Traffic Hazards
3.1.3.3 Haul Route Permits
3.2 DISPOSAL OF DEBRIS AND WASTE
3.2.1 Burning
3.2.2 Disposal offsite for useful purposes
3.2.3 Disposal in a locally operated sanitary landfill
3.2.4 Disposal of Solid Construction Debris and Waste
3.3 SCHEDULING
3.3.1 General
3.3.2 Notification
3.4 OTHER CONTRACTS
3.5 GOVERNMENT-FURNISHED EQUIPMENT
3.5.1 General
3.5.1.1 Storage Location and Contact
3.5.1.2 Government-Furnished Equipment List
3.5.2 Delivery and On-Site Storage
3.6 SHORING
3.6.1 General
3.6.2 Responsibility
3.6.3 Removal
3.7 DEWATERING OPERATIONS
3.7.1 Scope
3.7.2 Payment
3.7.3 Requirements
3.7.3.1 Design
3.7.3.2 Regulations
3.7.3.3 Operation
3.7.3.4 Removal
3.7.4 Geologic and Hydrologic Information
3.7.5 Specific Requirements for Wells

3.7.5.1 Screens
3.7.5.2 Setback
3.7.5.3 Roads and Levees
3.7.6 Dewatering Plan
3.7.7 Liability
3.7.8 Related Work
3.7.9 Surface Water Management During Construction
3.8 SURVEYS
3.8.1 Field Layout
3.8.1.1 Alignment Changes
3.8.2 Utility As-builts
3.8.3 Quantity Surveys
3.9 PRECONSTRUCTION DAMAGE SURVEY
3.9.1 Contacting
3.9.2 Preconstruction Structure Surveys
3.9.3 Preconstruction Condition Surveys
3.9.4 Preconstruction Damage Reports
3.9.5 Contractor Responsibility
3.10 PERMITS
3.11 WORK ON RAILROAD RIGHT OF WAY
3.11.1 General
3.11.1.1 Separate Agreements Between the Contractor and the Railroad
3.11.2 42 Inch Storm Sewer Pipe

-- End of Section Table of Contents --

SECTION 01000

GENERAL

PART 1 GENERAL

1.1 ORGANIZATION OF SPECIFICATIONS

The specifications which govern the materials and equipment to be furnished and the work to be performed under this contract are listed in the Table of Contents. No attempt has been made in the specifications to segregate work to be performed by any trade, craft, or subcontractor. Any segregation between the trades or crafts shall be solely a matter for agreement between the Contractor, Contractor's employees, and subcontractors.

1.2 REFERENCES

Reference to the standards, specifications, or codes of any technical society, organization, or association, or local, state, or Federal authority shall mean the specific edition or revision listed.

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The addresses, phone numbers, and internet addresses (if available) for references cited in these specifications are listed in the Unified Facilities Guide Specification: UFGS 01090 SOURCES FOR REFERENCE PUBLICATIONS. UFGS 01090 is available on the TECHINFO page of the Corps of Engineers Huntsville District internet site: http://www.hnd.usace.army.mil/.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Utility As-Builts;

The Utility As-Builts are described under PARAGRAPH: SURVEYS.

Quantity Surveys;

The Quantity Surveys are described under PARAGRAPH: SURVEYS.

SD-08 Statements

Dewatering Plan;

The submittal requirements are as described in PARAGRAPH: DEWATERING OPERATIONS.

Shoring plan;

The submittal requirements are described in PARAGRAPH: SHORING.

Haul Route Permits;

The submittal requirements are described in PARAGRAPH: ROADWAYS.

Traffic Control Plan; G, CO

A traffic control plan shall be submitted as described in PARAGRAPH: ROADWAYS.

SD-09 Reports

Preconstruction Damage Report;

Preconstruction damage reports shall be submitted as described in PARAGRAPH: PRECONSTRUCTION DAMAGE SURVEY.

1.4 MEASUREMENT AND PAYMENT

The Contractor shall be responsible for the work of this section, without any direct compensation being made other than the payment received for contract line items on the bidding schedule.

PART 2 PRODUCTS

2.1 RECYLED/RECOVERED MATERIALS

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

PART 3 EXECUTION

3.1 GROUNDS AND ROADWAYS

3.1.1 Availability of Grounds

The boundary limits of the grounds made available for the Contractor's use during the life of the contract are shown on the drawings. Any additional rights-of-way or grounds desired by the Contractor shall be obtained by the Contractor at its own expense, and copies of agreements for the use of such rights-of-way shall be furnished to the Contracting Officer before entering thereon. Such agreements shall clearly relieve the Government of any responsibility for damages resulting from the use of the grounds.

3.1.2 Drainage Facilities

Insofar as natural drainage from protected areas and agricultural fields is obstructed by contract operations, it shall be the Contractor's responsibility to make adequate provision for accommodating such drainage in a satisfactory manner during the life of this contract, either by temporary means or by use of the permanent construction and operation of the permanent facilities.

3.1.3 Roadways

3.1.3.1 Traffic Control Plan

A traffic control plan including, but not limited to, road closures, detour drawings, traffic signage lists and locations, and a schedule of traffic modifications shall be submitted for approval. The traffic control plan shall be in accordance with the Minnesota Manual on Uniform Traffic Control Devices. The Contractor shall coordinate with the City of Wahpeton and Mn/DOT to determine restrictions on road closures and detours.

3.1.3.2 Traffic Hazards

When continuous haul operations or other conditions created by the Contractor's operations result in interference or hazard to traffic on streets and highways, beyond that of ordinary public usage, the Contractor shall erect warning signs and provide flagging services as necessary to safeguard the public as required in SECTION 01500 TEMPORARY CONSTRUCTION FACILITIES.

3.1.3.3 Haul Route Permits

The Contractor shall be responsible for securing all permits (including fees) required along haul routes. The Contractor shall be the sole permittee and shall be responsible for meeting all obligations of the permits. A copy of each permit shall be submitted to the Contracting Officer. The Contractor, as between the Government and the Contractor, has sole responsibility for damage or deterioration of the Contractor's haul routes. Dust control shall be provided as stated in SECTION 01355 ENVIRONMENTAL PROTECTION.

3.2 DISPOSAL OF DEBRIS AND WASTE

The Contractor's attention is directed to SECTION 01355 ENVIRONMENTAL PROTECTION and to the following CONTRACT CLAUSES: 52.236-7 PERMITS AND RESPONSIBILITIES; 52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS; 52.236-10 OPERATIONS AND STORAGE AREAS; and 52.236-12 CLEANING UP. Burning will not be permitted at the project site and debris or waste shall not be left on the site. Disposal of clearing and grubbing debris shall be by one of the following methods:

3.2.1 Burning

Burning will not be permitted at the project site.

3.2.2 Disposal offsite for useful purposes

In the interest of conservation, it is required that the Contractor make a reasonable effort to dispose of the material offsite for some useful purpose. Timber may be cut into convenient lengths and utilized for making saw logs, posts, cordwood, wood chips for paper making or other uses, or

other similar use.

3.2.3 Disposal in a locally operated sanitary landfill

Contractor shall select the disposal site with the approval of the Contracting Officer. The Contractor shall secure the required permits for disposal and provide copies of the permit to the Contracting Officer.

3.2.4 Disposal of Solid Construction Debris and Waste

Disposal of Solid Construction Debris and Waste shall consist of removal from Government property and disposal in compliance with Federal, state, and local requirements for solid waste disposal. Contractor shall select the disposal site with the approval of the Contracting Officer.

3.3 SCHEDULING

3.3.1 General

It shall be the responsibility of the Contractor to schedule and execute the work, incorporating the necessary requirements set forth in these specifications. The Contractor shall develop and submit a schedule in accordance with CONTRACT CLAUSE: 52.236-15 SCHEDULES FOR CONSTRUCTION CONTRACTS.

3.3.2 Notification

The Contractor shall inform the Government in writing within 5 days after receipt of notice to proceed and before work begins as to which hours of the day and days of the week work under this contract will be performed. The Contractor shall notify the Government at least 24 hours before work is to be conducted on overtime, in multiple shifts, on weekends, or on Federal Government holidays.

3.4 OTHER CONTRACTS

The Contractor shall coordinate with other contractors in the performance of the work and schedule such work to provide for a minimum of delays and interferences. Coordination shall be through the Contracting Officer. These contracts will be considered in the application of CONTRACT CLAUSE: 52.236-8 OTHER CONTRACTS.

3.5 GOVERNMENT-FURNISHED EQUIPMENT

3.5.1 General

The work of this contract includes installing equipment furnished by the Government. The Government-furnished equipment is listed below. The Contractor shall be responsible for loading and unloading, transporting, installing, and testing the Government-furnished equipment. The Government-furnished equipment shall be transported to the project site from the storage location.

3.5.1.1 Storage Location and Contact

The Government furnished equipment will be stored at the City of Wahpeton Maintenance Building. The storage area is in a locked facility. The Contractor shall coordinate with the Contracting Officer to arrange access to the Government furnished equipment.

3.5.1.2 Government-Furnished Equipment List

Government furnished equipment is listed below:

(6) Vertical pumps, 20 inch size. Manufacturer: FPI. Each pump rated at 10,000 gpm. Each pump includes grease pressure lubrication system.

(6) Electric Motors for each vertical pump. Two motors are rated for outdoor use at stations 4 and 5. Four motors are designed for new stations 1A and 7. Manufacturer: US Motor. Each motor rated at 75 hp.

3.5.2 Delivery and On-Site Storage

Equipment shall be inspected for damage, loaded, transported, and unloaded with a minimum of handling. The Contractor shall notify the Contracting Officer of any damaged equipment prior to loading and transporting from the storage location. The equipment shall not be stored directly on the ground and shall be protected from any environment that would result in damage or deterioration to the equipment. The Contractor shall not remove any equipment from the Government storage facility unless installation in the pump stations is scheduled to occur within 15 calendar days of removing the Government furnished equipment from the storage facility. The Contractor shall complete installation of the Government furnished equipment within 15 calendar days of removal from the storage facility.

3.6 SHORING

3.6.1 General

At locations where shoring is not specifically required by the contract documents to safeguard adjacent structures, the Contractor may at its own option employ shoring for protecting work areas within excavations in lieu of performing excavation to safe and stable side slopes. The Contractor shall construct all shoring required in performing the excavations. Shoring shall be constructed in accordance with the safety requirements of EM 385-1-1.

3.6.2 Responsibility

The Contractor shall be responsible for design and maintenance of all shoring which the Contractor proposes to install. Shoring plan and design computations for all shoring used shall be submitted in accordance with SECTION 01330: SUBMITTAL PROCEDURES at least 30 days prior to installation.

3.6.3 Removal

Unless otherwise authorized, all sheeting and bracing shall be removed when backfill is completed.

3.7 DEWATERING OPERATIONS

3.7.1 Scope

The Contractor shall design, furnish, install and operate dewatering systems in the execution of the contract work. The work involves the drawdown of water table and construction of temporary barriers (small cofferdams, earth dikes, sheeting, or other satisfactory types of barriers) to protect against the prevailing river stages and to permit, where

specified or shown, placement of concrete, utilities, and fill in the dry.

3.7.2 Payment

No separate payment will be made for dewatering on this project and compensation for all dewatering operations will be included in the respective contract items to which the work pertains.

3.7.3 Requirements

Control of groundwater shall be accomplished in a manner that will provide suitable working conditions for construction, preserve the strength of the foundation soils, will not cause instability of excavations, and will not result in damage to existing structures. Suitable working conditions for construction will provide a dry or moist subgrade free of standing, percolating, or running water during placement and curing of concrete, and placement and compaction of backfill. Where necessary to these purposes, the water level shall be lowered in advance of excavation utilizing wells, wellpoints, or similar methods. For structure foundations, the water level (as measured in piezometers) shall be maintained a minimum of 2 feet below the prevailing excavation level.

3.7.3.1 Design

If conditions warrant, and if not otherwise specified in the contract documents, dewatering may consist of collection in sumps or trenches, and open pumping. Sumps, trenches and running water shall not jeopardize erosion or ground loss near foundations, pipes, or other structures. Open pumping will not be permitted if it results in boils, seepage in concrete placement areas, loss of fines, softening of the ground, instability of slopes, or interference with orderly progress of the construction.

3.7.3.2 Regulations

Compliance with all regulations shall be incidental to the dewatering work. Disposal of water shall be in accordance with SECTION 01355: ENVIRONMENTAL PROTECTION and all applicable regulations. Dewatering water may be discharged through the City's storm water system. Well abandonment shall seal aquifers and confining layers in compliance with environmental regulations and permits.

3.7.3.3 Operation

Upon installation and commencement of dewatering operations, the system shall be operated continuously (24 hours/day, 7 days/week) until the structure and backfill are completed to the groundwater elevation. The Contractor shall be responsible for maintaining the system.

3.7.3.4 Removal

Upon completion of the work, well casing and screens shall be withdrawn, and all equipment shall be removed (including related temporary cofferdams, shoring, etc.)

3.7.4 Geologic and Hydrologic Information

Ground water elevations shown on the boring logs are those encountered at the time the borings were taken. Because groundwater elevations are dependent upon hydrologic conditions, variations in the water table should

be expected. For work near the Red River of the North and the Bois de Sioux, refer to the hydrographs included with the contract drawings. It shall be the Contractors responsibility to perform the necessary dewatering operations irrespective of the water elevations at the time of the work. However, nothing in this clause prohibits the Contractor from receiving a time extension under the Default clause, Time Extensions for Unusually Severe Weather, or any other clause in this contract.

3.7.5 Specific Requirements for Wells

3.7.5.1 Screens

Wells and wellpoints shall be installed with suitable screens and filters so that continuous pumping of fines does not occur. Pumps shall discharge into a settling tank to check for movement of sand. Wells shall be sealed in accordance with State Health Department requirements.

3.7.5.2 Setback

The following criteria shall be followed to the maximum extent possible. Where permanent site features restrict placement of dewatering devices, the Contracting Officer will allow a variance. Wellpoints shall be located a minimum horizontal distance away from structures (existing and proposed) equal to the depth of penetration below foundation elevation. Wells larger than 3 inches diameter shall be located a minimum horizontal distance away from structures equal to the depth of penetration below foundation elevation plus half the depth of penetration above foundation elevation.

3.7.5.3 Roads and Levees

Wells larger than 3-inches diameter shall not be jetted through roadway and levee embankments. Wells larger than 3-inches diameter located on the up-gradient side of levees, dikes, dams or floodwalls shall be screened without a gravel filter pack. These wells shall be abandoned by plugging the hole with a cement-bentonite grout. The screens shall include a loose end cap to allow removal of screen and casing without hole collapse.

3.7.6 Dewatering Plan

At least 30-calendar days prior to commencing work on the installation or construction of dewatering protection, the Contractor shall submit for review by the Contracting Officer prints showing plans and details of the type of construction, including shoring proposed for installation at each location. The design shall be in accordance with sound engineering practice as approved. This submittal data shall include computations covering the analysis and design layout, proposed methods of protection of construction work that would be subject to exposure to channel flows exceeding the dewatering protection capacity, type and spacing of dewatering devices, number and size of pumps and other equipment, together with a description of the installation and operating procedures, including relationship to the construction operations. The plan shall be reviewed and signed by a Registered Professional Engineer. The plan shall include the following items:

1. layout (including the relationship to site improvements and construction operations)

2. type, sizes, depth and spacing of dewatering devices

3. number and capacity of pumps

4. design assumptions, analysis methods, and calculations
   4A. justification for pump capacity

   4B. justification for slot size on screens

   4C. justification for screen intake area

   4D. justification for filter pack gradation

5. description of installation equipment

6. description of operating procedures

7. description of discharge point (weirs, sedimentation basin, etc.)

8. type and location of monitoring equipment

9. removal and abandonment plans

3.7.7 Liability

Government review of the proposed dewatering system will not relieve the Contractor of full responsibility for the adequacy of the dewatering operations. The Contractor shall be responsible for dewatering effects on adjacent properties, including but not limited to blockage of easements, erosion or sedimentation of ditches, and encroachment onto private property by flooding from pump outlets and sedimentation basins.

3.7.8 Related Work

Shoring, trench support systems, cofferdams and diversion structures shall be coordinated with the dewatering effort to provide safe and reliable conditions.

3.7.9 Surface Water Management During Construction

The Bois de Sioux River and Red River of the North are prone to experience extremely high flood stages of relatively long duration. The Contractor shall be responsible for monitoring local weather conditions and flow conditions in order to anticipate flooding conditions prior to their occurrence. The Contractor shall keep the Contracting Officer informed regarding all flooding conditions on the project.

The Contractor should satisfy itself before submitting its bid as to hazards that arise from weather conditions and flooding. Red River rating curves and hydrographs are included in the contract drawings.

3.8 SURVEYS

3.8.1 Field Layout

The Contractor shall layout the work from the Government established bench marks in accordance with CONTRACT CLAUSE: 52.236-17 LAYOUT OF WORK (Apr 1984). The construction of each feature of work shall follow the alignments as indicated on the drawings. The Contractor shall have in place, at least 7 calendar days prior to commencing construction operations, sufficient stakes and markings to enable the Contracting

Officer to observe the field layout of the alignment and limits of each feature of work. For each feature of work, these stakes shall define areal limits such that the Contracting Officer can easily determine, without additional surveys, if alignment and/or limit adjustments need to be made. For embankments, levees, and similar work, these stakes shall define centerline, stationing, outermost fill/cut limits, and work limits. For structures and similar work, the corners shall be staked. General site work shall be staked to define staging areas, storage areas, and other area limits as directed. The Contracting Officer may waive these requirements for certain areas. The layout shall be sufficient for the Contracting Officer to mark trees, vegetation and other features to be left undisturbed. No work shall take place without approval of field layout by the Contracting Officer.

3.8.1.1 Alignment Changes

The Government reserves the right to make changes in the alignment of any feature of work as may be found necessary during the course of the contract. If it becomes necessary, through no fault of the Contractor, equitable adjustment for completed work will be made. No alignment changes or abandonment shall take place without prior written notice from the contracting Officer.

3.8.2 Utility As-builts

An as-built field survey of all utilities shall be conducted after installation to determine the final locations and elevations of all utility structures such as manholes, catch basins, hydrants, gate valves, cleanouts, service connections, and other special controls or structures. Final elevations shall be determined for all sewer inverts and castings. Locations shall be shown using the same convention as the original contract drawings(typically stationing and offset from known centerline). If no convention is used in the contract drawings, locations shall be tied to at least 2 permanent landmarks.

3.8.3 Quantity Surveys

The Contractor shall perform quantity and tolerance verification surveys for all features of work in accordance with CONTRACT CLAUSE: 52.236-16 QUANTITY SURVEYS (1984)-ALTERNATE I (1984). Unless changed by the Contracting Officer, the Contractor shall provide cross sections at 100 foot intervals to verify the required section. Areas where payment for material is specified by volume shall be surveyed by the Contractor, prior to commencement of construction of each feature and upon completion of each feature, in enough detail to accurately determine quantities and verify the required section. The Contractor shall also provide a copy of the survey notes and cross sections to the Contracting Officer within 10 days after completion of the survey.

3.9 PRECONSTRUCTION DAMAGE SURVEY

Prior to the start of contract construction operations in an area, the Contractor shall conduct preconstruction property damage surveys. These surveys shall be performed initially and repeated later as required.

3.9.1 Contacting

The Contractor shall have both letter and personal contact with residents, institutional operators, and/or business establishments that are within the

project work limits or near enough for ground and noise vibrations to be considered objectionable. This contact shall be made prior to beginning potential vibration-producing activities. The Contractor shall submit a list of those individuals and companies contacted prior to vibration-producing activities.

3.9.2 Preconstruction Structure Surveys

Preconstruction surveys shall be performed by qualified specialists, as approved, and retained by the Contractor for observing the condition of existing structures in the vicinity of the work at required intervals. Each survey shall include all existing structures located entirely or partially within 100 feet of the proposed work limits. Each structure shall be completely surveyed even if only part of the structure is located within the survey limits. The preconstruction survey shall produce a report including diagrams as necessary of accessing all existing foundations, floors, walls, partitions, and roofs as determined by the Contracting Officer. The report shall show and describe existing interior and exterior cracks, including elevations and photographs and video tapes of cracks/damage, and such other data as applicable to locate and define the amount and extent of existing damage. All existing structure deficiencies, major or minor, shall be identified and recorded. Crack displacement monitoring gages shall be installed as appropriate in structures within a radius of 100 feet of the contract work in order to help verify distress if any should develop. Crack displacement monitoring gages shall be read by the Contractor on a weekly basis.

3.9.3 Preconstruction Condition Surveys

The Contractor shall photograph and video tape facilities within the work limits, including, but not limited to, roads,borrow areas, side walks, trees, shrubs, and lawns prior to working in an area in order to document the preconstruction conditions. The Contractor shall also take photographs and video tape the conditions in the same areas upon completion of the project.

3.9.4 Preconstruction Damage Reports

The Contractor shall prepare and submit to the Contracting Officer, prior to the start of contract construction work/activities at each work site, two bound copies of each preconstruction damage report containing surveys, photographs, and video tapes, sketches and diagrams, field notes taken, descriptions and reports, all signed and witnessed by the persons involved in the survey. Thereafter, as contract work progresses, the Contractor shall resurvey as often as necessary, as required by the Contracting Officer, in order to verify the adequacy of the Contractor's construction methods for prevention of damage and to obtain sufficient evidence for use in defense against possible claims for damage from third parties. Data obtained by the Contractor from each resurvey shall be submitted to the Contracting Officer within 5 calendar days after the Contractor has obtained it.

3.9.5 Contractor Responsibility

Nothing contained herein shall relieve the Contractor of responsibility for claims arising from its construction operations. Failure to inspect any structure, whether or not required by the contract documents, or inadequacy of the inspections shall not relieve the Contractor of its responsibilities.

3.10 PERMITS

No permits relating to the work of this contract have been obtained by the Government at the time this solicitation was printed.

3.11 WORK ON RAILROAD RIGHT OF WAY

3.11.1 General

Installation of the 42 inch cased pipe will require coordination with the Red River Valley and Western Railroad. The Contractor shall coordinate with the Red River Valley and Western Railroad Company and the Contracting Officer a minimum of 30 days prior to installation of these features, or any preparation work in or around the railroad tracks.

The Contractor shall protect utilities and equipment on the Red River Valley and Western Railroad Company property including, but not limited to, communication, signal, and electric utilities that may be adjacent to the railroad tracks.

The Contractor will be required to enter agreements with the Red River Valley and Western Railroad Company for work on the Red River Valley and Western Railroad Company right-of way. Copies of the agreements and additional requirements are included in Section 00830. The Contractor shall provide insurance to meet the requirements of the railroad agreements and shall pay the cost of flagging and other services provided by the Red River Valley and Western Railroad Company as required by the agreements. A copy of all agreements with the Red River Valley and Western Railroad Company shall be provided to the Contracting Officer.

Contacts for the Red River Valley and Western Railroad Company are as follows:

Daniel Zink	Director of Administration	(701) 642-8257
Cal Gruebele	Manager of Tracks and Structures	(218) 643-1532

3.11.1.1 Separate Agreements Between the Contractor and the Railroad

If any separate agreements are made between the Contractor and the Red River Valley and Western Railroad Company, such as modifications to work to be performed by the Red River Valley and Western Railroad Company or time available to the Contractor, the Contracting Officer shall be notified of such agreements 24 hours prior to the start of any work affected by such agreements.

3.11.2 42 Inch Storm Sewer Pipe

The railroad requires a casing pipe for the 42 inch carrier pipe.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.1 MEASUREMENT AND PAYMENT
1.2 SUBMITTALS
1.3 GROUNDS AND ROADWAYS
1.3.1 Parking
1.3.2 Snow Removal
1.4 BLASTING

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 LEVEE REMOVAL
3.2 PUMP STATION MODIFICATIONS
3.2.1 High River Stages
3.2.2 Normal River Stages
3.2.3 Pump Stations 4 and 5
3.3 GOLF COURSE WORK
3.3.1 Storm Sewer
3.3.2 Ponding Area 1A
3.4 EXISTING UTILITIES
3.4.1 General
3.4.2 Buried Utilities
3.4.3 Interruption of Services
3.4.4 North Dakota One Call Excavation Notice System
3.5 PROTECTION OF TREES
3.5.1 Restoration of Damaged Trees

-- End of Section Table of Contents --

SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.1 MEASUREMENT AND PAYMENT

The contactor shall be responsible for the work of this section, without any direct compensation being made other than the payment received for contract items.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-08 Statements

Utility Service Interruption Request; G, CO.

Submit request to interrupt utilities as described in PARAGRAPH: INTERRUPTION OF SERVICES.

Levee Removal/Flood Protection Plan; G, CO

A plan for removal of levees and flood protection during construction operations shall be submitted as described in PARAGRAPH: Levee Removal.

Pump Station Modification Plan; G, CO

A plan for modifications to the pump stations so that pump stations are available as needed as described in PARAGRAPH: Pump Station Modifications.

1.3 GROUNDS AND ROADWAYS

1.3.1 Parking

Contractor parking will be permitted only in the work limits. No parking will be allowed at the City's office building without prior approval. Contractor parking shall be coordinated with the Contracting Officer.

1.3.2 Snow Removal

The Contractor shall be responsible for snow removal in the Contractor's access, work, and parking areas.

1.4 BLASTING

Blasting will not be permitted.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 LEVEE REMOVAL

The work shall be sequenced so that the level of protection afforded by existing levees is maintained for areas within the final constructed levee alignment. When existing levee integrity is removed, the Contractor shall be prepared to provide, if necessary, and shall provide when directed by the Contracting Officer, flood protection equal to the level of protection of the existing levees prior to starting construction. The Contractor shall submit a sequencing plan which:

a) Identifies areas where sequencing is necessary to maintain flood protection.

b) Indicates how the work will be sequenced in the identified areas so that the potential exposure to flood threat is minimized and,

c) Indicates how any reduction to levee protection, due to the Contractor's operations, will be restored when directed by the Contracting Officer.

3.2 PUMP STATION MODIFICATIONS

It is important that the existing pump stations be available for use by the City of Wahpeton when needed. The Contractor shall submit a schedule and work plan to demonstrate how the following restrictions will be managed.

3.2.1 High River Stages

The work to modify the existing pump stations shall be scheduled such that the pump stations will be in service during periods of gate closure when the river stage is high and the pump stations would be needed to control interior drainage.

3.2.2 Normal River Stages

The existing pump stations pass gravity flow during storm events when the river stage is low. The Contractor shall be aware of weather conditions and be prepared to remove all materials and equipment from the existing pump stations as necessary to allow gravity flow through the structures as necessary to prevent damage to the community from flooding.

3.2.3 Pump Stations 4 and 5

In general, it is required that the Contractor schedule and sequence the pump station modification work so that the modifications to Pump Stations 4 and 5 are completed as soon in the contract period as is reasonable so that they will be available for use during subsequent flood events.

3.3 GOLF COURSE WORK

The following restrictions are intended to minimize adverse affects on the golf course.

3.3.1 Storm Sewer

There are three lengths of storm sewer that cross the golf course fairways. Work on these three lengths of storm sewer may not commence until after September 15 and must be completed by April 15.

3.3.2 Ponding Area 1A

Ponding Area 1A is used as a source of water for irrigation on the golf course. Excavation and reshaping of this pond may not commence until after September 15 and must be completed by April 15.

3.4 EXISTING UTILITIES

3.4.1 General

The Contractor shall coordinate all utility relocation requirements and make payment to the utility companies for all services, fees, and permits required to relocate and reestablish service. The Contractor shall be responsible for all costs related to protecting existing utilities. The Contractor shall coordinate with the utility representatives listed below:

Electric Utility:

OTTER TAIL POWER COMPANY
PO BOX 70
2111 15TH ST N
WAHPETON, ND 58074-0070
(701) 642-6684
Fax: (701) 671-6031
RUSSEL DENAULT

Phone Company:

QWEST CORPORATION
220 N 5TH ST
BISMARCK, ND 58501
(701) 222-6959
Fax: (701) 222-6976
SCOTT MACINTOSH

Cable Company:

CABLE ONE
1025 PAGE DR
FARGO, ND 58103
(701) 280-0033
ARLENE NELSON

Gas Company:

GREAT PLAINS NATURAL GAS CO.
PO BOX 845
WAHPETON, ND 58074-0845
(701) 642-5430
Fax: (701) 642-6493

3.4.2 Buried Utilities

The approximate locations of known existing buried utilities are shown on the drawings to the extent of available information at the time the drawings were prepared. (In general, no service connections are shown.) Prior to commencing excavation, the Contractor shall accurately locate all such installations. In the event the Contractor damages any existing utility lines, report thereof shall be made immediately to the Contracting Officer. Repair of damaged utilities shall be in accordance with CLAUSE 52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS.

3.4.3 Interruption of Services

Utility services shall not be interrupted except for brief periods to facilitate cut-ins. The Contractor shall provide temporary service and shall relocate existing utilities as required to construct the work shown and insure uninterrupted service. If interruption of services is unavoidable, the Contractor shall request approval in writing at least 30 calendar days prior to the proposed interruption. This submittal shall fully describe all details of proposed interruption and the reasons why alternatives are not feasible. The Contractor shall further coordinate with the owner of the utility and notify affected consumers at least 10 calendar days in advance of interruption of services. The Contracting Officer will not in general approve proposals which require interruption of services for more than 4 continuous hours.

3.4.4 North Dakota One Call Excavation Notice System

For contract work performed within the State of North Dakota, the Contractor shall meet the requirements of North Dakota Statutes, Chapter 42-23 "One Call Excavation Notice System." The North Dakota One Call notification center telephone numbers are:

Hotline	800-795-0555
Main Office	701-223-9380

3.5 PROTECTION OF TREES

Trees to be protected shall be determined and staked by the Contracting Officer. The following measures shall be implemented for tree protection and shall be addressed in the Environmental Protection Plan required under SECTION 01355:

a. The trees shall be protected from wounds to the bark and foliage.
b. The critical root zone shall be protected from compaction and grading.
c. Changes in temporary site drainage and ponding shall be minimized to the extent possible that it effects the protected trees.

The critical root zone of trees designated to be protected shall be surrounded by a high visibility fence 4 feet in height, supplied and erected by the Contractor. The critical root zone shall be defined by an area extending 1.5 feet radius from each tree for each inch of Diameter at Breast Height (DBH). The fence shall be securely erected and installed prior to any movement through the project site by construction vehicles or equipment, and remain in place until construction and clean-up are completed. The critical root zone shall remain free of all construction activities including trenching, staging, stockpiling and storage of

materials. Vehicles and equipment shall not drive or park within the critical root zone. Variation to the critical root zone size or configuration will only be permitted where it is absolutely necessary for construction of the project, and requires approval of the Contracting Officer. Short duration alterations of the critical root zone involving wood chips and limited equipment travel shall be submitted in writing for approval.

The Contractor shall not operate equipment in vegetated areas outside the work limits.

3.5.1 Restoration of Damaged Trees

Any existing tree designated to be protected that is damaged by the Contractor's operations shall be replaced. Trees will be considered damaged if the critical root zone in cohesive soils is compacted, if there are significant wounds that could contribute to rot, or if distress (evident by reduced growth or other observations of distress documented by a forester) is observed prior to closing the contract. Trees shall be replaced in kind on a caliper inch per caliper inch basis (DBH) (i.e. one 6-inch red oak shall be replaced with two 3-inch red oaks, three 2-inch red oaks, or six 1-inch red oaks). Replacement trees shall be planted in accordance with SECTION 02920 SEEDING, SODDING AND TOPSOIL and guaranteed with the Contractor's standard warranty. Replacement tree size and location will be determined and staked by the Contracting Officer. Repair by pruning, aeration, soil conditioning, or other recommendation from a qualified forester will be considered as substitution for replacement by the Contracting Officer.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUBMITTALS
1.2 LUMP SUM PAYMENT ITEMS
1.2.1 Bonds
1.2.1.1 Payment
1.2.1.2 Unit of Measure
1.2.2 Pump Station Structure
1.2.2.1 Payment
1.2.2.2 Unit of Measure
1.2.3 Pump Station Electrical
1.2.3.1 Payment
1.2.3.2 Unit of Measure
1.2.4 Pump Station Mechanical
1.2.4.1 Payment
1.2.4.2 Unit of Measure
1.2.5 Pump Station Electrical Service
1.2.5.1 Payment
1.2.5.2 Unit of Measure
1.2.6 Storm Sewer
1.2.6.1 Payment
1.2.6.2 Unit of Measure
1.2.7 Storage Shed
1.2.7.1 Payment
1.2.7.2 Unit of Measurement
1.2.8 Sanitary manholes
1.2.8.1 Payment
1.2.8.2 Unit of Measurement
1.2.9 Clearing and Grubbing
1.2.9.1 Payment
1.2.9.2 Unit of Measurement
1.2.10 Demolition
1.2.10.1 Payment
1.2.10.2 Unit of Measurement
1.3 UNIT PRICE PAYMENT ITEMS
1.3.1 Stripping
1.3.1.1 Payment
1.3.1.2 Measurement
1.3.1.3 Unit of Measure
1.3.2 Excavation
1.3.2.1 Payment
1.3.2.2 Measurement
1.3.2.3 Unit of Measure
1.3.3 Inspection Trench
1.3.3.1 Payment
1.3.3.2 Measurement

1.3.3.3 Unit of Measure
1.3.4 Select Impervious Fill
1.3.4.1 Payment
1.3.4.2 Measurement
1.3.4.3 Unit of Measure
1.3.5 Topsoil and Seed
1.3.5.1 Payment
1.3.5.2 Measurement
1.3.5.3 Unit of Measurement
1.3.6 Aggregate Surface Course
1.3.6.1 Payment
1.3.6.2 Measurement
1.3.6.3 Unit of Measurement
1.3.7 Riprap and Bedding
1.3.7.1 Payment
1.3.7.2 Measurement
1.3.7.3 Unit of Measurement
1.3.8 Pad For Portable Pump
1.3.8.1 Payment
1.3.8.2 Measurement
1.3.8.3 Unit of Measurement
1.3.9 Sluice Gates
1.3.9.1 Payment
1.3.9.2 Measurement
1.3.9.3 Unit of Measure
1.3.10 Install Pumps
1.3.10.1 Payment
1.3.10.2 Measurement
1.3.10.3 Unit of Measure

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section Table of Contents --

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Quantity Surveys; .

The Quantity Surveys are described in Section 01720 CONTRACTOR SURVEYS.

1.2 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.2.1 Bonds

1.2.1.1 Payment

Bonds will be paid for on a job basis in accordance with FAR 52.232-5.

1.2.1.2 Unit of Measure

Unit of measure: lump sum.

1.2.2 Pump Station Structure

1.2.2.1 Payment

Payment will be made for the construction and or modification of pump station and discharge chamber (Pump stations 1A, 7, 1, 2, 3, 4, 5 and 6) and pump station superstructures (Pump stations 1A & 7). Work includes, but is not limited to demolition, excavation, backfill, compaction of structural backfill, reinforced concrete foundations, walls, and slabs, construction of exterior cast-in-place concrete slabs, and exterior

cast-in-place concrete stairs associated with the pump stations and discharge structures, masonry block walls, structural steel (including trusses), roof systems, skylights, gutters and downspouts, and doors. Also included are miscellaneous metal appurtenances including but not limited to ladders, grab bars, hatches, checkered plates, gratings and railings. Restoration of roads, curbs and sidewalks removed or damaged during construction is incidental to the price bid. All incidentals shall be included.

1.2.2.2 Unit of Measure

Unit of measure: lump sum.

1.2.3 Pump Station Electrical

1.2.3.1 Payment

Payment will be made for work associated with furnishing materials, equipment, supplies and labor and performing all operations necessary for the electrical features of the discharge structures and pump stations.

Electrical features include but are not limited to raceways, conductors, enclosures, grounding, power distribution, lighting, receptacles, controls, instrumentation, telemetry (SCADA), and switches. This shall also include the satisfactory completion of all required tests. All incidentals shall be included.

1.2.3.2 Unit of Measure

Unit of measure: lump sum.

1.2.4 Pump Station Mechanical

1.2.4.1 Payment

Payment will be made for work associated with furnishing materials, equipment, supplies and labor and performing all operations necessary for the mechanical features of the discharge structures and pump stations.

Mechanical features include but are not limited to stop log guides, motorized operators, sump pump hoists, sump pumps with guide rail systems, discharge piping, wall sleeves and link seals, flap valves, trash rack, pipe supports, exhaust fans, ductwork, louvers, control dampers, actuators, unit heaters, thermostats, duct insulation, duct supports, monorail crane and repositioning of existing gate operating equipment. All incidentals shall be included.

1.2.4.2 Unit of Measure

Unit of measure: lump sum.

1.2.5 Pump Station Electrical Service

1.2.5.1 Payment

Payment will be made for work associated with furnishing electrical service to the pump stations. Work includes, but is not limited to, installation of poles, conductors, conduit and grounding to provide a complete electrical service. Additional work to be included under this item include

power company hookup charges and fees and any work associated with removing and/or abandoning existing electrical services as indicated on the drawings. All incidentals shall be included.

1.2.5.2 Unit of Measure

Unit of measure: lump sum.

1.2.6 Storm Sewer

1.2.6.1 Payment

The bid schedule separates the storm sewer into 3 bid items, Storm Sewer B, Storm Sewer C, and Storm Sewer C1.

Storm Sewer B is designated on the drawings with a B as the first part of all manhole, catch basin, and flared end section structure titles. Storm Sewer B includes the structures and the corresponding pipes and the removal and replacement of MH4F-1.

Storm Sewer C is designated on the drawings with a C as the first part of all manhole, catch basin, and flared end section structure titles. Storm Sewer C includes the structures and the corresponding pipes with the following exception:

Storm Sewer C does not include Storm Sewer C1 as defined below.

Storm Sewer C1 is included in the bid schedule as part of Option 1. Storm Sewer C1 includes Catch Basin C-2C, Catch Basin C-2D, and the pipe between the catch basins. It also includes all work associated with jacking the casing pipe through the railroad embankment.

Payment will be made for work associated with all operations necessary for the construction of storm drainage systems. Work includes, but is not limited to, installation of pipes, manholes, catch basins, grates, castings, end sections, trash guards and outfall structures with associated pipe railing and flap gates. The work shall also include excavation, connections to new and existing structures, bedding and backfilling of excavations, temporary modifications or support to other utilities such as waterlines, and all work associated with jacking pipe through the railroad embankment. Restoration of topsoil and turfed areas is incidental to the price bid. All incidentals shall be included.

1.2.6.2 Unit of Measure

Unit of measure: lump sum.

1.2.7 Storage Shed

1.2.7.1 Payment

Payment will be made for work associated with operations for supply and construction of a pre-engineered storage building. Work includes but is not limited to excavation, backfill, compaction, construction of footings, construction of reinforced concrete floor and reinforced concrete apron, restoration of topsoil and turf disturbed by Contractor operation in the construction of the building, placement of aggregate base and bituminous between building and existing driveway, supply and erection of pre-engineered building, installation of overhead and service doors, supply

and installation of heat system and all associated components, all work and work associated with providing electrical service and coordination with the electrical power company, all work and work associated with providing and installing all floor drain components and hookups, and electrical and mechanical work as specified. All incidentals shall be included.

1.2.7.2 Unit of Measurement

Unit of measure: lump sum.

1.2.8 Sanitary manholes

1.2.8.1 Payment

The bid schedule includes separate items for each sanitary manhole. Payment will be made for all work associated the construction of each sanitary manhole including excavation and backfill, restoration of all curbs and roadway surfaces, demolition and removals as necessary and required, connections to new or existing piping, temporary modifications needed during construction, supply of all labor and equipment, and supply and installation of all materials as required.

1.2.8.2 Unit of Measurement

Unit of measure: lump sum.

1.2.9 Clearing and Grubbing

1.2.9.1 Payment

Payment for clearing and grubbing will be made at the contract lump sum price bid for clearing and grubbing, and this price shall constitute full compensation for all labor, equipment, tools, and incidentals necessary to complete the work specified herein.

1.2.9.2 Unit of Measurement

Unit of measure: lump sum.

1.2.10 Demolition

1.2.10.1 Payment

Payment for demolition will be made at the contract lump sum price bid for demolition, and this price shall constitute full compensation for all labor, equipment, tools, and incidentals necessary to complete the work specified in Section 02220 herein.

1.2.10.2 Unit of Measurement

Unit of measure: lump sum.

1.3 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality

control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.3.1 Stripping

1.3.1.1 Payment

Payment will be made for work associated with operations necessary to perform stripping within the work limits shown. Work shall include, but not be limited to stripping vegetation, topsoil, and organic material within the limits shown, stockpiling of topsoil, and disposing of excess stripped materials. No allowances will be made for stripping outside the limits of construction unless authorized.

1.3.1.2 Measurement

Stripping shall be measured for payment by the cubic yard, in the original position, using the average-end-area method based on the original ground lines, as determined by the required survey and the lines and grade shown. The Contractor shall be responsible to perform the necessary quantity surveys. Materials removed outside the lines and grades shown will not be measured for payment. Material removed outside the lines and grades shown, but within the specified tolerance will not be measured for payment. Disposal of excess excavation will not be measured for payment. All costs therefore shall be included in the bid item to which the work pertains.

1.3.1.3 Unit of Measure

Unit of measure: cubic yard.

1.3.2 Excavation

1.3.2.1 Payment

Payment will be made for work associated with excavation for the construction of proposed pond areas, scour holes and ditches. Disposition of excess excavated material and unsuitable and frozen materials will be incidental to the price bid for excavation. Common excavation does not include excavation for the storm sewer piping and structures, excavation for structures, excavation for inspection trenches, off-site borrow excavation and any other excavation where measurement and payment is specified elsewhere.

1.3.2.2 Measurement

Excavation shall be measured for payment by the cubic yard, in the original position, using the average-end-area method based on the original ground lines as measured after stripping operations, as determined by the required survey and the lines and grades shown at the bottom of the topsoil or bedding layers. Final surveys shall be used for any authorized over-depth excavation. The Contractor shall be responsible to perform the necessary quantity surveys. Except for authorized over-depth excavation, materials removed outside the lines and grades shown will not be measured for payment. Material removed outside the lines and grades shown, but within the specified tolerance will not be measured for payment. Excess excavated material will not be measured for payment.

1.3.2.3 Unit of Measure

Unit of measure: cubic yard.

1.3.3 Inspection Trench

1.3.3.1 Payment

Payment will be made for work associated with excavation and backfill for the inspection trench as indicated on the drawings. Disposition of excess excavated material and unsuitable and frozen materials will be incidental to the price bid for excavation.

1.3.3.2 Measurement

Inspection trench shall be measured for payment by the cubic yard, in the original position, using the average-end-area method based on the original ground lines as measured after stripping operations, as determined by the required survey and the lines and grades shown. Final surveys shall be used for any authorized over-depth excavation. The Contractor shall be responsible to perform the necessary quantity surveys. Except for authorized over-depth excavation, materials removed and replaced outside the lines and grades shown will not be measured for payment. Material removed outside the lines and grades shown, but within the specified tolerance will not be measured for payment.

1.3.3.3 Unit of Measure

Unit of measure: cubic yard.

1.3.4 Select Impervious Fill

1.3.4.1 Payment

Payment will be made for the work associated with the furnishing and final placement and compaction of select impervious fill for the construction of the levees.

1.3.4.2 Measurement

Select impervious fill shall be measured for payment by the cubic yard and quantities will be determined by the average-end-area method. The basis for payment will be cross sections of areas to be filled taken after clearing, grubbing, and stripping operations or the placement of underlying fill material, where applicable, and the theoretical cross sections of the embankments constructed within the specified tolerance. The Contractor shall be responsible to perform the necessary quantity surveys. Cross sections shall be performed at significant breaks in grade except that the maximum distance between cross sections shall not exceed 50 feet. Volumes occupied by structures and piping will not be included in the measurement of select impervious fill for payment. Material placed as backfill for the construction of storm sewers or other structures will not be included in the measurement of select impervious fill for payment.

1.3.4.3 Unit of Measure

Unit of measure: cubic yard.

1.3.5 Topsoil and Seed

1.3.5.1 Payment

Payment will be made for the work associated with furnishing, final placement, and grading of topsoil and for work associated with providing and planting seed mixture specified within the limits indicated. Payment will include, but not be limited to soil preparation, mulch, watering, maintenance, seeding and work incidental to seeding. No additional payment will be made for topsoil and seeding outside the limits of required topsoil and seed as indicated on the drawings. No additional payment will be made for restoration of areas damaged by Contractor operations or for topsoil and seeding areas incidental to other work such as the installation of storm sewers.

1.3.5.2 Measurement

Topsoil and seed, whether topsoil comes from salvage or borrow, shall be measured for payment by square yard and quantities will be determined by measuring the lengths of the topsoil and seeded area perimeters and calculations the square yards. The Contractor shall be responsible to perform necessary quantity surveys.

1.3.5.3 Unit of Measurement

Unit of measure: square yard

1.3.6 Aggregate Surface Course

1.3.6.1 Payment

Quantity of aggregate surface course, as specified below, will be paid for at the contract unit price for aggregate surface course, which will constitute full compensation for the construction and completion of the aggregate surface course, including the furnishing of all other necessary labor and incidentals.

1.3.6.2 Measurement

Aggregate surface course located on the tops of the levees will be measured for payment by the cubic yard (CY) in place, within neat lines and to the compacted thicknesses shown on the drawings. Aggregate surface course in other locations will not be measured for payment and shall be considered incidental to the bid item to which it pertains. No payment will be made for overfill due to surface or subgrade variations. Material wasted, unused, rejected, or used for the convenience of the Contractor will not be measured for payment.

1.3.6.3 Unit of Measurement

Unit of measure: cubic yard

1.3.7 Riprap and Bedding

1.3.7.1 Payment

Payment shall be by ton (2,000 pounds avoirdupois) of material acceptably placed within the tolerances specified. Payment shall constitute full payment for all work associated with placement as shown and specified.

Deductions. All stone permitted by the Contracting Officer to remain

outside the tolerances specified will be deducted from the quantity to be paid for. Volume of excess stone will be computed, using the average-end-area of excess above the tolerance line. The excess volume will be deducted for the payment quantity at the rate of 115 pounds per cubic foot, regardless of actual weight per cubic foot.

1.3.7.2 Measurement

Riprap and bedding shall be weighed on accurate, approved scales furnished or made available of the Contractor. Before being approved for use, the scales shall have been tested by the State of North Dakota, Department of Weights and Measures or by an approved scale servicing company so as to operate within a degree or error not greater than 1 percent and to be sensitive to a change in load of 1/5 of 1 percent, both percentages being based on the total required weight of material normally weighed as a unit on the scale. Scales shall be spot checked for accuracy and sensitivity at least once a week as the work progresses. When materials are weighed in hauling vehicles, gross weights shall be checked and the vehicle tare weight determined as often as the Contracting Officer directs. The Contractor shall furnish such weights, and require reweighing as often as the Contracting Officer may require.

Weighing operations shall be performed offsite, as approved, in the presence of a representative of the Contracting Officer, unless waived. Each load shall be accompanied by duplicate copies of delivery tickets certified by the weighmaster. As a minimum, each ticket shall contain the following information:

1) Date and time
2) Vehicle number
3) Gross weight
4) Vehicle tare weight
5) Net weight
6) Material weighed
7) Signature of weighmaster

1.3.7.3 Unit of Measurement

Unit of measure: TON

1.3.8 Pad For Portable Pump

1.3.8.1 Payment

Payment will be made for all work associated with the construction of the pad for portable pumps as indicated on the drawings, including but not limited to, all labor and equipment and materials for excavation, forms reinforcement, concrete, backfill and all other work incidental to the construction.

1.3.8.2 Measurement

1.3.8.3 Unit of Measurement

Unit of measure: each

1.3.9 Sluice Gates

1.3.9.1 Payment

Payment will be made for work associated with furnishing and installing sluice gates, complete and fully operable. Work includes, but is not limited to supply and installation of sluice gate leaves and frames, gate operators and lifting hardware, stems, stem covers, stem guides, thimbles, and position indicators. Testing of sluice gates and associated hardware, shall also be included in the price paid. Supply of one portable operator and tripod shall also be included under this item. Tools, maintenance and operating manuals, and other appurtenances are considered incidental to the sluice gates. All incidentals shall be included.

1.3.9.2 Measurement

Sluice gates will be measured for payment by the gate, complete, tested and fully operational.

1.3.9.3 Unit of Measure

Unit of measure: each

1.3.10 Install Pumps

1.3.10.1 Payment

Payment will be made for work associated with installing Government supplied vertical pumps and motors. Work includes, but is not limited to installation of vertical storm water pumps, motors, vertical pump discharge piping and couplings, and mounting hardware. Testing of pumps and motors shall also be included in the price paid. Tools, maintenance and operating manuals, and other appurtenances are considered incidental to the pumps. All incidentals shall be included. Work associated with supply and installation of sump pumps and associated piping and flap valves shall be paid under "Pump Station Mechanical". Work associated with supply and installation of pump controls and electrical work shall be paid under "Pump Station Electrical". Work associated with modifications to existing pump station concrete, steel, grating and other appurtenances shall be paid under "Pump Station Structure".

1.3.10.2 Measurement

Pumps will be measured for payment by the pump, complete, tested and fully operational.

1.3.10.3 Unit of Measure

Unit of measure: each

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01312

QUALITY CONTROL SYSTEM (QCS)

PART 1 GENERAL

1.1 GENERAL
1.2 QCS SOFTWARE
1.3 SYSTEM REQUIREMENTS
1.4 RELATED INFORMATION
1.4.1 QCS User Guide
1.4.2 Contractor Quality Control(CQC) Training
1.5 CONTRACT DATABASE
1.6 DATABASE MAINTENANCE
1.6.1 Administration
1.6.1.1 Contractor Information
1.6.1.2 Subcontractor Information
1.6.1.3 Correspondence
1.6.1.4 Equipment
1.6.1.5 Management Reporting
1.6.2 Finances
1.6.2.1 Pay Activity Data
1.6.2.2 Payment Requests
1.6.3 Quality Control (QC)
1.6.3.1 Daily Contractor Quality Control (CQC) Reports.
1.6.3.2 Deficiency Tracking.
1.6.3.3 Three-Phase Control Meetings
1.6.3.4 Accident/Safety Tracking.
1.6.3.5 Features of Work
1.6.3.6 QC Requirements
1.6.4 Submittal Management
1.6.5 Schedule
1.6.6 Import/Export of Data
1.7 IMPLEMENTATION
1.8 DATA SUBMISSION
1.8.1 File Medium
1.8.2 Disk or CD-ROM Labels
1.8.3 File Names
1.9 MONTHLY COORDINATION MEETING
1.10 NOTIFICATION OF NONCOMPLIANCE

-- End of Section Table of Contents --

SECTION 01312

QUALITY CONTROL SYSTEM (QCS)

PART 1 GENERAL

1.1 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format.

Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

Particular attention is directed to other clauses which have a direct relationship to the reporting to be accomplished through QCS:

52.236-15 Schedules for Construction Contracts,
52.232-5 Payments Under Firm Fixed Price Construction Contracts,
Section 01320, PROJECT SCHEDULE,
Section 01330, SUBMITTAL PROCEDURES,
Section 01451, CONTRACTOR QUALITY CONTROL

There is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.2 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the

Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on 3-1/2 inch high-density diskettes or CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available. See http://winrms.usace.army.mil.

1.3 SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

Hardware

IBM-compatible PC with 200 MHz Pentium or higher processor

32+ MB RAM

4 GB hard drive disk space for sole use by the QCS system

3 1/2 inch high-density floppy drive

Compact disk (CD) Reader

Color monitor

Laser printer compatible with HP LaserJet III or better, with minimum 4 MB installed memory.

Connection to the internet, minimum 40,000 bits per second

Software

MS Windows 95 or newer version operating system (MS Windows NT 4.0 or newer is recommended)

Word Processing software compatible with MS Word 97 or newer

Internet browser

The Contractor's computer system shall be protected by virus protection software that is regularly upgraded with all issued manufacturer's updates throughout the life of the contract.

Electronic mail (E-mail) compatible with MS Outlook

1.4 RELATED INFORMATION

1.4.1 QCS User Guide

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website; the Contractor can obtain the current address from the Government. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.4.2 Contractor Quality Control(CQC) Training

The use of QCS will be discussed at the Contractor's QC System Manager

Training classes.

1.5 CONTRACT DATABASE

Prior to the pre-construction conference, the Government shall provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.6 DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government shall be submitted with file attachments, e.g., daily reports, schedule updates, payment requests. The QCS database typically shall include current data on the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, and management staff. The Contractor shall deliver Contractor administrative data in electronic format prior to the preconstruction conference.

1.6.1.2 Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. The Contractor shall deliver subcontractor administrative data in electronic format prior to the preconstruction conference.

1.6.1.3 Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main) office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.6.1.4 Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC

comments, Submittal Register Status, Three-Phase Inspection checklists.

1.6.2 Finances

1.6.2.1 Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.6.2.2 Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet and include it with the payment request. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment requests with supporting data with file attachment(s). A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01451 CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a data diskette or CD-ROM reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.6.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01451 CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government using E-mail or diskette within 24 hours after the date covered by the report. Use of either mode of submittal shall be coordinated with the Government representative. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.6.3.2 Deficiency Tracking.

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies

it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.6.3.3 Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.6.3.4 Accident/Safety Tracking.

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 200.

1.6.3.5 Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.6.3.6 QC Requirements

The Contractor shall develop and maintain a complete list of QC testing, transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.6.4 Submittal Management

The Government will provide the initial submittal register, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.6.5 Schedule

The Contractor shall develop a construction schedule consisting of pay activities, in accordance with Contract Clause "Schedules for Construction Contracts", and Section 01320 PROJECT SCHEDULE. This schedule shall be input and maintained in the RMS-QC database. The updated schedule data shall be included with each pay request submitted by the Contractor.

1.6.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data, and schedule data.

1.7 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.8 DATA SUBMISSION

The Contractor shall submit updates, payment requests, correspondence and other data in the format directed by the Contracting Officer. Submission formats available include diskettes, CD-ROM, or E-mail. Generally, E-mail is preferred for submissions from the Contractor's home office, and diskette or CD-ROM is preferred for submissions from the contractor's field office.

Data on the disks or CDs shall be exported using the QCS built-in export function. If used, diskettes and CD-ROMs will be submitted in accordance with the following:

1.8.1 File Medium

The Contractor shall submit required data on 3-1/2 inch double-sided high-density diskettes formatted to hold 1.44 MB of data, capable of running under Microsoft Windows 95 or newer. Alternatively, CD-ROMs may be used. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.8.2 Disk or CD-ROM Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.8.3 File Names

The Government will provide the file names to be used by the Contractor with the QCS software.

1.9 MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions. The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.10 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01320

PROJECT SCHEDULE

PART 1 GENERAL

1.1 SUBMITTALS
1.2 QUALIFICATIONS

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE REQUIREMENTS

PART 3 EXECUTION

3.1 GENERAL
3.2 BASIS FOR PAYMENT
3.3 SOFTWARE
3.3.1 Use of the Critical Path Method
3.3.2 Level of Detail Required
3.3.2.1 Activity Durations
3.3.2.2 Procurement Activities
3.3.2.3 Critical Activities
3.3.2.4 Government Activities
3.3.2.5 Responsibility
3.3.2.6 Feature of Work
3.3.3 Scheduled Project Completion
3.3.3.1 Constraint of Last Activity
3.3.3.2 Early Project Completion
3.3.4 Interim Completion Dates
3.3.5 Default Progress Data Disallowed
3.3.6 Out-of-Sequence Progress
3.3.7 Extended Non-Work Periods
3.3.8 Negative Lags
3.4 PROJECT SCHEDULE SUBMISSIONS
3.4.1 Initial Project Schedule Submission
3.4.2 Periodic Updates
3.4.3 Standard Activity Coding Dictionary
3.5 SUBMISSION REQUIREMENTS
3.5.1 Earnings Report
3.5.2 Network Diagram
3.6 PERIODIC PROGRESS MEETINGS
3.6.1 Meeting Attendance
3.6.2 Update Submission Following Progress Meeting
3.6.3 Progress Meeting Contents
3.7 REQUESTS FOR TIME EXTENSIONS
3.7.1 Justification of Delay
3.7.2 Submission Requirements
3.8 DIRECTED CHANGES
3.9 OWNERSHIP OF FLOAT

-- End of Section Table of Contents --

SECTION 01320

PROJECT SCHEDULE

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Initial Project Schedule; G,COR Periodic Updates; G,COR

Five copies of the initial project schedule shall be submitted. Two copies of periodic project schedule updates shall be submitted.

SD-04 Samples

Software;

The Contractor shall furnish the Government copies of the scheduling software if required under paragraph COMPUTER SOFTWARE REQUIREMENTS.

1.2 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports.

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE REQUIREMENTS

The Contractor shall furnish the Government with the software to be used, unless waived by the Contracting Officer. The Contactor shall assist in installing the software in the Government resident office. The Contractor shall provide the software complete, including documentation and updates used in the Contractor's system. The software shall remain the property of the Contractor, but shall be in the possession of and for the exclusive use by the Government during the contract period. The Government shall have rights to install the software on 3 computers (resident office, area office, and district office).

PART 3 EXECUTION

3.1 GENERAL

Pursuant to the Contract Clause, SCHEDULES FOR CONSTRUCTION CONTRACTS (FAR

52.236-15), a project schedule as described below shall be prepared. The scheduling of all work shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall contribute in developing and maintaining an accurate project schedule. The approved project schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of progress payments.

3.2 BASIS FOR PAYMENT

The project schedule shall be the basis for measuring Contractor progress. The Contracting Officer will use an approved project schedule to evaluate Contractor progress for payment purposes. In the case where project schedule revisions have been directed by the Contracting Officer and those revisions have not been included in the project schedule, then the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until the project schedule updates have been accepted.

3.3 SOFTWARE

Computer software systems utilized by the Contractor to produce the project schedule shall be capable of providing all requirements of this specification.

3.3.1 Use of the Critical Path Method

The project schedule shall clearly show the critical path. If a network analysis system is used, the Critical Path Method (CPM) of network calculation shall be used to generate the project schedule, provided in either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM).

3.3.2 Level of Detail Required

The project schedule shall include an appropriate level of detail. The Contracting Officer will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the project schedule.

3.3.2.1 Activity Durations

The Contractor shall breakout lump-sum or sum-job contract line items into subcategories, or activities. The number of activities shall be sufficient to allow the progress to be accurately determined between payment periods.

3.3.2.2 Procurement Activities

Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over calender 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, and delivery.

3.3.2.3 Critical Activities

The following activities shall be listed as separate line activities on the

Contractor's project schedule:

a. Submission and approval of as-built drawings.

b. Prefinal inspection.

c. Correction of punchlist from prefinal inspection.

d. Final inspection.

3.3.2.4 Government Activities

Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, inspections, utility tie-in, Government furnished property, and notice to proceed for phasing requirements.

3.3.2.5 Responsibility

All activities shall be identified in the project schedule by the party (Prime Contractor, subcontractor, Government agency, etc.) responsible to perform the work. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

3.3.2.6 Feature of Work

All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to a work breakdown structure for the project schedule. The feature of work for each activity shall be identified by the Feature of Work Code.

3.3.3 Scheduled Project Completion

The schedule interval shall extend from notice to proceed to the contract completion date. The notice to proceed date shall be taken as the date that notice to proceed was acknowledged.

3.3.3.1 Constraint of Last Activity

Completion of the last activity in the project schedule shall be constrained by the contract completion date. If the early finish of the last activity falls after the contract completion date, then the critical path shall show a negative float.

3.3.3.2 Early Project Completion

If the project schedule shows project completion prior to the contract completion date, the Contractor shall identify activities that have been accelerated and activities that are scheduled in parallel to support the "early" completion. The Contractor shall assist the Contracting Officer in evaluating the Contractor's ability to actually complete prior to the contract completion date.

3.3.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in

that phase falls after the interim completion date.

3.3.5 Default Progress Data Disallowed

The Contractor shall document the actual start and actual finish dates on the daily quality control report for every in-progress or completed activity and ensure that the data contained on the daily quality control reports is the sole basis for project schedule updating. Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual start and finish dates on the CPM schedule shall match those dates provided from Contractor quality control reports.

3.3.6 Out-of-Sequence Progress

The Contracting Officer shall be notified prior to work on any activities that are out-of-sequence with the project schedule. The Contractor shall update the project schedule to correct any out-of-sequence work.

3.3.7 Extended Non-Work Periods

Non-work periods of over 5 working days shall be identified by addition of activities that represent the delays.

3.3.8 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

3.4 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below.

3.4.1 Initial Project Schedule Submission

The project schedule shall provide a reasonable sequence of activities which represent work through the entire contract period and shall be at a reasonable level of detail.

3.4.2 Periodic Updates

Based on the result of progress meetings, the Contractor shall submit periodic project schedule updates. The Contractor shall furnish information and project schedule data, which in the judgement of the Contracting Officer, is necessary for verifying the Contractor's progress.

3.4.3 Standard Activity Coding Dictionary

The Contractor shall submit, with the initial project schedule, a coding scheme that shall be used throughout the project schedule for all activity codes contained in the project schedule. The coding scheme submitted shall list the values for each activity code category and translate those values into project specific designations. For example, a responsibility code value, "ELE", may be identified as "Electrical Subcontractor". Activity code values shall represent the same information throughout the duration of the contract.

3.5 SUBMISSION REQUIREMENTS

The following items shall be submitted for each project schedule submission:

3.5.1 Earnings Report

The Contractor shall submit a compilation of the Contractor's Total Earnings on the project through the most recent Monthly Progress Meeting. Activities shall be grouped by contract line item. The printed report shall contain, for each contract line item: activity number, activity description, original budgeted amount, total quantity, quantity to date, percent complete (based on cost), and earnings to date. A total project percent complete shall also be provided. If necessary to substantiate partial payment and requested by the Contracting Officer, the earnings report shall detail activities within a contract line item.

3.5.2 Network Diagram

A network diagram shall be required on the initial project schedule submission and on periodic submissions when requested by the Contracting Officer (not less than quarterly). The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The network diagram shall be constructed to meet the following conditions:

a. Continuous Flow. Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity or event number, description, duration, and estimated earned value shall be shown on the diagram.

b. Project Milestone Dates. Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

c. Critical Path. The critical path shall be clearly shown.

d. Banding. Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

e. S-Curves. Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project.

3.6.1 Meeting Attendance

The Contractor's project manager and the Contractor's authorized representative responsible for preparation of the project schedule shall attend the regular progress meeting.

3.6.2 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be

submitted not later than 4 working days after every third monthly progress meeting.

3.6.3 Progress Meeting Contents

Update information, including actual start dates, actual finish dates, remaining durations, and cost-to-date shall be subject to the approval of the Contracting Officer. The Contractor shall address the following minimum set of items, on an activity by activity basis, during each progress meeting.

a. Start and Finish Dates. The actual start and actual finish dates for each completed activity. The actual start and projected finish dates for each activity in-progress.

b. Cost Completion. The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains defects.

c. Project Schedule Changes. All changes pertaining to notice to proceed on change orders, change orders to be incorporated into the project schedule, Contractor proposed changes in work sequence, corrections to project schedule for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

d. Other Changes. Other changes required due to delays in completion of any activity or group of activities include unusually severe weather, product procurement, or other delays or work stoppages which make re-planning the work necessary.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, the Contractor shall furnish such justification, project schedule data and supporting evidence as the Contracting Officer may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract.

3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon an approved project schedule and other factual information. Delays that are caused by the Contractor's own actions will not be a cause for a time extension to the contract completion date.

3.7.2 Submission Requirements

The Contractor shall submit a justification in accordance with the requirements of other appropriate contract clauses and shall include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number.

b. A brief explanation of the cause(s) of the change.

c. An analysis of the overall impact of the changes proposed.

d. If requested by the Contracting Officer, the Contractor shall provide an interim project schedule update with revised activities.

3.8 DIRECTED CHANGES

If notice to proceed is issued for undefinitized work, the Contractor shall submit proposed project schedule revisions to the Contracting Officer within 14 calender days of the notice to proceed being issued. The proposed revisions to the project schedule must be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule; and the Contractor shall update the project schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached.

3.9 OWNERSHIP OF FLOAT

Float available in the project schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION
1.2 SUBMITTAL CLASSIFICATION
1.2.1 Government Approved
1.2.2 Information Only
1.3 APPROVED SUBMITTALS
1.4 DISAPPROVED SUBMITTALS
1.5 WITHHOLDING OF PAYMENT
1.6 MEASUREMENT AND PAYMENT

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL
3.2 SUBMITTAL REGISTER (ENG FORM 4288)
3.3 SCHEDULING
3.4 TRANSMITTAL FORM (ENG FORM 4025)
3.5 SUBMITTAL PROCEDURE
3.5.1 Submittal Copies
3.5.2 Schedule
3.5.3 Shop Drawings
3.5.4 Warranties
3.5.5 Deviations
3.6 CONTROL OF SUBMITTALS
3.7 GOVERNMENT APPROVED SUBMITTALS
3.8 INFORMATION ONLY SUBMITTALS
3.9 STAMPS

-- End of Section Table of Contents --

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUBMITTAL IDENTIFICATION

Submittals required are identified by SD numbers and titles as follows:

SD-01 Preconstruction Submittals

SD-02 Shop Drawings

SD-03 Product Data

SD-04 Samples

SD-05 Design Data

SD-06 Test Reports

SD-07 Certificates

SD-08 Manufacturer's Instructions

SD-09 Manufacturer's Field Reports

SD-10 Operation and Maintenance Data

SD-11 Closeout Submittals

1.2 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.2.1 Government Approved

Governmental approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.2.2 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.3 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory.

Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.5 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.6 MEASUREMENT AND PAYMENT

The work of this section will not be measured for payment. The Contractor shall be responsible for the work of this section, without any direct compensation being made other than the payment received for contract items.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) representative and each item shall be stamped, signed, and dated by the CQC representative indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288)

At the end of this section is a submittal register (ENG Form 4288) showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. Columns "c" through "f" have been completed by the Government; the Contractor shall complete columns "a" and "g" through "i" and submit the forms to the Contracting Officer for approval within 7 calendar days after Notice to Proceed. The Contractor shall keep the submittal register up-to-date and shall submit it to the Government together with the monthly payment request. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 30 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. The submittal register shall provide for a reasonable timely distribution of shop drawings as they are prepared (particularly within a specific discipline, i.e.: structural, mechanical).

3.4 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the CQS software. Hardcopies will be furnished to the Contractor if the CQS software is not used on this contract. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

3.5 SUBMITTAL PROCEDURE

3.5.1 Submittal Copies

The Contractor shall submit 6 hardcopies of each submittal (both government approved and for information only), or 1 hardcopy and 1 electronic copy, unless otherwise indicated. Each transmittal shall address only one submittal item. Transmittals returned for resubmission shall be resubmitted in their entirety. When approved by the Contracting Officer, routine test reports and delivery tickets may be submitted with daily quality control reports in place of following submittal procedures under this section.

3.5.2 Schedule

Shop drawings shall be submitted with ample time to secure Government approval prior to the time the items covered thereby are to be delivered to the site. Additional time should be allowed for possible resubmittal. Materials fabricated or delivered without Government approval of the shop drawing will be subject to rejection. All submittals shall be made prior to commencement of applicable work, and allow adequate time for government

review acceptable to the Contracting Officer.

3.5.3 Shop Drawings

Shop drawings shall be reproductions on high quality paper with clear legible print. Drawings shall generally be bordered a minimum of one inch and trimmed to neat lines. Shop drawing quality will be subject to approval. Each shop drawing, including catalog data, shall be identified with a title block including the name of the Contractor, contract number, name and location of project, and name of the item of work or structure to which the shop drawing applies. Catalog data, including specifications and full descriptive matter, may be submitted as shop drawings. Catalog data must be supplemented as necessary to include all pertinent data to verify conformance to the contract documents. When catalog data includes non applicable data, the applicable data shall be clearly indicated.

3.5.4 Warranties

Any items that are submitted for review or approval of the Contracting officer should include a copy of the manufacturer's standard warranty if one is available.

3.5.5 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.6 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.7 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Five copies of the submittal will be retained by the Contracting Officer and 1 copy of the submittal will be returned to the Contractor.

3.8 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

3.9 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s).

SIGNATURE: _____

TITLE: _____

DATE: _____

-- End of Section --

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS	**I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.** _____ NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A -- Approved as submitted.

B -- Approved, except as noted on drawings.

C -- Approved, except as noted on drawings. Refer to attached sheet resubmission required.

D -- Will be returned by separate correspondence.

E -- Disapproved (See attached).

F -- Receipt acknowledged.

FX -- Receipt acknowledged, does not comply as noted with contract requirements.

G -- Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

(Reverse of ENG Form 4025-R)

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01000	SD-04 Samples															
			Utility As-Builts	3.8.2														
			Quantity Surveys	3.8.3														
			SD-08 Manufacturer's Instructions															
			Dewatering Plan	3.7.6														
			Shoring plan	3.6.2														
			Haul Route Permits	3.1.3.3														
			Traffic Control Plan	3.1.3.1	G CO													
			SD-09 Manufacturer's Field															
			Reports															
			Preconstruction Damage Report															
		01140	SD-08 Manufacturer's Instructions															
			Utility Service Interruption		G CO													
			Request															
			Levee Removal/Flood Protection		G CO													
			Plan															
			Pump Station Modification Plan		G CO													
		01270	SD-02 Shop Drawings															
			Quantity Surveys															
		01320	SD-01 Preconstruction Submittals															
			Initial Project Schedule		G COR													
			Periodic Updates		G COR													
			SD-04 Samples															
			Software															
		01355	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.7	G ENV													

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01356	SD-07 Certificates															
			Mill Certificate or Affidavit	2.1.3														
		01500	SD-02 Shop Drawings															
			Site Plan															
			Government Field Office															
		01565	SD-01 Preconstruction Submittals															
			Notice of Intent (NOI)															
			SD-02 Shop Drawings															
			Temporary Erosion And Sediment															
			Control Plan															
		01780	SD-11 Closeout Submittals															
			As-Built Drawings		G GEN													
		02220	SD-07 Certificates															
			Work Plan		G ED													
		02300	SD-06 Test Reports															
			Testing	1.4.2.1														
			Daily Report Forms	3.10.1														
		02315	SD-06 Test Reports															
			Testing	3.14														
		02316	SD-06 Test Reports															
			Testing	3.3														
		02388	SD-06 Test Reports															
			Gradation Test															
			SD-07 Certificates															
			Material Sources		G ED													
			Certified Weight Scale Tickets															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02630	SD-03 Product Data															
			Placing Pipe	3.3														
			SD-07 Certificates															
			Pipe Certification		G	ED												
			Hydrostatic Test on Watertight		G	ED												
			Joints															
			Determination of Density		G	ED												
			Frame and Cover Castings	2.3.4	G	ED												
		02720	SD-01 Preconstruction Submittals															
			Aggregate Sources															
			SD-04 Samples															
			Aggregate Samples															
			SD-06 Test Reports															
			Testing															
		02920	SD-03 Product Data															
			Manufacturer's Literature															
			SD-04 Samples															
			Samples															
			SD-06 Test Reports															
			Soil Test															
			Seed Test															
			Water Test															
			Quantity Check															
			Maintenance Record															
			Seed Order for Native Grasses															
			SD-07 Certificates															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02920	Experience for Native Grasses															
			Certificates of Compliance															
		03100	SD-02 Shop Drawings															
			Formwork	3.1.1														
			SD-03 Product Data															
			Form Materials	2.1														
			Form Releasing Agents	2.1.7														
			SD-05 Design Data															
			Design	1.3														
		03150	SD-02 Shop Drawings															
			Waterstops	2.4														
			SD-03 Product Data															
			Preformed Expansion Joint Filler	2.2														
			Sealant	2.3														
			Waterstops	2.4														
			SD-04 Samples															
			Lubricant for Preformed	2.3.2														
			Compression Seals															
			Non-metallic Materials	2.4.1														
			SD-07 Certificates															
			Waterstops	2.4														
		03200	SD-02 Shop Drawings															
			Reinforcement	3.1	G ED													
			SD-07 Certificates															
			Welding	1.3														
			Reinforcing Steel	2.3														

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		03200	Splicing Lap Lengths															
		03300	SD-03 Product Data															
			Mixture Proportions	1.5	G ED													
			SD-06 Test Reports															
			Testing and Inspection for	3.12	G ED													
			Contractor Quality Control															
			SD-07 Certificates															
			Qualifications	1.3														
		04200	SD-03 Product Data															
			Burnished Block Masonry Units	2.4	G CO													
			SD-04 Samples															
			Burnished Block Masonry Units	2.4	G CO													
			SD-07 Certificates															
			Concrete Masonry Units (CMU)	2.3														
			Burnished Block Masonry Units	2.4														
		05055	SD-02 Shop Drawings															
			Detail Drawings	1.3	G ED													
			SD-03 Product Data															
			Welding of Structural Steel	2.2.2.1	G ED													
			Welding of Aluminum	2.2.2.3	G ED													
			Structural Steel Welding Repairs	2.3.4	G ED													
			Materials Orders	2.1.1														
			Materials List	2.1.2														
			Shipping Bill	2.1.3														
			SD-06 Test Reports															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05055	Tests, Inspections, and	2.3														
			Verifications															
			SD-07 Certificates															
			Qualification of Welders and	1.4														
			Welding Operators															
			Application Qualification for Steel	2.2.2.4	G ED													
			Studs															
			Welding of Aluminum	2.2.2.3	G ED													
		05120	SD-02 Shop Drawings															
			Structural Steel System		G ED													
			Structural Connections	3.2.1	G ED													
			SD-03 Product Data															
			Erection	3.2	G ED													
			Welding Procedure Specifications		G ED													
			(WPS)															
			SD-04 Samples															
			High Strength Bolts and Nuts	2.3	G CO													
			Carbon Steel Bolts and Nuts	2.4	G CO													
			Nuts Dimensional Style	2.5	G CO													
			Washers	2.6	G CO													
			Expansion Bolts and Adhesive	2.7	G CO													
			Bolts															
			SD-07 Certificates															
			Mill Test Reports		G CO													
			Welder Qualifications		G CO													
			Welding Inspector	1.5	G ED													

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05120	Fabrication	3.1	G ED													
		05210	SD-02 Shop Drawings															
			Steel Joists	1.3	G ED													
			SD-07 Certificates															
			Steel Joists	1.3														
		05300	SD-02 Shop Drawings															
			Deck Units	2.1	G ED													
			Accessories	2.5	G ED													
			Attachments	3.2	G ED													
			Holes and Openings	3.3	G ED													
			SD-03 Product Data															
			Deck Units	2.1	G ED													
			Attachments	3.2	G ED													
			SD-04 Samples															
			Deck Units	2.1	G ED													
			Accessories	2.5	G ED													
			SD-07 Certificates															
			Deck Units	2.1	G ED													
			Attachments	3.2	G ED													
		05500	SD-02 Shop Drawings															
			Miscellaneous Metal Items	1.6	G ED													
			SD-04 Samples															
			Miscellaneous Metal Items	1.6														
		05615	SD-02 Shop Drawings															
			Detail Drawings	2.4.1	G ED													
			SD-03 Product Data															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		05615	Materials	2.1														
			Materials Disposition Records															
			SD-06 Test Reports															
			Tests, Inspections, and	2.5														
			Verifications															
			SD-07 Certificates															
			Welding	2.4.3														
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance															
			Manuals															
		06100	SD-02 Shop Drawings															
			Nailers and Nailing Strips	3.1.3														
			SD-07 Certificates															
			Grading and Marking	2.1.1														
		07412a	SD-02 Shop Drawings															
			Metal Roofing	1.7.1	G	ED												
			SD-04 Samples															
			Accessories	2.2														
			Roof Panels	2.1	G	CO												
			Fasteners	2.3	G	CO												
			Gaskets and Insulating	2.9	G	CO												
			Compounds															
			Sealant	2.8	G	CO												
			SD-07 Certificates															
			Roof Panels	2.1														

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		07412a	Installation	3.1														
			Accessories	2.2														
			Insulation	2.6														
			Installer	1.3.3	G CO													
			Warranties	1.7	G CO													
		07900	SD-03 Product Data															
			Sealant	2.4	G ED													
		08110	SD-02 Shop Drawings															
			Doors	2.2	G ED													
			Doors	2.2	G ED													
		08361	SD-02 Shop Drawings															
			Doors	2.2	G													
			SD-03 Product Data															
			Doors	2.2	G													
			Electric operators	2.6	G													
			SD-08 Manufacturer's Instructions															
			Doors	2.2														
			SD-10 Operation and Maintenance															
			Data															
			Doors	2.2														
		08600	SD-02 Shop Drawings															
			Shop Drawings	3.2														
			SD-03 Product Data															
			Skylights	2.2														
			Warranty	1.6														
			SD-07 Certificates															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		08600	Skylights	2.2														
			Qualifications	1.4														
		08700	SD-03 Product Data															
			Hardware Schedule		G	ED												
			Keying	2.5	G	ED												
		09900	SD-03 Product Data															
			Paint	2.1														
			Mixing and Thinning	3.3														
			Application	3.4														
			SD-04 Samples															
			Paint	2.1														
			SD-06 Test Reports															
			Paint	2.1														
			SD-07 Certificates															
			Lead	2.1.2														
			Volatile Organic Compound	2.1.4														
			(VOC) Content															
		13120	SD-02 Shop Drawings															
			Building Shop Drawings		G	ED												
			Heating Equipment Shop		G	ED												
			Drawings															
			Floor Drain Equipment		G	ED												
			SD-03 Product Data															
			Design Analysis	1.5	G	ED												
			Instruction Manuals															
			Erection	3.1														

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		13120	Qualifications	1.3.2	G CO													
			Shelving	2.19														
			Heating Equipment		G ED													
			SD-04 Samples															
			Accessories	2.3.7														
			Roofing and Siding	2.3														
			Fasteners	2.5														
			Insulation	2.14														
			Gaskets and Insulating	2.16														
			Compounds															
			Sealant	2.15														
			Wall Liners	2.4														
			SD-06 Test Reports															
			Performance Test Reports		G ED													
			SD-07 Certificates															
			Metal Building Systems															
			Insulation	2.14														
		14600	SD-02 Shop Drawings															
			Wiring and Schematic diagrams		G ED													
			SD-03 Product Data															
			Hoist Hook Assembly	2.2.2	G ED													
			Heat Treatment															
			Hoist	2.1	G ED													
			SD-06 Test Reports															
			Electrification System Tests	3.3	G ED													
			Acceptance Testing	3.4	G ED													

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		14600	SD-07 Certificates															
			Hoist	2.1	G ED													
			Track Design	2.5.1	G ED													
			Hoist controls	2.1.1	G G													
			Hoist controls	2.1.1	G G													
			Electric Hoists	2.1.2	G ED													
			Trolleys	2.3	G ED													
			Wiring	2.6	G ED													
			Contact Conductors		G ED													
			Overcurrent Protection	2.6	G ED													
			Grounding	2.6	G ED													
			SD-10 Operation and Maintenance															
			Data															
			Operation Manuals		G ED													
			Maintenance Manuals		G ED													
		15050	SD-02 Shop Drawings															
			Sluice Gates		G ED													
			Operators		G ED													
			SD-03 Product Data															
			Hoist Design Criteria		G ED													
			Gate Vendors Erecting Engineer															
			SD-10 Operation and Maintenance															
			Data															
			Sluice Gates		G ED													
			Operators		G ED													
		15131	SD-02 Shop Drawings															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		15131	Shop Drawings		G ED													
			SD-03 Product Data															
			Coating Systems		G ED													
			Warranty	3.4	G ED													
			Spare Parts Listing		G ED													
			SD-05 Design Data															
			Pump Capacity-Head Curves		G ED													
			SD-06 Test Reports															
			Field Testing	3.3	G ED													
			SD-07 Certificates															
			Material Listing & Certification		G ED													
			Welding Certification															
			SD-08 Manufacturer’s Instructions															
			Installation And Erection		G ED													
			Instructions															
			SD-10 Operation and Maintenance															
			Data															
			Operation And Maintenance		G ED													
			Manual															
		15200	SD-02 Shop Drawings															
			Layout and Installation of Pump		G ED													
			Discharge Lines															
			SD-03 Product Data															
			Manufacturer's Standard Coatings		G ED													
			SD-06 Test Reports															
			Performance Test Reports															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		15200	SD-07 Certificates															
			Certificates of Compliance for		G ED													
			Piping															
			Certificates of Compliance for		G ED													
			Anchors and Supports															
		15895	SD-02 Shop Drawings															
			Shop Drawings		G ED													
			SD-03 Product Data															
			Heating Equipment		G ED													
			Exhaust Fans		G ED													
			Louvers and Dampers		G ED													
			Air Quality Monitoring Equipment		G ED													
			Air Ventilation Blower Equipment		G ED													
			Portable Heater		G ED													
			SD-06 Test Reports															
			Balancing Reports		G ED													
			Performance Test Reports		G ED													
			SD-10 Operation and Maintenance															
			Data															
			Operating and Maintenance		G ED													
			Instructions															
		16000	SD-02 Shop Drawings															
			Lighting Fixtures and Lamps		G ED													
			Drawings															
			Electronic Ballast Drawings		G ED													
			Panelboard Drawings		G ED													

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		16000	SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance															
			Manual															
		16120	SD-03 Product Data															
			Installation Instructions															
			SD-06 Test Reports															
			Tests, Inspections, and	2.2														
			Verifications															
		16415	SD-02 Shop Drawings															
			Interior Electrical Equipment		G	ED												
			SD-03 Product Data															
			Manufacturer's Catalog		G	ED												
			Material, Equipment, and Fixture		G	ED												
			Lists															
			As-Built Drawings	1.2.6	G	ED												
			Onsite Tests		G	ED												
			SD-06 Test Reports															
			Factory Test Reports		G	ED												
			Field Test Plan		G	ED												
			Field Test Reports	3.20	G	ED												
			SD-07 Certificates															
			Materials and Equipment	1.4	G	ED												
		16528	SD-02 Shop Drawings															
			Lighting System	1.3.1	G	ED												
			Detail Drawings		G	ED												

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG # RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		16528	As-Built Drawings	3.12.2														
			SD-03 Product Data															
			Equipment and Materials	1.3.7														
			SD-06 Test Reports															
			Operating Test	3.12.1	G ED													
			Ground Resistance	3.12.2														
			Measurements															
			SD-10 Operation and Maintenance															
			Data															
			Lighting System	1.3.1														
		16920	SD-02 Shop Drawings															
			Installation		G EE													
			Wiring		G EE													
			SD-03 Product Data															
			Instrumentation and Pump Control		G EE													
			Systems															
			Meters and Sensors		G EE													
			Training Manuals		G EE													
			Performance Verification Test	3.10.3	G EE													
			(PVT)															
			Factory Test Procedure		G EE													
			SD-06 Test Reports															
			Radio Path Study Reports		G EE													
			Factory Test Report		G EE													
			Testing, Adjusting and		G EE													
			Commissioning															

SUBMITTAL REGISTER

CONTRACT NO.
DACW37-02-B-0015

TITLE AND LOCATION
Wahpeton Stage 1

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		16920	Performance Verification	3.10.3	G	EE												
			Test(PVT)															
			Endurance Test		G	EE												
			Test results in report format.															
			SD-07 Certificates															
			Sensor and Control Wiring		G	EE												
			Testing of Ground Rods		G	EE												
			UL 508A Certification		G	EE												
			Software, program licenses and		G	EE												
			documentation															
			FCC radio licenses and		G	G												
			documentation															

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01355

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Environmental Pollution and Damage
1.2.2 Environmental Protection
1.2.3 Contractor Generated Hazardous Waste
1.2.4 Land Application for Discharge Water
1.2.5 Pesticide
1.2.6 Pests
1.2.7 Surface Discharge
1.2.8 Waters of the United States
1.2.9 Wetlands
1.3 GENERAL REQUIREMENTS
1.4 SUBCONTRACTORS
1.5 PAYMENT
1.6 SUBMITTALS
1.7 ENVIRONMENTAL PROTECTION PLAN
1.7.1 Compliance
1.7.2 Contents
1.7.3 Appendix
1.8 PROTECTION FEATURES
1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
1.10 NOTIFICATION

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PERMITS
3.2 LAND RESOURCES
3.2.1 Work Area Limits
3.2.2 Landscape
3.2.3 Erosion and Sediment Controls
3.2.4 Contractor Facilities and Work Areas
3.3 WATER RESOURCES
3.3.1 Cofferdams, Diversions, and Dewatering Operations
3.3.2 Stream Crossings
3.3.3 Wetlands
3.4 AIR RESOURCES
3.4.1 Particulates
3.4.2 Odors
3.4.3 Sound Intrusions
3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
3.5.1 Solid Wastes

3.5.2 Chemicals and Chemical Wastes
3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials
3.5.4 Fuel and Lubricants
3.5.5 Waste Water
3.6 RECYCLING AND WASTE MINIMIZATION
3.7 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
3.8 BIOLOGICAL RESOURCES
3.9 PESTICIDES
3.9.1 Pesticide Delivery and Storage
3.9.2 Qualifications
3.9.3 Pesticide Handling Requirements
3.9.4 Application
3.10 PREVIOUSLY USED EQUIPMENT
3.11 MAINTENANCE OF POLLUTION FACILITIES
3.12 TRAINING OF CONTRACTOR PERSONNEL
3.13 POST CONSTRUCTION CLEANUP

-- End of Section Table of Contents --

SECTION 01355

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 328	Definitions
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171 - 178	Hazardous Materials Regulations

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

US ARMY CORPS OF ENGINEERS TECHNICAL REPORT

WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners,excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.5 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.6 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.7 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers,creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.8 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.9 Wetlands

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLAND MANUAL.

1.3 GENERAL REQUIREMENTS

The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G,ENV

The environmental protection plan.

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the Contractor shall submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The Contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the Contractor considers necessary, shall be identified and discussed after those items

formally identified in this section. Prior to submittal of the Environmental Protection Plan, the Contractor shall meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan shall be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

The environmental protection plan shall include, but shall not be limited to, the following:

a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan shall include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

1. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer, and the local Fire Department for flammable materials, in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

3. Training requirements for Contractor's personnel and methods of accomplishing the training.

4. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

5. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

6. The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. The plan shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction.

l. A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

m. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

n. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the

intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the site, the plan shall be updated.

o. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan shall include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan shall include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, a copy of the permit and associated documents shall be included as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan shall include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

p. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. The plan shall include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Contracting Officer.

q. A pesticide treatment plan shall be included and updated, as information becomes available. The plan shall include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements.

1.7.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached,as an appendix, to the Environmental Protection Plan.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause 52.236-9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and

the Contracting Officer shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report shall be signed by both the the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor shall protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings,plans and specifications which may have an environmental impact will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.10 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping (suspending) all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law. The failure of the Contracting Officer to notify the Contractor of any noncompliance with Federal, State, or local environmental laws or regulations, permits, or the Contractor's Environmental Protection Plan shall not relieve the Contractor of the duty to comply with those laws or regulations, permits, or the Contractor's Environmental Protection Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PERMITS

Permits obtained by the Government related to the work of this contract are attached in SECTION 00830 ATTACHMENTS, or referenced in SECTION 01000 GENERAL. The Contractor is responsible for obtaining all applicable permits or licenses(those not obtained by the Government). The Contractor shall be responsible for implementing the terms and requirements of the permits held by the Contractor or the Government. Copies of permits referenced in SECTION 01000 GENERAL are available for inspection in the

Office of the District Engineer, Army Corps of Engineers Centre, 190 Fifth Street East, St. Paul, Minnesota 55101-1638.

3.2 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

3.2.1 Work Area Limits

Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Any temporary measures shall be removed after the area has been stabilized.

3.2.4 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation

of Contractor facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

3.3 WATER RESOURCES

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the Contractor. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.3.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for dewatering, water return for hydraulic dredging, removal of cofferdams, tailrace excavation, and tunnel closure shall be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body. The Contractor shall plan its operations and perform all work necessary to minimize adverse impact, such as water turbidity, on the habitat for wildlife and on water quality for downstream use.

3.3.2 Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments.

3.3.3 Wetlands

The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands, unless authorized herein. The Contractor shall be responsible for the protection of wetlands shown on the drawings in accordance with paragraph ENVIRONMENTAL PERMITS, REVIEWS, AND APPROVALS. Authorization to enter specific wetlands identified shall not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction site and associated boundaries.

3.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and performance laws and standards.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded

or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The Contractor shall comply with all State and local visibility regulations.

3.4.2 Odors

Odors from construction activities shall be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.4.3 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with state rules.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Solid wastes (excluding dredge material and clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

3.5.2 Chemicals and Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed. Chemical waste shall be collected in corrosion resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes shall be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials

during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations. The Contractor shall transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations.

3.5.5 Waste Water

Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. shall not be allowed to enter water ways.

3.6 RECYCLING AND WASTE MINIMIZATION

The Contractor shall participate in State and local government sponsored recycling programs.

3.7 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings, or will be designated by the Contracting Officer, if any have been identified. The Contractor shall protect these resources and shall be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing,

or otherwise disturbing such resources.

3.8 BIOLOGICAL RESOURCES

The Contractor shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.9 PESTICIDES

3.9.1 Pesticide Delivery and Storage

Pesticides shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. Pesticides shall be stored according to manufacturer's instructions and under lock and key when unattended.

3.9.2 Qualifications

For the application of pesticides, the Contractor shall use the services of a subcontractor whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.9.3 Pesticide Handling Requirements

The Contractor shall formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and shall use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Material Safety Data Sheets (MSDS)shall be available for all pesticide products.

3.9.4 Application

Pesticides shall be applied by a State Certified Pesticide Applicator in accordance with EPA label restrictions and recommendation. The Certified Applicator shall wear clothing and personal protective equipment as specified on the pesticide label. Water used for formulating shall only come from locations designated by the Contracting Officer. The Contractor shall not allow the equipment to overflow. Prior to application of pesticide, all equipment shall be inspected for leaks, clogging, wear, or damage and shall be repaired prior to being used.

3.10 PREVIOUSLY USED EQUIPMENT

The Contractor shall clean all previously used construction equipment prior to bringing it onto the project site. The Contractor shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. The Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

3.11 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.12 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Additional meetings shall be conducted for new personnel and when site conditions change. The training and meeting agenda shall include: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.13 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction in accordance with Contract Clause 52.236-12 CLEANING UP. The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01356

STORM WATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL
1.3 SUBMITTALS
1.4 EROSION AND SEDIMENT CONTROLS
1.4.1 Stabilization Practices
1.4.1.1 Unsuitable Conditions
1.4.1.2 No Activity for Less Than 21 Days
1.4.2 Structural Practices
1.4.2.1 Silt Fences
1.4.2.2 Straw Bales
1.4.2.3 Diversion Dikes

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES
2.1.1 Filter Fabric
2.1.2 Silt Fence Stakes and Posts
2.1.3 Mill Certificate or Affidavit
2.1.4 Identification Storage and Handling
2.2 COMPONENTS FOR STRAW BALES

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES
3.2 INSTALLATION OF STRAW BALES
3.3 MAINTENANCE
3.3.1 Silt Fence Maintenance
3.3.2 Straw Bale Maintenance
3.3.3 Diversion Dike Maintenance
3.4 INSPECTIONS
3.4.1 General
3.4.2 Inspections Details
3.4.3 Inspection Reports

-- End of Section Table of Contents --

SECTION 01356

STORM WATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4439	(1997) Standard Terminology for Geosynthetics
ASTM D 4491	(1996) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(1991; R 1996) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 1996)) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(1995) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(1995) Identification, Storage, and Handling of Geosynthetic Rolls

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01355 ENVIRONMENTAL PROTECTION, and Section 01565 NORTH DAKOTA POLLUTANT DISCHARGE ELIMINATION SYSTEM.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On his daily CQC Report, the Contractor shall record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, stabilization practices shall be initiated as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 21 Days

Where construction activity will resume on a portion of the site within 21 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 21 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Contracting Officer.

1.4.2.2 Straw Bales

The Contractor shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and

grading) in each independent runoff area (e.g., after clearing and grubbing in a area between a ridge and drain, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where straw bales are to be used are shown on the drawings. Final removal of straw bale barriers shall be upon approval by the Contracting Officer. Rows of bales of straw shall be provided as follows:

a. Along the downhill perimeter edge of all areas disturbed.

b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

c. Along the toe of all cut slopes and fill slopes of the construction areas.

d. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced a maximum of 200feet apart.

e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 200 feet apart.

f. At the entrance to culverts that receive runoff from disturbed areas.

1.4.2.3 Diversion Dikes

Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic. Diversion dikes shall be located as shown on the drawings.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry condition. The bales shall have a standard cross section of 14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The Contractor may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have a minimum dimensions of 2 inches x 2 inches in cross section and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be

spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Contracting Officer.

3.2 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

3.3 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

3.3.1 Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall receive erosion control.

3.3.2 Straw Bale Maintenance

Straw bale barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be

removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

3.3.3 Diversion Dike Maintenance

Diversion dikes shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with Section 02920 TURF.

3.4 INSPECTIONS

3.4.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.4.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.4.3 Inspection Reports

For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES
1.2 PAYMENT

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS
3.2 QUALITY CONTROL PLAN
3.2.1 General
3.2.2 Content of the CQC Plan
3.2.3 Acceptance of Plan
3.2.4 Notification of Changes
3.3 COORDINATION MEETING
3.4 QUALITY CONTROL ORGANIZATION
3.4.1 Personnel Requirements
3.4.2 CQC System Manager
3.4.3 Additional Requirement
3.4.4 Organizational Changes
3.5 SUBMITTALS AND DELIVERABLES
3.6 CONTROL
3.6.1 Preparatory Phase
3.6.2 Initial Phase
3.6.3 Follow-up Phase
3.6.4 Additional Preparatory and Initial Phases
3.7 TESTS
3.7.1 Testing Procedure
3.7.2 Testing Laboratories
3.7.2.1 Capability Check
3.7.2.2 Capability Recheck
3.7.3 Onsite Laboratory
3.7.4 Furnishing or Transportation of Samples for Testing
3.8 COMPLETION INSPECTION
3.8.1 Punch-Out Inspection
3.8.2 Pre-Final Inspection
3.8.3 Final Acceptance Inspection
3.9 DOCUMENTATION
3.10 SAMPLE FORMS
3.11 NOTIFICATION OF NONCOMPLIANCE

-- End of Section Table of Contents --

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2000b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

The Contractor shall be responsible for the work for the work of this section, without any direct compensation being made other than the payment received for contract items.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent or someone higher in the Contractor's organization.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These

procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager shall receive direction and authority from the CQC System Manager and shall serve as a member of the CQC staff. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority

and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. The Contractor shall provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation shall be maintained at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a person with a minimum of 10 years experience in related duties on construction work. The CQC system manager shall be computer literate and capable of utilizing/executing the QCS requirements of Section 01312. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall have no duties outside of CQC system manager. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 Additional Requirement

In addition to the above qualifications, the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors". This course is periodically offered through the Government in the Minneapolis - St. Paul, Minnesota metropolitan area.

3.4.4 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall

include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a testing laboratory meeting the requirements listed under PARAGRAPH: CAPABILITY CHECK, or establish a testing laboratory at the project site meeting those requirements. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and

comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329. The Contractor shall submit a Quality Management Manual meeting the requirements of ASTM D 3740 and ASTM E 329 for each laboratory to be used, including on-site project laboratories.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of $1000.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Contracting Officer. Coordination for each specific test, exact delivery location, and dates will be made with the Contracting Officer.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the Special Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

The following sample forms are enclosed at the end of this section:

a. Construction Quality Control Management Report

b. CQC Report

c. Preparatory Phase Checklist

d. Initial Phase Checklist

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take

immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

CONSTRUCTION QUALITY CONTROL MANAGEMENT REPORT

Contractor Production

Contractor's Name

_____

_____

Daily Report No:_____ Date:_____
Contract No.:_____

Project Title & Location: _____

Weather:_____ Precipitation:_____in. Temp.:_____Min._____Max.

1. Contract/Subcontractors and Area of Responsibility:

NUMBER:	TRADE	HOURS	EMPLOYER	LOCATION/DESCRIPTION OF WORK

2. Operating Plant or Equipment. (Not hand tools)

Plant/Equipment	Date of Arrival/Departure	Date of Safety Check	Hours Used	Hours Idle	Hours Repair

CQC Report

1. Work performed today: (Indicate location and description of work performed by prime and/or subcontractors by letter in table above).

2. Results of control activities: (Indicate whether P - Preparatory, I - Initial, or F - Follow-up Phase. When a P or I meeting is conducted, complete attachment 1-A or 1-B, respectively. When network analysis system is used, identify work by use of I-J numbers)

3. Test performed as required by plans and/or specifications:

4. Material received:

CQC Report (Cont'd)

5. Submittals Reviewed:

(a) Submittal No.	(b) Spec/Plan Reference	(c) By Whom	(d) Action

6. Off-site surveillance activities, including action taken:

7. Job safety: (Report violations; Corrective instructions given; Corrective actions taken).

8. Remarks: (Instructions received or given. Conflict(s) in Plans and/or Specifications)

Contractor's Verification: On behalf of the Contractor, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.

CQC System Manager

PREPARATORY PHASE CHECKLIST

Contract No.: _____ Date: _____
Definable Feature: _____ Spec Section: _____

Government Rep Notified_____ Hours in Advance Yes ____ No ____

I. Personnel Present.

	Name	Position	Company/Government
1.			
2.			
3.			
4.			
5.			
6.			
7.			

(List additional personnel on reverse side)

II. Submittals.

1. Review submittals and/or submittal log 4288. Have all submittals been approved? Yes _____ No _____

If No, what items have not been submitted?
a._____
b._____
c._____

2. Are all materials on hand? Yes _____ No _____
a._____
b._____
c._____

3. Check approved submittals against delivered material. (This should be done as material arrives).

Comments:_____
_____

III. Material Storage.
Are materials stored properly? Yes _____ No _____
If No, what action is taken?
_____

Preparatory Phase Checklist (Cont'd)

IV. Specifications.

1. Review each paragraph of specifications.

_____

_____

_____

2. Discuss procedure for accomplishing the work.

_____

_____

_____

_____

_____

_____

3. Clarify any differences.

_____

_____

_____

_____

_____

V. Preliminary Work.
Ensure preliminary work is correct.
If not, what action is taken?_____

_____

VI. Testing.

1. Identify test to be performed, frequency, and by whom.

_____

2. When required? _____
3. Where required?_____
4. Review Testing Plan._____
5. Has test facilities been approved? _____

VII. Safety.
1. Review applicable portion of EM 385-1-1._____

_____

2. Activity Hazard Analysis approved? Yes _____ No _____

VIII. Corps of Engineers comments during meeting.

_____

_____

_____

_____
CQC System Manager

INITIAL PHASE CHECKLIST

Contract No.:_____ Date:_____

Definable Feature:_____

Government Rep Notified:_____ Hours in Advance Yes_____ No _____

I. Personnel Present:

Name	Position	Company/Government
1.		
2.		
3.		
4.		
5.		
6.		

(List additional personnel on reverse side)

II. Identify full compliance with procedures identified at preparatory. Coordinate plans, specifications, and submittals.
Comments: _____

III. Preliminary Work. Ensure preliminary work is complete and correct. If not, what action is taken? _____

IV. Establish Level of Workmanship.
1. Where is work located? _____
2. Is a sample panel required? Yes _____ No_____
3. Will the initial work be considered as a sample? Yes_____No_____
(If yes, maintain in present condition as long as possible).

V. Resolve any Differences.
Comments:_____

Review job conditions using EM 385-1-1 and job hazard analysis.
Comments: _____

_____
CQC System Manager

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUBMITTALS
1.2 GROUNDS AND ROADWAYS
1.2.1 Availability of Grounds
1.2.2 Drainage Facilities
1.3 PAVEMENT REMOVAL AND REPLACEMENT
1.4 AVAILABILITY AND USE OF UTILITY SERVICES
1.4.1 Temporary Electrical Facilities
1.4.2 Sanitation
1.4.3 Telephone
1.5 PROTECTION AND MAINTENANCE OF TRAFFIC
1.5.1 Off-Site Haul routes
1.5.2 On-Site Haul Roads
1.5.3 Barricades
1.6 CONTRACTOR'S TEMPORARY FACILITIES
1.6.1 Administrative Field Offices
1.6.2 Staging Area
1.7 PLANT COMMUNICATION
1.8 TEMPORARY PROJECT SAFETY FENCING

PART 2 PRODUCTS

2.1 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN
2.1.1 Bulletin Board
2.1.2 Project and Safety Signs
2.2 GOVERNMENT FIELD OFFICE
2.2.1 Location
2.2.2 Construction
2.2.3 Utilities.
2.2.4 Furnishings
2.2.5 Furniture
2.2.6 Office Equipment
2.2.7 Maintenance.

PART 3 EXECUTION

3.1 CLEANUP
3.2 RESTORATION OF STORAGE AREA

-- End of Section Table of Contents --

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Site Plan;

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

Government Field Office;

The Contractor shall submit a preliminary plan and description of the mobile office facilities which it proposes to furnish prior to proceeding with procurement thereof.

1.2 GROUNDS AND ROADWAYS

1.2.1 Availability of Grounds

The boundary limits of the grounds made available for the Contractor's use during the life of the contract are shown on the drawings. Any additional rights-of-way or grounds desired by the Contractor shall be obtained by the Contractor at its own expense, and copies of agreements for the use of such rights-of-way shall be furnished to the Contracting Officer before entering thereon. Such agreements shall clearly relieve the Government of any responsibility for damages resulting from the use of the grounds.

1.2.2 Drainage Facilities

Insofar as natural drainage from the protected areas is obstructed by contract operations, it shall be the Contractor's responsibility to make adequate provision for accommodating such drainage in a satisfactory manner during the life of this contract, either by temporary means or by use of the permanent construction and operation of the permanent facilities.

1.3 PAVEMENT REMOVAL AND REPLACEMENT

Where roads are cut, removed, or otherwise damaged in the prosecution of the work the Contractor shall replace all pavements or other surfacings so removed or damaged to their preconstruction condition. After backfill is completed on paved streets, a temporary surface shall be laid down and the street opened to the traffic in order to provide access to abutting property. Restoration of the original street surface construction shall be completed no later than 60 calendar days after starting excavation. Should weather conditions preclude the restoration of the original surface material, temporary resurfacing utilizing a bituminous mixture shall be installed with the final surface constructed no later than June 1 of the following construction season.

1.4 AVAILABILITY AND USE OF UTILITY SERVICES

1.4.1 Temporary Electrical Facilities

The Contractor shall be responsible for coordination and costs for electrical power required for the Contractor's operations, including all costs for utility company hookup, installation/dismantling of transformers and distribution lines. In general, the Contractor shall establish its own service connection with the utility company. If the Contractor proposes to use an existing Government service connection, a request shall be submitted for approval to verify the Contractor's use will not interfere with operation of the facilities, and the monthly service fees will be paid for in whole (including Government power consumption) by the Contractor.

1.4.2 Sanitation

The Contractor shall provide and maintain within the construction area field-type sanitary facilities in accordance with EM 385-1-1. These facilities shall include but not be limited to toilet, washing, and drinking water facilities.

1.4.3 Telephone

The Contractor shall make arrangements and pay all costs for their telephone facilities desired. Government personnel will not take or deliver messages for the Contractor.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. Dust control shall be provided as stated in SECTION 01355 ENVIRONMENTAL PROTECTION.

1.5.1 Off-Site Haul routes

The Contractor shall be responsible for securing all permits required along haul routes. The Contractor shall be the sole permittee and shall be responsible for meeting all obligations of the permits. A copy of each permit shall be submitted to the Contracting Officer. The Contractor, as between the Government and the Contractor, has sole responsibility for damage or deterioration of the Contractor's haul routes.

1.5.2 On-Site Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.5.3 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.6 CONTRACTOR'S TEMPORARY FACILITIES

1.6.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.6.2 Staging Area

The boundary limits of the grounds made available for the Contractor's use during the life of the contract are shown on the drawings as Work Limits. Trailers, materials, or equipment shall not be placed or stored outside the work limits.

1.7 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

1.8 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, generally located to encompass the active construction areas. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

PART 2 PRODUCTS

2.1 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

2.1.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

2.1.2 Project and Safety Signs

The Contractor shall furnish and erect a Project sign and a Safety sign in a location selected by the Contracting Officer at the project site within 15 days after receipt of the notice to proceed. The requirements for the signs and their content shall be as shown on the drawings at the end of this section. The data required by the safety sign shall be corrected each work day. Signs shall be maintained throughout the construction period, and upon completion of the project, the signs shall be removed from the site. The PROJECT DESCRIPTION and PROJECT NAME shall be as follows:

PROJECT DESCRIPTION:
FLOOD CONTROL
RED RIVER OF THE NORTH
WAHPETON, NORTH DAKOTA

PROJECT NAME: WAHPETON N.D. STAGE 1

2.2 GOVERNMENT FIELD OFFICE

The Contractor shall provide and maintain for the life of the contract an approved mobile office (mobile home style) meeting the following requirements as to space and facilities for the exclusive use of the government. The unit shall be ready for occupancy within 30 calendar days after notice to proceed. The unit shall provide a minimum of 500 square feet of floor area and shall include two private offices, each having approximately 100 square feet of floor area and a storage closet. The unit shall have two entrance doors. The remaining space is to be utilized as one large office, a toilet room and a storage area for coats, etc. The unit

shall be provided with a toilet room consisting of a stool and lavatory and an electric heater. The unit interior headroom shall be no less than a nominal 8'-0".

2.2.1 Location

The Contractor shall locate the portable mobile home type field office at or near the Contractor's field office site at a location approved by the Contracting Officer. Four parking spaces shall be reserved for Government vehicles at the Government trailer.

2.2.2 Construction.

The Government field office shall be similar in quality and age as the Contractor's field office, if provided. Exterior and interior finishes shall be free from color fade, chipping, or peeling. The unit shall be set level on blocking, be provided with plywood skirting, and be anchored to the ground for protection against wind damage. Exterior doors shall be provided with screens and outside hasps for use with padlocks. The unit shall be electrically wired for fluorescent ceiling lighting fixtures and weather proof porch lights at each entrance door, along with switches, duplex convenience outlets, and a master switch and fuse box as required. The entire unit shall be adequately insulated with fiberglass insulation and vapor barrier. Dead air crawl space shall be properly ventilated. Heating and air conditioning facilities shall be provided to maintain an ambient inside temperature of 68 degrees F. The unit shall be weather proof, and furnished with a forced air type heating plant, either gas or oil with hot and cold air ducts adequate to supply even heat throughout the unit. Air conditioning shall be furnished with capacity as recommended by the manufacturer for the trailer size. A central air conditioning system shall be provided.

2.2.3 Utilities.

The Contractor shall be responsible for service fees in connection with electrical power and heating (natural gas or oil service). The Contractor shall also be responsible for service fees in connection with the water supply, sanitary waste system, and telephone as indicated below. When available, city water and sewer system connections are preferred.

a. Sanitary Facilities. In the absence of a city sewer connection, holding tanks shall be provided. The lavatory shall discharge into an outside underground holding tank with a capacity of not less than 400 gallons and a vented drain. The contractor shall provide year-round pumping of the holding tank as required. Subject to approval, a serviced chemical toilet may be used.

b. Potable Water. In the absence of a city water connection, a potable water storage tank of not less than 300 gallons capacity shall be furnished with adequate supply filling connections and screened vent, and shall be stainless steel or plastic with a drain cock of not less than ½ inch size. Upon completion of the job, the Contractor shall remove the underground holding tank and backfill the excavation. The Contractor shall provide potable water for the storage tank if service connections are not provided.

c. Telephone. The Contractor shall be responsible for installation of telephone at the Government office. The telephone hook-up should be placed on a separate account from the Contractor's phone so that it can be transferred to the Government after installation. The Government will be responsible for the telephone service to the Government field

office after installation.

2.2.4 Furnishings.

The following furnishings shall be provided for the Government office:

a. A hot and cold drinking water dispenser.
b. Bulletin board, 48" x 36" wood framed cork, mounted near entry/exit door.
c. Dry erase board, 60" x 36" porcelain-on-steel with wood frame, wall mounted near and easily observable from the conference table.
c. A work counter shall be supplied and mounted along a side wall, 2 feet wide/deep x 8 feet long at 40" above the finished floor. The top of the counter shall be 2" (nominal) planking covered on top with hard tempered laminate or masonite of not less than 1/16" thickness and edged with a standard laminate trim. Alternatively, this work counter may be made of a pre-fabricated laminate counter top similar to a bathroom/kitchen counter top found at home improvement stores. Two shelves (each 12 inches wide/deep x 8 feet long and fabricated of a pre-finished laminate material), one above and one below the counter shall be supplied and installed. Install top shelf approximately 70" and bottom shelf approximately 24" above finished floor directly above and below the counter. Counter shall be structurally supported with brackets, etc. in order to prevent L/360 deflection (1/2 inch) of a 30 psf distributed and 200 pound point load at any point. Shelves shall be structurally supported with brackets, etc. in order to prevent a L/360 deflection of a 30 psf distributed load.
d. Sign. The contractor shall securely attach to the unit exterior and adjacent to the main entrance door, as approved, a 24 inch by 36 inch sign with the Corps of Engineers castle insignia with wording as specified.
e. Stoop. A stoop with 8 inch risers and handrails shall be provided at each entrance door.
f. Windows. All windows shall be provided with sash and security screens along with shades, blinds or similar features that allow for the complete coverage of the windows on the inside.
g. Lavatory. A 5 by 24 inch metal shelf and 15 by 20 inch wood or metal framed plate glass mirror shall be provided above the lavatory.

2.2.5 Furniture

Office furniture shall be coordinated with respect to style, color, and upholstery. The following furniture shall be provided:

a. Three desks either wood or steel, double pedestal type, top approximately 60 inches by 34 inches, with lock.
b. Four swivel arm/office chairs with tilting seat, adjustable spring back and seat height adjustment.
c. Two filing cabinets, four-drawer roller supported legal size, with lock.
d. One drafting table stool, non-tilting, rotary type with back and circular footrest.
e. One drafting table, metal and/or wood, 36 inches by 48 inches.
f. One conference table, 3/4 inch thick by 72 inches long by 36 inches wide with solid core construction top.
g. Six chairs for conference table, either wood or steel construction, with cushioned seat and backrest.
h. Four steel folding chairs with cushion seat and back.
i. One caster mounted rack for hanging full size drawings.

2.2.6 Office Equipment

The following equipment shall be provided:

a. Facsimile (fax) machine: one each, desk top plain paper type with modem bits per second speeds of 9600, 4800, and 2400, and capable of scanning or printing a letter size page (8.5 by 11 inch) with 10 millimetre margins at standard (203 x 98 dpi) and fine (203 x 196 dpi) resolutions. The Contractor shall also supply approved white facsimile paper for the entire project contract period.

b. Copying machine: one each, with a halogen lamp light source and an indirect dual component dry tone process. For scanning, the machine shall have both a flat bed and an automatic sheet feeder accepting 11 x 17 (tabloid), 8.5 x 14 (legal), and 8.5 x 11 (US letter) paper. It shall be able to print the copy at 50% or 100% or 200% of the scale of the original. It shall have separate trays for 11 x 17, 8.5 x 14, and 8.5 x 11 paper. It shall also have the following capabilities: automatic feed, duplexing, collating, sorting, grouping, and stapling. It shall be completely set up and operational. For the entire contract project period, the Contractor shall supply approved white paper and furnish a complete maintenance service contract for the copying machine.

c. Personal computers: two each, each having the following minimum capabilities and components, completely setup and operational.

(1) Processor: At least 900 MHz with 128 bit internal memory data paths and at least 256 KB level 2 (on chip) cache running at processor speed and at least 2 MB SDRAM level 3 cache.

(2) Memory: At least 512 MB RAM.

(3) Internal disk drive: At least one, with at least 12 GB capacity (usable, after formatting).

(4) Floppy disk drive: At least one 3.5 inch, high density.

(5) Optical disk drives: At least one CD (read at 24x or faster), and at least one CD-RW (read at 24x or faster, write CD-R at 8x or faster, write CD-RW at 4x or faster), and at least one DVD (read at 6x or faster; could be combined with one of the CD drives) and software for creating CDs.

(6) Internal modem: V.90.

(7) Video card: at least 16 MB SDRAM, supporting at least 1280 x 1024 pixels at 24 bits per pixel at greater than 74 Hz refresh frequency.

(8) Monitor: color, compatible with the video card and computer, capable of displaying at least 1280 x 1024 at greater than 74 Hz refresh frequency, with viewing area greater than 20 inches measured diagonally.

(9) Keyboard: compatible with computer, with over 100 keys.

(10) Mouse: two button with wheel.

(11) Operating system: Microsoft Windows 98 (or newer), loaded and operational.

(12) Application software: Microsoft Office 2000 (or newer) and Adobe Acrobat (version 5 or newer), loaded and operational.

(13) Utility software: Norton AntiVirus for Windows (latest version), loaded and operational.

d. Networked laser printer: color Postscript, at least 600 dpi, capable of printing tabloid and letter size paper, at least 12 letter pages per minute nominal printing speed.

e. Telephones and telephone lines: Four telephone lines, each capable of supporting over 40,000 bits per second data transmission on a routine basis. Three identical telephones, each having at least 20 speed dial locations, speakerphone and intercom (within the trailer)

capability, mute, hold, and redial functions, "line in use" indicator, and a volume control. Each telephone shall connect to all four phone lines, so that any phone can call on any line, and one line each shall be connected to the fax machine and each computer.

2.2.7 Maintenance.

The Contractor shall maintain the field office for the life of the contract. The Contractor shall be responsible for maintaining and paying for all costs associated with the following services:

a. Supplies. Toilet paper, paper toweling, paper and supplies for the FAX and copy machines shall be provided. Supply water for the drinking water dispenser. Supply water for the lavatory if a service connection is not provided for potable water.
b. Maintenance of office equipment. Include a maintenance service contract/agreement for operation of the Fax and Copy machines.
c. Janitorial Service. The Contractor shall provide daily janitorial service and provide all janitorial and sanitary supplies as well as trash removal service.
d. Snow removal. Maintenance of site access including snow removal service is the responsibility of the contractor.

PART 3 EXECUTION

3.1 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

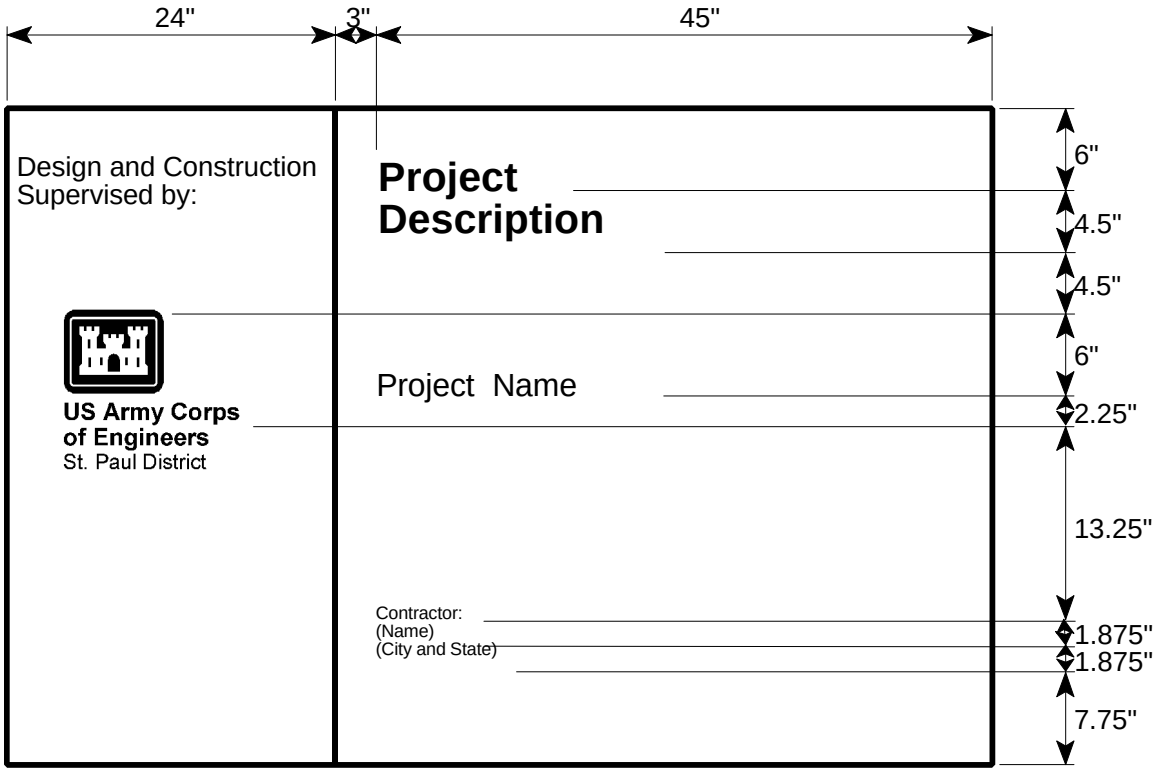
3.2 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

-- End of Section --

PROJECT SIGN

The graphic format tor this 4' x 6' sign panel follows the legend guidelines and layout as specified below. The large 4' x 4' section of the panel on the right is to be white with black legend. A 2' x 4' decal provided by the Corps shall be placed on the left side of the sign panel.



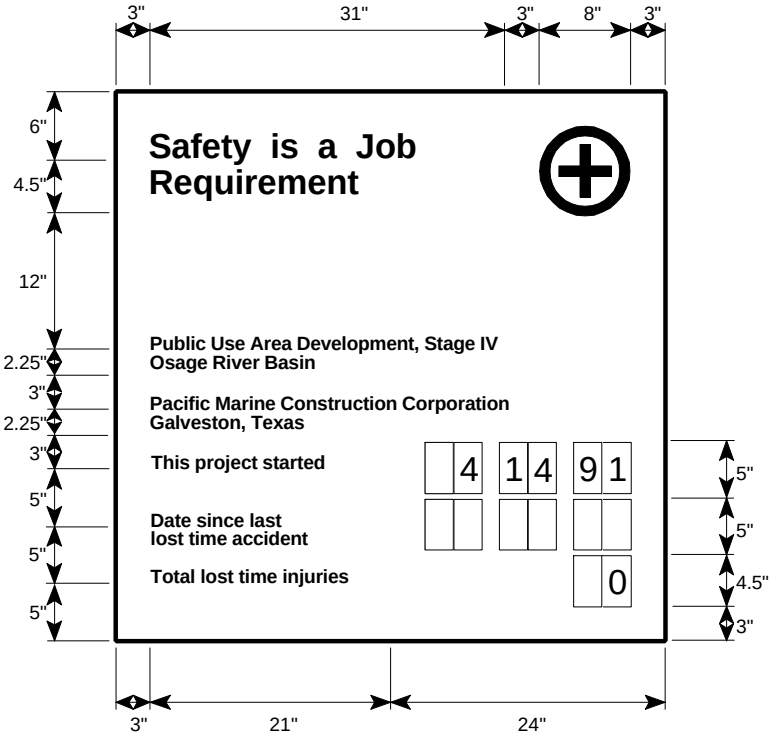
Project Description:
One to three line project title legend describes the work being done under this contract.
Color: Black; Typeface: 3" Helvetica Bold; Maximum line length: 42".

Project Name:
One to three line identification of project or facility.
Color: Black; Typeface: 1.5" Helvetica Bold; Maximum line length: 42".
Cross-align the first line of PROJECT NAME with the first line of the Corps Signature as shown.

Contractor:
One to five line identification of prim e contractors including: type (architect, general contractor, etc.), corporate or firm name, city, state.
Color: Black; Typeface: 1.25" Helvetica Bold; Maximum line length: 21".

All typography is flush left and ragged right, upper and lower case with initial capitals only as shown. Letter and word spacing to follow Corps Standards (EP 310-1-6a and 6b).

SAFETY SIGN



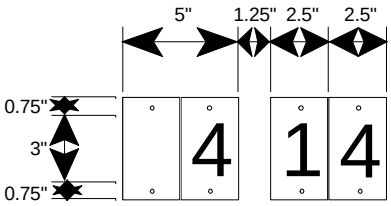
All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter and word spacing to follow Corps Standards (EP 310-1-6a and 6b).

Legend Group 1: Standard two-line title "Safety is a Job Requirement" with (8" od.) Safety Green First Aid logo. Typeface: 3" Helvetica Bold; Color: Black.

Legend Group 2: One- to two-line project title legend describes the work being done under this contract and name of host project. Typeface: 1.5" Helvetica Regular; Color: Black; Maximum line length: 42".

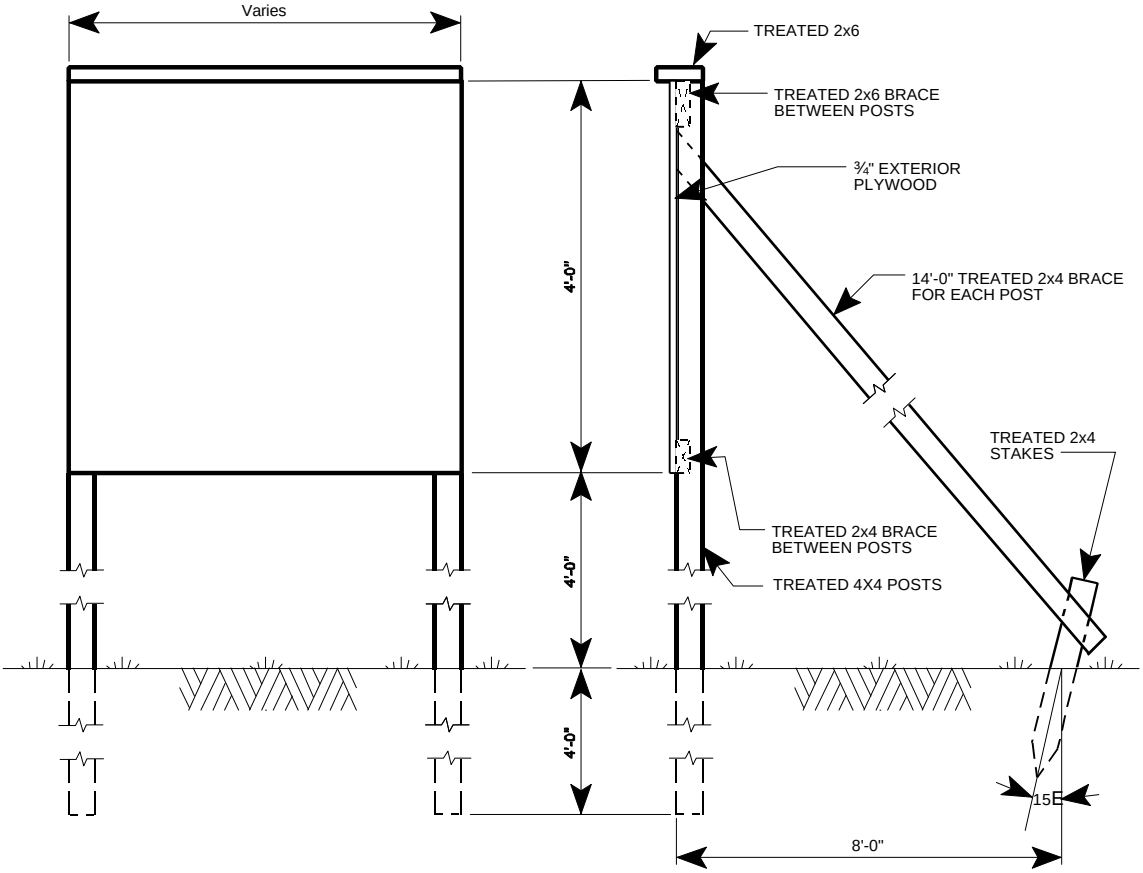
Legend Group 3: One- to two-line identification: name of prime contractor and city, state address. Typeface: 1.5" Helvetica Regular; Color: Black; Maximum line length: 42".

Legend Group 4: Standard safety record captions as shown. Typeface: 1.25" Helvetica Regular; Color: Black.



Replaceable numbers are to be mounted on white 0.060 aluminum plates and screw-mounted to background. Typeface: 3" Helvetica Regular; Color: Black; Plate size: 2.5" x 4.5".

SIGN ERECTION DETAILS



SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01565

NORTH DAKOTA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PART 1 GENERAL

1.1 GENERAL
1.1.1 Definitions
1.1.2 Contract Drawings
1.2 REFERENCES
1.3 SUBMITTALS
1.4 PERMIT COMPLIANCE AND ADDITIONAL REQUIREMENTS
1.4.1 Schedule
1.4.2 Storm Water Pollution Prevention (SWPP) Plan
1.4.3 Notice of Intent (NOI)
1.5 MEASUREMENT AND PAYMENT

PART 2 PRODUCTS

2.1 SILT FENCE
2.2 STRAW BALES
2.3 OTHER PRODUCTS

PART 3 EXECUTION

3.1 IMPLEMENTATION
3.2 MAINTENANCE
3.3 RECORDS
3.4 ATTACHMENTS

-- End of Section Table of Contents --

SECTION 01565

NORTH DAKOTA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PART 1 GENERAL

1.1 GENERAL

This section covers best management practices to be implemented for prevention of storm water pollution as required by the National Pollutant Discharge Elimination System (NPDES). The North Dakota Department of Health is responsible for administering permits for NPDES in the state of North Dakota. The Government has determined that the project work included under this contract requires NPDES permitting. The requirements herein supplement those covered in SECTION 01355 ENVIRONMENTAL PROTECTION.

1.1.1 Definitions

The following terms apply to this specification and the general permit, unless redefined in subsequent paragraphs.

a. "EPA" means the United States Environmental Protection Agency.
b. "NPDES" means the National Pollutant Discharge Elimination System.
c. "BMP" means Best Management Practices.
d. "General Permit" means the general permit authorization to discharge storm water associated with a construction activity under the National Pollutant Discharge Elimination System/State Disposal System Permit Program.
e. "Owner" as referred to in the general permit shall mean the Federal Government.
f. "NDPDES" means the North Dakota Pollutant Discharge Elimination System.
g. "Notice of Intent (NOI)" means the application to be filed with the state to receive a general permit for storm water discharges associated with a construction activity.

1.1.2 Contract Drawings

The following features are shown on or can be determined from the contract drawings:

a. The drainage patterns and approximate slopes anticipated after the major grading activities.
b. Areas of soil disturbance.
c. The location(s) where stabilization practices are expected to occur.
d. Typical details showing suggested Best Management Practices (BMP's) for erosion and sediment control.
e. Waters of the State.
f. Final site stabilization.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic

designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 6461	(1999) Silt Fence Materials
ASTM D 6462	(1999) Silt Fence Installation

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA/832/R-92/005	Storm Water Management for Construction Activities - Developing Pollution Prevention Plans and Best Management Practices

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION (NDDOT)

NDDOT 856	Standard Specifications for Road and Bridge Construction (1997 Edition), Erosion Control Blankets

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Notice of Intent (NOI);

A copy of the NOI (ND Form SFN 19145) shall be submitted to the Contracting Officer at the same time it is transmitted to the state.

SD-02 Shop Drawings

Temporary Erosion And Sediment Control Plan;

A specific Temporary Erosion and Sediment Control Plan shall be submitted in accordance with PARAGRAPH: PERMIT COMPLIANCE AND ADDITIONAL REQUIREMENTS.

SD-11 Closeout Submittals

1.4 PERMIT COMPLIANCE AND ADDITIONAL REQUIREMENTS

The Contractor shall comply with the requirements of General Permit No. . The following define additional requirements and clarify which requirements of the General Permit are to be performed by either the Contractor, the Government, or both.

1.4.1 Schedule

No contract project construction activities which require an NPDES permit

may commence until the state's general permit is valid.

1.4.2 Storm Water Pollution Prevention (SWPP) Plan

The contract drawings show typical details of suggested best management practices (BMP's) for erosion and sediment control taken from EPA/832/R-92/005. The BMP's, together with applicable portions of the site drawings and specifications form an initial plan for temporary erosion and sediment control. The Contractor shall finalize and implement the plan. The finalized plan, together with documentation, shall be in accordance with the general permit. The plan shall be maintained at the site and made available to federal, state, and local officials as requested. The Contractor shall determine the specific BMP's for erosion and sediment control (including the types, locations, and installation scheduling of erosion and sediment controls). These BMP's and corresponding material specifications and shop drawings shall be included in the Plan.

1.4.3 Notice of Intent (NOI)

The NOI shall be signed by the Contractor. A blank copy of the Application form is included at the end of this section. Immediately after contract award, the Contractor shall prepare the SWPP plan, complete the Notice of Intent, and submit the form with the SWPP plan to the state. The NOI shall be submitted to the State 30 days in advance of ground breaking activities. The Contractor is responsible for payment of the application fee.

1.5 MEASUREMENT AND PAYMENT

The contactor shall be responsible for the work of this section, without any direct compensation being made other than the payment received for contract items.

PART 2 PRODUCTS

2.1 SILT FENCE

Silt fence shall be manufactured and installed as shown on drawings. On level sites with minimal potential for sediment loading, the wire fabric may be omitted. Silt fence shall conform to ASTM D 6461 and shall be installed in accordance with ASTM D 6462.

2.2 STRAW BALES

Straw shall be baled from oats, wheat, rye, barley, rice, or other coarse fiber vegetation that will percolate water. Hay baled from grass, alfalfa and clover is not acceptable.

2.3 OTHER PRODUCTS

Any products proposed for use that are not included on drawing Z2-22 shall be described fully, with catalog cuts and manufacturer's instructions for use, in the temporary erosion and sediment control plan. Use of such other products is contingent upon approval by the Contracting Officer.

Erosion control blankets shall meet NDDOT 856

PART 3 EXECUTION

As between the Government and the Contractor, the Contractor shall be responsible for fulfilling the obligations of the general permit.

3.1 IMPLEMENTATION

The Contractor shall install the sediment and erosion control system in accordance with the plan submitted to the Contracting Officer. The BMP's shall be modified if inspection indicates distress to the system or reveals unforeseen circumstances, or if directed by the Contracting Officer. Any updates to the plan shall be recorded. Permanent stabilization shall be initiated as soon as practicable in any portion of the site where construction activities are complete.

3.2 MAINTENANCE

The Contractor shall be responsible for implementing and managing the erosion and sediment control BMP's before and during the construction activities; and ensure that the Plan will be implemented and stay in effect until the work has been completed, the entire work site has undergone final stabilization, and a Notice of Termination has been submitted to the Contracting Officer and the state permitting authority.

3.3 RECORDS

The contractor shall record on CQC reports: (1) dates when major stripping and grading activities occur, (2) dates when construction activities temporarily or permanently cease on a portion of the site, (3) when permanent stabilization practices are initiated, and (4) activities associated with inspection and maintenance.

3.4 ATTACHMENTS

NOTICE OF INTENT TO OBTAIN COVERADGE UNDER NPDES GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY, NORTH DAKOTA DEPARTMENT OF HEALTH (SFN 19145) 1 Page

NDPDES General Permit No. NDR03-0000 16 Pages

-- End of Section --

NOTICE OF INTENT TO OBTAIN COVERAGE UNDER NDPDES GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY
NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF WATER QUALITY

SFN 19145 (09/99)

FOR DEPT. USE ONLY

Application No.
Date Received

GENERAL INFORMATION

Name of Construction Project			
Name of Company, Individual, or Organization Seeking Authorization to Discharge		Telephone No. { }	
Mailing Address	City	State	Zip Code
Status of the Construction Site	☐ Private ☐ State	☐ Federal ☐ Other (Specify):	

NATURE OF DISCHARGE

Brief Description of Nature of Construction Project:						
Project Start Date				Estimated Area of Total Disturbance in Acres		
Estimated Completion Date						
Facility Location	Street			City		
	OR	1/4 1/4	Section	Township	Range	County
	OR	Latitude o I II		Longitude o I II		County
Receiving Waters	☐ Natural Surface Drainage		Name or Description of Receiving Waters			
	OR	☐ Municipal Storm Sewer	Name of City			
			Ultimate Receiving Waters			

RETURN COMPLETED APPLICATION TO: North Dakota Department of Health Division of Water Quality 1200 Missouri Ave., Rm. 203 PO Box 5520 Bismarck, ND 58506-5520 Telephone: 701-328-5210	I certify I am familiar with NDCC 61-28-08, and with the information contained in this application. To the best of my knowledge and belief, the information in this application is true, complete, and accurate.	
	Printed Name of Applicant(s)	Title
	Signature of Applicant(s)	Application Date

(Attach additional pages if needed)

Permit No.: NDR03-0000

Effective Date: October 1, 1999

Expiration Date: September 30, 2004

AUTHORIZATION TO DISCHARGE UNDER THE

NORTH DAKOTA POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with Chapter 33-16-01 of the North Dakota Department of Health rules as promulgated under Chapter 61-28 (North Dakota Water Pollution Control Act) of the North Dakota Century Code,

facilities both qualifying for and satisfying the requirements identified in Part I of this permit

are authorized to discharge stormwater associated with **CONSTRUCTION ACTIVITY**

to waters of the state

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I-VI, hereof.

This permit and the authorization to discharge shall expire at midnight,

September 30, 2004.

_____
Dennis R. Fewless, Director
Division of Water Quality

_____
Date

PART I - PERMIT COVERAGE

A. Permit Area

This permit applies to all areas within the jurisdiction of the state of North Dakota.

B. Eligibility and Limitations

1. Stormwater Discharges Covered by this Permit

This permit applies to all new and existing discharges of stormwater associated with construction activity from any of the following:

a. Construction activity including: clearing, grading, and excavation activities.

b. Examples of eligible construction projects include but are not limited to: road building/rebuilding, site development, housing subdivision development, utility trenching, ect.

c. Areas that are dedicated to producing earthen materials (such as soils, sand and gravel) for use at a construction site(s) as approved by the Department.

2. Stormwater Discharges *Not* Covered by this Permit

The following are not provided coverage under this permit:

a. Stormwater discharges associated with industrial activity from any source other than construction activities of those approved operations as in Part I.B.1.b..

b. Stormwater discharges associated with mining activities.

c. Stormwater discharges associated with industrial activity form discharge points subject to existing effluent limitations guidelines.

d. Stormwater discharges that the Department has shown to be contributing to a violation of a water quality standard.

C. Notice of Intent to Obtain Coverage

1. Deadlines

The operator of the construction activity shall submit a Notice of Intent (NOI) (form attached as Appendix A) to obtain coverage for stormwater discharges and a SWPP plan (see Part II.C.3) for the construction project, 30 days prior to the start of construction. An operator is the company, individual, or organization who has day to day supervision and control of activities occurring at the construction site. This can be the owner, developer, the general contractor or, in some circumstances, the agent of one of these parties.

2. Contents of the NOI

The Notice of Intent (NOI) shall contain, at a minimum, the following information:

a. Name of the construction site.
b. The status of the construction site (federal, state, private, or other entity).
c. Name of the company, individual, or organization seeking authorization.
d. County and location of the construction site, including latitude and longitude or Township, Range, section, and 1/4 section.
e. A brief description of the construction activity.
f. The anticipated starting date and the anticipated date of completion for the project.
g. The estimated area of total disturbance in acres.
h. Name of receiving water(s) or the name of the receiving municipal storm sewer system and receiving water(s).
i. The signature of the applicant(s), signed in accordance with Part IV.E of this permit.

3. Submission

Completed NOIs and SWPP plans shall be submitted, by mail or hand delivery, to:

North Dakota Department of Health
Division of Water Quality
1200 Missouri Avenue
PO Box 5520
Bismarck, ND 58506-5520

D. **Permit Certification**

1. Automatic Coverage

If the applicant does not receive a request for additional information or a notification of denial from the Department within 10 days of receipt of the application by the Department, authorization to discharge in accordance with the conditions of this permit shall be deemed granted.

2. Request for Additional Information

The Department shall have the right to request additional data and/or deny the authorization for any particular discharge.

3. Individual or Alternative General Permits

a. The Department may, at any time and by written notification only, require any person authorized by this permit to apply for and obtain either an individual NDPDES permit or to seek coverage under an alternative NDPDES general permit.

b. Any person covered by this general permit may request to be excluded from such coverage by either applying for an individual NDPDES permit or filing a Notice of Intent to be covered under an alternative NDPDES general permit.

c. When an individual NDPDES permit is issued to a person otherwise subject to this permit or the person is approved for coverage under an alternative NDPDES general permit, the applicability of this permit to the individual permittee is automatically terminated upon the effective date of the individual permit or the date of approval for coverage under the alternative general permit.

d. When an individual NDPDES permit is denied to a person otherwise subject to this permit, or the person is denied for coverage under an alternative NDPDES general permit, the applicability of this permit remains in effect, unless otherwise specified by the Department.

4. Local Authority

This permit does not preempt or supersede the authority of local agencies to prohibit, restrict, or control discharges of stormwater to storm sewer systems or other water courses within their jurisdiction.

E. Continuation of Coverage

Facilities covered under this permit can continue coverage under the renewed permit, provided a satisfactory request is made. Any request to retain coverage under a renewal of this permit shall be made in writing to the Department at least 15 days prior to the expiration date of this permit. If requested by the Department, a new NOI shall be submitted.

F. Transfer of Ownership or Control

1. Coverage under this permit may be transferred to a new permittee if the existing and new permittee notifies the Department, in writing, at least 48 hours before the transfer of ownership or control; and the notice includes a written agreement between the existing and new permittee containing a specific date of transfer of permit responsibility, coverage and liability between them. If requested by the Department, a NOT shall be submitted by the existing permittee and a NOI submitted by the new permittee.

2. The new owner or operator must comply with all regulations in this permit and with all provisions of the existing SWPP plan until such time as the existing SWPP plan is amended or replaced by a new SWPP plan. If the personnel responsible for implementing the SWPP plan change, these changes must be amended to the SWPP plan within 30 days of transfer of ownership or control.

G. Notice of Termination

1. Final Stabilization

When a site has been finally stabilized, a Notice of Termination (see Appendix B) shall be submitted to the Department. Final stabilization is reached when all construction activities that are authorized by this permit have been completed, and uniform vegetative cover has been established with a density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.

2. Content of NOT

The Notice of Termination (NOT) shall contain, at a minimum, the following information:

a. Permit number.
b. Name of construction site.
c. Operator's name, mailing address and phone number.
d. County and location of the construction site, including latitude and longitude or Township, Range, section, and 1/4 section.
e. Certification that the site has been finally stabilized.
f. Signature of the applicant(s), signed in accordance with Part IV.E of this permit.

PART II - SPECIAL CONDITIONS

A. Prohibition of Non-stormwater Discharges

All discharges covered by this permit shall be composed entirely of stormwater. The discharge of materials other than stormwater must be identified as a potential source of pollution in the SWPP plan (Part II.C.3). Unless otherwise determined by the Department, discharges other than stormwater must be in compliance with an appropriate NDPDES permit issued for the discharge.

B. Releases in Excess of Reportable Quantities

This permit does not relieve the permittee of the reporting requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302. Any release of a hazardous substance, including a release in a stormwater discharge, must be reported to the agencies identified in Part IV.F. The discharge of hazardous substances in stormwater discharges shall be minimized in accordance with the applicable SWPP plan for the facility. Should a reportable quantity release occur, the SWPP plan shall be revised to prevent the recurrence of such a release.

C. Stormwater Pollution Prevention Plans

1. All facilities covered by this permit shall prepare and implement a Stormwater Pollution Prevention (SWPP) plan that is subject to Department approval. Guidance forms for preparing a SWPP plan are located in Appendix C. The main objective of the plan shall be to identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges associated with construction activity; and to describe Best Management Practices (BMPs) which will be used to reduce the pollutants in the storm-water discharges associated with construction activity. The implementation of these objectives will be used to meet the terms and conditions of this permit.

2. Plan Preparation and Implementation Deadlines

a. The SWPP plan shall be submitted with the NOI, 30 days prior to the start of construction. Implementation of the plan shall be at the start of construction. The SWPP plan may be submitted and/or implemented at later dates only upon written request by the permittee showing just cause and subsequent written approval by the Department.

b. SWPP plans approved and implemented under the previous version of this permit shall remain in effect under this permit. Operations covered under an existing SWPP plan shall amend the SWPP plan as described in Part II.C.2.d of this permit.

c. If the permittee must also operate under an approved state or local sediment and erosion control plan, or any other stormwater management plan, it will be the permittee's responsibility to ensure that the SWPP plan for this permit complies with all other required plans. A SWPP plan is not a substitute for a stormwater management plan developed under other regulatory programs. It is acceptable for the plan to reflect the stormwater management measures developed under other regulatory programs and to incorporate the applicable portions of such programs by reference.

d. The permittee shall amend the SWPP plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the water of the state, or if the SWPP plan proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associate with construction activity.

3. <u>SWPP Plan Contents</u>

Key elements for SWPP plans shall include, at a minimum, the following information:

a. *Site Description*

A site description shall contain, at a minimum, the following information:

i) A description of the nature of the construction activity.
ii) The proposed timetable for major activities.
iii) Estimates of the total area of the site, and the area of the site that is expected to undergo clearing, excavation, or grading.
iv) A description of the fill material to be used, the existing soils at the site, and the erodibility of such soils.
v) The name of any receiving water(s) and the size, type and location of any outfall or; for discharges to a municipal separate storm sewer, the name of the municipal owner of the system, the location of the storm sewer discharge, and the name of the ultimate receiving waters.

b. *Site Map*

A site map that indicates, at a minimum, the following information:

i) Construction site boundaries and area of soil disturbance.
ii) The location of springs, streams, wetlands, and other surface waters.
iii) The location of areas used for storage of building materials, soils, or wastes.
iv) The locations of proposed and existing stormwater controls.
v) Stormwater runoff drainage patterns.
vi) Township, range, section or lines of latitude and longitude.

c. *Significant Material Inventory*

The location and description of any potential pollution sources, such as vehicle fueling, fertilizers, or chemicals, etc. Generally, significant materials are raw materials, finished products, and byproducts. The term also includes materials necessary for an operation which have the potential to be released with stormwater. The description should identify methods of storage, disposal, and outdoor processing involving significant materials.

d. *Best Management Practices (BMPs)*

The plan shall clearly describe the relationship between the phases of construction and the implementation and maintenance of BMPs. The description of BMPs shall include the following components:

i) Erosion and Sediment Controls

a) Nonstructural

A description of nonstructural practices designed to preserve existing vegetation where practicable and re-vegetate open areas as soon as practicable after construction activity ceases. In developing vegetative practices, the permittee shall consider: temporary and permanent seeding, mulching, sod stabilization,
filter strips, grassed waterways, erosion blankets, geotextiles, preservation of mature vegetation and tree or shrub planting.

b) Structural

A description of structural practices which indicates how, to the degree practicable, the permittee will divert flows from exposed soil, store flows, or otherwise limit runoff from exposed areas of the site. In developing structural practices, the permittee shall consider the relevance of: straw bale dikes, silt fences, earth dikes, drainage swales, check dams, subsurface drains, pipe slope drains, rock outlet protection, drain inlet and outlet protection, temporary drain diversion, sediment traps, temporary sediment basins, infiltration trenches or basins, and retaining walls.

ii) Other Controls

a) A description of methods to reduce the tracking of sediment onto public or private roads.

b) If applicable, a description of methods for handling and disposing of contaminated soils.

c) A description of methods for recovering sediments.

d) A description of spill prevention and response procedures for areas where potential spills can occur.

e. *Post-construction Controls*

A description of the post-construction control measures to be implemented until final stabilization is achieved.

f. *Inspection and Maintenance*

A description of procedures which will be used to inspect and maintain, in good and effective operating condition, the stormwater controls identified in the SWPP plan. Site inspections must be in accordance with Part III of this permit.

g. *Signature*

All SWPP plans must be signed in accordance with Part IV-E of this permit.

D. **Additional Terms and Conditions**

Stormwater discharges from construction sites shall not cause pollution, contamination, or degradation to waters of the state.

1. Visible or measurable erosion which leaves the construction site is prohibited. Visible or measurable erosion is defined as:

   a. Deposits of mud, dirt, sediment, or similar material exceeding one-half cubic foot in volume in any area of 100 square feet or less on public or private streets, adjacent property, or into the storm and surface water either by deliberate actions or as a result of erosion; or

   b. Evidence of concentrated flows of water over bare soils, turbid or sediment-laden flows, or evidence of on-site erosion on bare soil slopes, where runoff of water is not filtered or captured on the site using the techniques in the approved SWPP plan; or

   c. Earth slides, mud flows, earth sloughing, or other earth movement which leaves the property.

2. If any measurable quantity of sediment leaves the site because of structural failure or lack of design capacity of the BMPs, the sediment shall be placed back on the site or properly disposed of, as soon as is prudent. Under no conditions shall the sediment be washed into the storm sewers or drainage ways.

3. Concrete wash water shall not be discharged to waters of the state or to storm sewer systems.

4. Bulk storage structures for petroleum products and other chemicals shall have adequate protection so as to contain all spills and prevent any spilled materials from entering waters of the state.

5. No chemicals are to be added to the discharge unless permission for the use of a specific chemical is granted by the Department. In granting the use of such chemicals, special conditions and monitoring may need to be addressed through an individual NDPDES permit or an alternative NDPDES general permit.

6. All stormwater discharges must comply with the requirements, policies, or guidelines, of municipalities and other local agencies. Any discharges of stormwater to storm drainage systems or other water courses under their jurisdiction, including applicable requirements in municipal stormwater management programs developed to comply with NDPDES permits, must comply with their local requirements.

PART III - EFFLUENT LIMITATIONS, MONITORING, AND RECORDING REQUIREMENTS

A. Effluent Limitations

The quality of stormwater discharges associated with construction activity shall reflect the best which is attainable through the proper implementation of all items in the SWPP plan for the construction site.

B. Monitoring requirements

The permittee shall inspect the construction site to ensure that the stormwater controls identified in the SWPP plan are effective and properly maintained. The construction site perimeter, disturbed areas, and areas used for material storage shall be inspected for evidence of, or the potential for, erosion, sediment accumulation, sediment material residue and spills. The following guidelines shall be used for monitoring the effectiveness of the SWPP plan:

1. Site inspections shall be performed by or under the direction of the permittee at least once every 7 calender days and within 24 hours after any storm event of greater than 0.50 inches of rain per 24-hour period. The permittee shall have the option of maintaining a rain gauge at their site or utilizing the nearest National Weather Service precipitation gauge station. Any gauge station used shall be located within 10 miles of the stormwater discharge.

2. During storm events or periods of snow melt, when runoff occurs daily, all SWPP plan controls shall be inspected by or under the supervision of the permittee daily.

3. Stormwater runoff discharges shall be visibly monitored at the above frequency to evaluate the effectiveness of the SWPP plan controls. If any measurable quantities of sediment are leaving the property, corrective action shall be taken as soon as is prudent to reduce the discharge of sediments.

4. There may be times when the performance of the site inspection may not be practical during an inspection period. Adverse climatic conditions, such as flooding, high winds, tornadoes, electrical storms, etc., or impracticable climatic conditions, such as drought, extended frozen conditions, etc., may prohibit inspections. Should this occur the permittee must make a record of the description of why the inspection(s) could not be performed in lieu of the actual inspection data. Any available documentation of the events which did not allow for the inspection should also be available.

C. **Recording Requirements**

Inspection results shall be summarized and recorded on a Site Inspection Record (SIR, see Appendix D). The SIRs shall be maintained on-site, in accordance with Part IV.D of this permit. The SIR shall contain, at a minimum, the following information:

1. The date and time of inspection.
2. The name of the person performing the inspection.
3. The date and duration (in hours) of the storm event.
4. The rainfall measurements or estimates (in inches) of the storm event.
5. The duration of time between this event and the end of the most recent storm event which was 0.50 inches or greater in precipitation.
6. All incidents of erosion, sediment accumulation, material residue, or spills shall be documented and noted on the SIR. The report shall include the location and description of the incident, estimated quantity of material or size of area affected, and a brief explanation of potential cause and remedial action taken.
7. Any measurable quantities of sediment released off the site, shall be recorded with a brief explanation as to the measures taken to prevent future releases as well as any measures taken to clean up the sediment that has left the site.
8. If no storm event occurs during an inspection period, “no discharge” shall be recorded on the SIR.

PART IV - COMPLIANCE RESPONSIBILITIES

A. **Duty to Comply**. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the Department advance notice of any planned changes at the permitted facility or of any activity which may result in permit noncompliance.

B. **Operation and Maintenance.** The permittee shall at all times maintain in good working order, and operate as efficiently as possible, all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit and with the requirement of the SWPP plans. If necessary to achieve compliance with the conditions of this permit, this shall include the operation and maintenance of backup or auxiliary systems.

C. **Duty to Provide Information**. The permittee shall furnish to the Department, upon request, copies of records required to be kept by this permit. When a permittee becomes aware that it failed to submit any relevant facts or submitted incorrect information in a permit application or any report, it shall promptly submit such facts or information.

D. **Records Retention**. All records and information (including calibration and maintenance) required by this permit shall be kept for at least three years or longer if requested by the Department or EPA.

E. **Signatory Requirements**. All applications, reports, or information submitted to the Department shall be signed and certified by the permittee in accordance with the following criteria:

1. All permit applications shall be signed by a responsible corporate officer, a general partner, or a principal executive officer or ranking elected official, in addition to contractors and subcontractors involved in the construction activity or SWPP plan.

2. All reports required by the permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Department; or

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

3. If an authorization under Part IV.E.2 is no longer accurate for any reason, a new authorization satisfying the above requirements must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

F. **Immediate Notification**. The permittee shall report any noncompliance of discharge which may seriously endanger health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstance. The report shall be made to the EPA, Region VIII, Emergency Response Branch, at (303) 293-1788 and the State of North Dakota, Division of Emergency Management, at (701) 328-2121. In addition, a written submission to both the Department and EPA shall be provided within five days of the time that the permittee became aware of the circumstances. The submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the estimated time noncompliance is expected to continue if it has not been corrected; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

G. **Bypassing**. Any bypass is prohibited except where unavoidable to prevent loss of life, personal injury, or severe property damage, and there were no feasible alternatives to the bypass. The permittee shall provide notification of unanticipated bypasses as may be required by Part IV.F, Immediate Notification. If, for other reasons, a bypass is considered necessary, a request to bypass shall be submitted, at least 15 days in advance if possible, to the Department. No bypass of this type shall occur until permission has been obtained from the Department.

H. **Upset Conditions**. An upset constitutes an affirmative defense to an action brought for noncompliance with technology-based permit effluent limitations if the requirements of the following paragraph are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

1. An upset occurred and the permittee can identify its cause(s);

2. The permitted facility was, at the time, being properly operated;

3. The permittee submitted notice of the upset as may be required under Part IV.F, Immediate Notification; and

4. The permittee complied with any remedial measures required under Part IV.I, Duty to Mitigate.

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

I. **Duty to Mitigate**. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. The permittee, at the Department's request, shall provide accelerated or additional monitoring as necessary to determine the nature and impact of any discharge.

J. **Removed Materials**. Collected screening, grit, solids, sludge, or other pollutants removed in the course of treatment shall be buried or disposed of in such a manner to prevent any pollutant from entering waters of the state or creating a health hazard.

PART V - GENERAL REQUIREMENT

A. **Right of Entry**. The permittee shall allow Department and EPA representatives, at reasonable times and, if requested, upon the presentation of credentials, to inspect any facilities or equipment (including monitoring and control equipment), to sample discharges, and to have access to and copy any records required to be kept by this permit. For facilities which discharge to a municipal or other separated storm sewer, this shall also pertain to authorized representatives of the municipal operator or the separate storm sewer receiving the discharge.

B. **Availability of Reports.** Except for data determined to be confidential under 40 CFR, Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

C. **Transfers.** This permit is not transferable except upon the filing of a Statement of Acceptance by the new party and subsequent Department approval. The Department may require the new operator to apply for and obtain an individual NDPDES permit as stated in Part I.D. The current permit holder should inform the new controller, operator, or owner of the existence of this permit and also notify the Department of the possible change.

D. **New Limitations or Prohibitions**. The permittee shall comply with any effluent standards or prohibitions established under Section 306(a), Section 307 (a), or Section 405 of the Act for any pollutant (toxic or conventional) present in the discharge or removed substances within the time identified in the regulations, even if the permit has not yet been modified to incorporate the requirements.

E. **Permit Actions**. This permit may be modified, revoked and reissued, or terminated for cause. Also, if there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or coverage under an alternative general permit in accordance with Part I.D of this permit. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit conditions.

F. **Need to Halt or Reduce.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

G. **State Laws.** Nothing in this permit shall be construed to preclude the institution of legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation preserved under Section 510 of the Act.

H. **Oil and Hazardous Substance Liability.** Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation preserved under Section 311 of the Act.

I. **Property Rights.** The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges; nor does it authorize any injury to private property or any invasion of personal rights; nor any infringement of federal, state, or local laws or regulations.

J. **Severability**. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

PART VI - DEFINITIONS

"the Act" means the Clean Water Act.

"BMP" or "Best Management Practices" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

"Construction" means any activity associated with construction, including but not limited to: clearing, grading, and excavation.

"Department" means the North Dakota State Department of Health and Consolidated Laboratories, Division of Water Quality.

"Grab" sample, for monitoring requirements, means a single "dip and take" sample collected at a representative point in the discharge stream.

“Non-stormwater discharges” means discharges other than stormwater. The term includes both process and non-process sources. Process waste water sources that require a separate NDPDES permit include, but are not limited to industrial processes, domestic facilities and cooling water. Non-stormwater sources that may be addressed in this permit include, but are not limited to: fire hydrant flushing and testing, potable water line flushing, infrequent building and pavement washdowns without detergents, uncontaminated foundation drains, springs, lawn watering and air conditioning condensate.

"Severe property damage" means substantial physical damage to property, damage to treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

"Significant materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

"Significant spills" includes, but is not limited to: releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (see 40 CFR 110.10 and CFR 117.21) or Section 102 of CERCLA (see 40 CFR 302.4).

"Stormwater" means stormwater runoff, snow melt runoff, and surface runoff and drainage.

"Stormwater associated with industrial activity" means the discharge from any conveyance which is used for collecting and conveying stormwater and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NDPDES program. For the categories of industries identified in

subparagraphs (i) through (x) of this subsection, the term includes, but is not limited to, stormwater discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or byproducts used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR 401); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater. For the categories of industries identified in subparagraph (xi), the term includes only stormwater discharges from all areas listed in the previous sentence (except access roads) where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, byproducts, or industrial machinery <u>are exposed to stormwater</u>. For the purposes of this paragraph, material handling activities include: storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, byproduct or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots, as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities (including industrial facilities that are federally or municipally owned or operated that meet the description of the facilities listed in this paragraph [(i)-(xi)] include those facilities designated under 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection:

(i) Facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR, Subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) of this paragraph);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, 373;

(iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry), including active or inactive mining operations [except for areas of coal mining operations meeting the definition of a reclamation area under 40 CFR 434.11(1)], and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge stormwater contaminated by contact with, or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of such operations; inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator;

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that have received any industrial wastes (waste that is received from any of the facilities described under this subsection), including those that are subject to regulation under Subtitle D of RCRA;

(vi) Facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites;

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42, 44, and 45, which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (i) - (vii) or (ix) - (xi) of this subsection are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including lands dedicated to the disposal of sewage sludge that are located within the confines of the facility, with design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with 40 CFR 503;

(x) Construction activity including clearing, grading, and excavation activities except: operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 31 (except 311), 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25 [and which are not otherwise included within categories (i) - (x)].

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

"Waters of the state" Any and all surface waters that are contained in or flow in or through the state of North Dakota as defined in NDCC 61-28-02. This definition includes all water courses, even if they are usually dry.

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01720

CONTRACTOR SURVEYS

PART 1 GENERAL

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 FIELD LAYOUT SURVEYS
3.1.1 Alignment Changes
3.2 UTILITY AS-BUILT SURVEYS
3.3 QUANTITY SURVEYS FOR MEASUREMENT AND PAYMENT

-- End of Section Table of Contents --

SECTION 01720

CONTRACTOR SURVEYS

PART 1 GENERAL

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 FIELD LAYOUT SURVEYS

The Contractor shall layout the work from the Government established bench marks in accordance with CONTRACT CLAUSE 52.236-17 LAYOUT OF WORK. The construction of each feature of work shall follow the alignments as indicated on the drawings. The Contractor shall have in place, at least 7 calendar days prior to commencing construction operations, sufficient stakes and markings to enable the Contracting Officer to observe the field layout of the alignment and limits of each feature of work. For each feature of work, these stakes shall define areal limits such that the Contracting Officer can easily determine, without additional surveys, if alignment and/or limit adjustments need to be made. For embankments, levees, floodwalls, and similar work, these stakes shall define centerline, stationing, outermost fill/cut limits, and work limits. For buildings and similar work, the building corners and grid lines shall be staked. General site work shall be staked to define staging areas, storage areas, and other area limits as directed. The Contracting Officer may waive these requirements for certain areas. The layout shall be sufficient for the Contracting Officer to mark trees, vegetation and other features to be left undisturbed. No work shall take place without approval of field layout by the Contracting Officer.

3.1.1 Alignment Changes

The Government reserves the right to make changes in the alignment of any feature of work as may be found necessary during the course of the contract. If it becomes necessary, through no fault of the Contractor, to abandon a line, location or feature on which work has been done, an equitable adjustment for completed work will be made. No alignment changes or abandonment shall take place without prior written notice from the Contracting Officer.

3.2 UTILITY AS-BUILT SURVEYS

An as-built field survey of all utilities shall be conducted after installation to determine the final locations and elevations of all utility structures such as manholes, catch basins, hydrants, gate valves, cleanouts, service connections, and other special controls or structures. Final elevations shall be determined for all sewer inverts and castings. Locations shall be shown using the same convention as the original contract drawings (typically stationing and offset from known centerline). If no

convention is used in the contract drawings, locations shall be tied to at least 2 permanent landmarks. This information shall be included on the Contractor Record Drawings in Section 01780 CLOSEOUT SUBMITTALS.

3.3 QUANTITY SURVEYS FOR MEASUREMENT AND PAYMENT

The Contractor shall perform quantity surveys in accordance with CONTRACT CLAUSE 52.236-16 QUANTITY SURVEYS--ALTERNATE I. Quantity surveys shall be completed for all features of work necessary to establish measurement for partial and final payments. Surveys shall be completed in enough detail to accurately determine quantities and verify the required section. The quantity surveys shall meet the following criteria:

a. Complete initial surveys prior to commencement of construction of each feature, and prior to disturbance in the area.
b. Space cross sections at 100 foot maximum intervals. Include additional cross sections as necessary to define the geometry.
c. Each cross section from the survey notes shall be plotted at a scale of 1" = 10'.
d. Provide a copy of the survey notes and cross sections to the Contracting Officer within 10 days after completion of the survey.
e. Complete partial surveys as necessary to supplement payment requests.
f. Complete final surveys upon completion of each feature.

The Contracting Officer may use the surveys for tolerance verification purposes.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUBMITTALS
1.2 As-Built Drawings
1.3 CONTRACTOR RECORD DRAWINGS
1.3.1 Changes and Corrections
1.3.2 Drawing Standards

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section Table of Contents --

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

As-Built Drawings; G,GEN

Contractor record drawings showing final as-built conditions of the project.

1.2 As-Built Drawings

Paper prints and reproducible drawings will become the property of the Government upon final approval. Failure to submit final as-built drawings and marked prints, as required herein, will be cause for withholding payment due the Contractor under this contract. These drawings shall be furnished to the Contracting Officer within 30 days after the required contract completion date. Approval and acceptance of final as-built drawings shall be accomplished before final payment is made to the Contractor.

1.3 CONTRACTOR RECORD DRAWINGS

The Contractor shall maintain a separate set of marked-up full-scale contract drawings indicating as-built conditions. These drawings shall show all changes and revisions made up to the time the work is completed and accepted. These drawings shall be maintained in a current condition at all times until completion of the work and shall be available for review by Government personnel at all times. All variations from the contract drawings, for whatever reason, including those occasioned by modifications, optional materials, and the required coordination between trades, shall be indicated.

1.3.1 Changes and Corrections

The working and final as-built drawings shall show, but shall not be limited to, the following information:

a. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
b. Surveyed elevations shall be listed for all sewer inverts and castings.

c. The location and dimensions of any changes within buildings or structures.
d. Changes in details of design.
e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
f. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

1.3.2 Drawing Standards

a. Deleted items shall be indicated in red.
b. Added items or changed locations shall be shown in green.
c. Variations shall be shown in the same general detail utilized in the contract drawings.
d. Revisions shall be shown on all drawings and details related to the changed feature.
e. All markups shall be neat, clean and legible.
f. Where contract drawings or specifications present options, only the option selected for construction shall be shown.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS
1.4 DUST CONTROL
1.5 PROTECTION
1.5.1 Protection of Personnel
1.5.2 Protection of Structures
1.5.3 Protection of Existing Property
1.5.4 Protection From the Weather
1.5.5 Protection of Trees
1.5.6 Protection of Utilities
1.5.7 Environmental Protection
1.6 BURNING
1.7 USE OF EXPLOSIVES

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXISTING STRUCTURES
3.2 UTILITIES
3.3 SURFACE FEATURES RESTORATION
3.4 FILLING
3.5 DISPOSITION OF MATERIAL
3.5.1 Salvageable Items and Material
3.5.1.1 Material Salvaged for the Contractor
3.5.1.2 Items Salvaged for Reuse
3.5.2 Unsalvageable Material
3.6 CLEAN UP
3.7 PAVEMENTS
3.8 TABLE A

-- End of Section Table of Contents --

SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 GENERAL REQUIREMENTS

The work includes demolition, salvage of identified items and materials, restoration of surface features, and removal of resulting rubbish and debris. Rubbish and debris shall be removed from Government property daily, unless otherwise directed, to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible; salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Work Plan; G, ED

The procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, including procedures and methods to provide necessary supports, lateral bracing and shoring when required, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress, materials and details for surface feature restorations, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1.

1.4 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

1.5 PROTECTION

1.5.1 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.5.2 Protection of Structures

Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, of lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.3 Protection of Existing Property

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.4 Protection From the Weather

Salvageable materials and equipment shall be protected from the weather at all times.

1.5.5 Protection of Trees

Trees within the project site which might be damaged during demolition, and which are indicated by the Contracting Officer to be left in place, shall be protected by a 6 foot high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain

that is damaged during the work under this contract shall be replaced in kind or as approved by the Contracting Officer.

1.5.6 Protection of Utilities

Existing utilities and services to remain in service indicated on drawings shall be braced and/or restrained as required. Protect services and utilities to remain.

1.5.7 Environmental Protection

The work shall comply with the requirements of Section 01355 ENVIRONMENTAL PROTECTION.

1.6 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.7 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXISTING STRUCTURES

Existing structures or portions there of, indicated on plans to be removed shall be removed to the limits indicated on the drawings. The location and approximate plan dimension of the principal items to be removed are listed in Table A attached at the end of this Section. In general, minor structures are not shown and the Contractor is expected to examine the work site, prior to bidding to determine the character and extent of such structures. All above ground structures, not listed separately at the end of this section and required to be removed to construct the permanent features shall be removed as part of the work to which the removal pertains. Removal of structures, not shown or specified for removal, for the convenience of the Contractor will be subject to approval.

3.2 UTILITIES

Disconnection of utility services, with related meters and equipment, shall be performed by the respective utilities. Existing utilities shall be removed, filled, and/or plugged as indicated. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

Storm sewers, sanitary sewers, water mains, and other utilities shall be plugged and/or removed as indicated on the drawings or as approved by the Contracting Officer. The water main, storm and sanitary sewer plugs shall be inspected and approved by the City of Wahpeton prior to backfilling.

3.3 SURFACE FEATURES RESTORATION

All surface features removed for the installation of utilities shall be restored to their pre removed condition upon completion of the utility installation. Surface features include bituminous or concrete pavement,

sub base materials, sidewalk, curb, aggregate surface, and other surface types indicated to be removed.

3.4 FILLING

Holes, open excavations and other hazardous openings shall be filled in accordance with Section 02300 EARTHWORK.

3.5 DISPOSITION OF MATERIAL

Title to material and equipment to be demolished, except Government salvage and historical items, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed.

3.5.1 Salvageable Items and Material

Contractor shall salvage items and material to the maximum extent possible.

3.5.1.1 Material Salvaged for the Contractor

Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from the project site before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.

3.5.1.2 Items Salvaged for Reuse

Salvaged items to be reused shall be removed in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage shall be repaired or replaced to match existing items. Containers shall be properly identified as to contents.

3.5.2 Unsalvageable Material

Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed off-site.

3.6 CLEAN UP

Debris and rubbish shall be removed from basement and similar excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

3.7 PAVEMENTS

Existing pavements designated for removal shall be saw cut at limits of removal and removed.

3.8 TABLE A

TABLE A

SHT NO.	DESCRIPTION	STATION OR COORD.	OFFSET	QTY	UNITS
5	4th St N	(2953640,250540)		1100	ft2

TABLE A

SHT NO.	DESCRIPTION	STATION OR COORD.	OFFSET	QTY	UNITS
5	Driveway	(2953640,250540)		125	ft2
5	Dirt Road	(2953026,250707)		324	ft2
5	Culvert	D0+20	R970'		
6	33" CMP	B17+71.5	0'	578	ft
6	Path/Road	B17+71.5	L140'	200	ft2
7	66" RCP	B32+12	0'	159	ft
7	Path/Road	B32+40	0'	360	ft2
7	Path/Road	B37+83	R351'	655	ft2
7	66" RCP	B39+00	R309'	188	ft
11	16" Waterline	C0+00	L70'	320	ft
11	Sanitary Sewer	C0+87	R53.5'	217	ft
11	4th Ave N	C3+80	L20'	625	ft2
11	Cut Watermain and Cap	C3+80	L50'	6" long	
11	Alley	C5+43	L41'	1776	ft2
11	Driveway	C5+43	L41'	36	ft2
11	3rd Ave N	C7+30	L70'	4170	ft2
11	Sidewalk	C7+30	L103'	300	ft2
11	16" Waterline	C7+60	L92'	981	ft
11	Alley	C10+00	L7'	462	ft2
11	6" Waterline	C11+54	L41'	80	ft
11	2nd Ave N	C12+00	L33'	1710	ft2
12	Sidewalk	C15+40	L18'	100	ft2
12	Sidewalk	C16+20	L24'	100	ft2
12	Alley	C17+80	0'	781	ft2
12	Sidewalk	C19+80	L36'	14	ft2
12	Relocate Sheds	C21+80	L10'	69/117	ft2
12	Path/Road	C22+40	0'	676	ft2
12	Sidewalk	C23+05	0'	320	ft2
12	Sidewalk	C23+92	L35'	62	ft2
12	Driveway	C24+03	L32'	650	ft2
12	3rd Ave S	C24+03	L32'	2750	ft2
12	Waterline	C24+09	0'	134	ft
12	Sanitary Sewer	C24+20	L16'	33	ft
12	4th Ave S	C27+00	L75'	635	ft2
12	Waterline	C27+20	L48'	52	ft
13	Center St S	C32+40	L60'	600	ft2
13	Driveway	C32+40	L60'	2700	ft2
13	Driveway	C42+00	L54'	275	ft2
14	Gravel Roadway	C44+90	L24'	379	ft2
14	Entryway	C45+65	L60'	40	ft2
14	Parking	C46+00	L65'	310	ft2
16	Dirt Pile	C59+70	0'	2000	ft2

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02230

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 DEFINITIONS
1.1.1 Clearing
1.1.2 Grubbing

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLEARING
3.2 GRUBBING
3.3 TREE REMOVAL
3.4 DISPOSAL OF MATERIALS
3.4.1 Materials Other Than Salable Timber
3.5 ACCEPTANCE

-- End of Section Table of Contents --

SECTION 02230

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared. Clearing operations shall be conducted in areas for structures and areas to receive levee fill or to be paved as shown on the drawings.

1.1.2 Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Grubbing operations shall be done in areas for structures and areas to receive levee fill or to be paved as shown on the drawings.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLEARING

Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.2 GRUBBING

Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 24 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for levees, buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 DISPOSAL OF MATERIALS

3.4.1 Materials Other Than Salable Timber

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, except for salable timber, shall be disposed of offsite, except when otherwise directed in writing. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed.

3.5 ACCEPTANCE

Upon completion of the site clearing, obtain the Contracting Officer's acceptance of the extent of clearing and grubbing.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 SUBSURFACE DATA
1.4 BORROW SOURCES AND EVALUATION
1.4.1 Borrow from Excavated Areas
1.4.2 Alternate Sources of Borrow
1.4.2.1 Alternate Sources

PART 2 PRODUCTS

2.1 DEFINITIONS
2.1.1 Satisfactory Materials
2.1.2 Cohesionless and Cohesive Materials
2.1.3 Proctor
2.2 MATERIALS
2.2.1 Common Borrow
2.2.2 Select Granular Fill
2.2.3 Granular Fill
2.2.4 Impervious Fill
2.2.5 Select Impervious Fill
2.2.6 Random Fill
2.3 CONSTRUCTION EQUIPMENT
2.3.1 Levees

PART 3 EXECUTION

3.1 CLASSIFICATION OF SOIL MATERIALS
3.2 TEMPORARY STOCKPILES
3.3 PERMANENT STOCKPILES
3.3.1 Placement Requirements
3.4 STRIPPING OF TOPSOIL
3.5 EXCAVATION
3.5.1 Changes and Differing Site Conditions
3.5.2 Topsoil Excavation at Ponding Area 2A
3.5.3 Borrow and Disposal Areas
3.5.4 Contaminated Materials
3.5.4.1 Accident Prevention Plan
3.6 DITCHES AND GUTTERS
3.7 BORROW MATERIAL
3.7.1 Excavation and Borrow Pits
3.7.2 Utilization of Excavated Materials
3.8 EMBANKMENTS
3.9 STRUCTURES
3.10 LEVEES
3.10.1 Inspection Trench
3.11 SUBGRADE PREPARATION
3.11.1 Subgrade Correction
3.12 FINISHING

3.12.1 Pavement Subgrade Tolerances
3.13 PLACING TOPSOIL
3.14 COMPACTION
3.14.1 Moisture Control
3.14.2 Placement And Compaction
3.15 TESTING
3.15.1 General
3.15.2 Field Density Tests
3.15.3 Proctor Tests
3.15.4 Treatment of Oversize Particles for Density Tests
3.15.5 Corrective Action
3.15.6 Testing Schedule
3.16 NUCLEAR DENSITY TESTING EQUIPMENT
3.17 SUBGRADE AND EMBANKMENT PROTECTION

-- End of Section Table of Contents --

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 Micrometers (No. 200 Sieve) in Mineral Aggregates by Washing
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	(1963; R 1998) Particle Size Analysis of Soils
ASTM D 698	(1998) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 1556	(1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(1993) Description and Identification of Soils
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4718	(1987; R 1994) Correction of Unit Weight and Water Content for Soils Containing Oversize Particles

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Testing;

A summary of testing results indicated in PARAGRAPH: TESTING shall be submitted when the site work is substantially complete. The Contracting Officer shall be informed of test results daily for direction on corrective action required. Draft copies of field testing results shall be furnished to the Contracting Officer on a frequent and regular basis as directed, but do not need to be formally transmitted through the submittal process.

Daily Report Forms;

A compilation of the daily report forms for earthwork observation and inspection trench observations ordered by date shall be submitted when the work is substantially complete. Preliminary copies shall be furnished to the Contracting Officer on a weekly or monthly basis as directed, but do not need to be formally transmitted through the submittal process.

1.3 SUBSURFACE DATA

Reference the Physical Data clause in Section 00700.

1.4 BORROW SOURCES AND EVALUATION

1.4.1 Borrow from Excavated Areas

Borrow materials obtained from excavated areas shall satisfy requirements as defined in paragraph 2.1 Definitions for the particular use of the material. Condition of the excavated soil such as moisture content may require reworking, such as drying, prior to placement. Boring and testing information for excavation areas is available to the Contractor from the St. Paul District Office.

1.4.2 Alternate Sources of Borrow

If the Contractor proposes to furnish borrow from a source not shown, Government approval of the source is required. The Government will make such investigations and evaluations as necessary to determine whether or not materials with acceptable characteristics can be obtained from the proposed source. Approval (or rejection) will require at least 30 days, but not more that 120 days. Borrow areas which involve the excavation of wetlands or wooded areas will not be approved.

1.4.2.1 Alternate Sources

a. Evaluation by Site Inspection. If the Contractor proposes to furnish borrow from an unlisted source, the Government will evaluate the alternate source. An investigation shall be performed by a Government geologist or engineer. The Contractor shall expose fresh soil for the full height of

the face proposed for production during the field evaluation.

b. Evaluation by Test Data. If sufficient information is not available, the Government will reconsider the alternate source if evaluation is supplemented by sampling and testing of the properties specified for the material. If the Contractor wishes to pursue the alternate source, the Government will notify the Contractor of required sampling and number of tests required. The Contractor shall be responsible for sampling and testing costs for alternate sources. The Contracting Officer shall be present during the sampling, unless waived. Information provided with the samples shall include the location and elevation from which the sample was taken. Testing shall be completed by a laboratory approved in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Test results and jar samples shall be furnished to the Government geologist at the District Office. This will require a 14 day evaluation period after the test results are received at the District Office.

PART 2 PRODUCTS

2.1 DEFINITIONS

2.1.1 Satisfactory Materials

Satisfactory materials shall be of a character and quality satisfactory for the purpose intended, and meet the applicable material specifications.

2.1.2 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

2.1.3 Proctor

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698. The maximum density is hereafter abbreviated as the "Standard Proctor" or "Proctor" value. The optimum moisture content, Wo, is the water content at which the soil is compacted to the maximum density as determined during the test procedure presented in ASTM D 698.

2.2 MATERIALS

All material placed as fill or backfill shall consist of material classified by ASTM D 2487 as GW, GP, GC, GM, SP, SM, SC, CL, CH AND SW. The material shall be free of ice, snow, frozen earth, trash, debris, sod, roots, organic matter, or stones larger than 3 inches in any dimension.

2.2.1 Common Borrow

Common borrow shall have less than 40 percent retained on the No. 4 sieve, and less than 30 percent retained on the 3/4 inch sieve.

2.2.2 Select Granular Fill

Select granular material shall meet requirements for common borrow and

shall contain not more than 5 percent by weight of material passing the No. 200 sieve. The maximum allowable aggregate size shall be 1-1/2 inches.

2.2.3 Granular Fill

Granular material shall meet requirements for common borrow and shall contain not more than 12 percent by weight of material passing the No. 200 sieve.

2.2.4 Impervious Fill

Impervious fill shall meet requirements for common borrow and classified by ASTM D 2487 as CL or CH.

2.2.5 Select Impervious Fill

Select impervious fill shall meet requirements for common borrow, shall have a plasticity index less than 30, and a clay fraction less than 40 percent by weight finer than 0.002 mm and classified by ASTM D 2487 as CL or CH.

2.2.6 Random Fill

Random fill shall consist of native materials meeting the requirements for common borrow.

2.3 CONSTRUCTION EQUIPMENT

Compaction equipment shall consist of sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil type being compacted. Water flooding or jetting methods of compaction will not be permitted for any soil types. Sprinkling equipment for cohesive soils shall apply water uniformly, in controlled quantities, and be capable of variable application widths.

2.3.1 Levees

Use of sheepsfoot rollers (vibratory or non-vibratory), or scarification between lifts, is required for construction of levees (any water retaining structures). Construction equipment and methods shall avoid poor bonding between lifts, characterized by layered or laminated texture at the lift interfaces. Smooth surfaces (such as produced from smooth drum rollers, rubber tired rollers, and construction traffic) shall be scarified prior to placing subsequent lifts.

PART 3 EXECUTION

3.1 CLASSIFICATION OF SOIL MATERIALS

Classification of soil materials shall be performed by the Contractor in accordance with ASTM D 2488. The Contracting Officer reserves the right to revise the Contractor classifications. In the case of disagreement, the Contracting Officer's classification will govern unless the soils are classified in accordance with ASTM D 2487. All testing completed by the Contractor in conjunction with soil material classification will be considered incidental to the contract work.

3.2 TEMPORARY STOCKPILES

Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed. Satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. Any material that becomes contaminated, frozen or too wet for use shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government.

3.3 PERMANENT STOCKPILES

The drawings indicate the locations of permanent stockpile areas. These stockpile areas are to be used for the disposal of all excess excavated materials meeting the requirements of select impervious fill or impervious fill. It is intended that this material will be used for the construction of levees in Stage 2. The drawings indicate the stockpile shape, side slopes, and maximum top elevation. All excavated materials not meeting the requirements of select impervious fill or impervious fill and not usable on this project shall be disposed of in areas approved for off site disposal.

3.3.1 Placement Requirements

It is anticipated that material will be placed in loose piles after removal from required excavation. The surface of the piles shall be graded to provide a uniform free draining surface and the entire final surface shall be compacted by a minimum of 2 passes of a crawler type tractor weighing not less than 20,000 lbs or other approved compaction equipment. The compaction should include the side slopes. The intent is to have a relatively smooth surface which provides free drainage. The top of the stockpile shall be sloped as necessary to provide drainage. If additional stockpile area is necessary, the Contractor shall notify the Contracting Officer and the stockpile area located southeast of Pump Station 7 will be extended.

3.4 STRIPPING OF TOPSOIL

Unless otherwise indicated or directed, topsoil shall be stripped to a depth of 6 inches. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from excavations and grading shall be removed from the site.

3.5 EXCAVATION

After topsoil removal has been completed, excavation of every description, regardless of material encountered, within the grading limits of the project shall be performed to the lines and grades indicated. Excavation material suitable for use as fill shall be transported to and placed in fill areas within the limits of the work. All unsatisfactory material, including any soil which is disturbed by the Contractor's operations or softened due to exposure to the elements and water, shall be disposed of in areas approved for off site disposal. Excavations carried below the depths

indicated shall be refilled to the proper grade with satisfactory material at no additional cost to the Government. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.5.1 Changes and Differing Site Conditions

Any excavation subgrades that are unstable, pump, rut excessively, reveal soil conditions that are substantially different from that indicated in the contract, or are unsuitable for proceeding with the work shall immediately be reported to the Contracting Officer. In the event that it is necessary to remove material to a depth greater than specified, the Contracting Officer will provide direction for changed work; and an adjustment in the contract price will be considered in accordance with the contract. Unsatisfactory material encountered below the grades shown shall be removed as directed. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer. The Contracting Officer shall be notified prior to proceeding with any unauthorized work. Additional work not authorized by the Contracting Officer shall be at the Contractor's expense.

3.5.2 Topsoil Excavation at Ponding Area 2A

Topsoil in ponding area 2A contains coal dust and therefore requires special considerations during construction activities involving this material. For any work involving the topsoil at 2A, such as excavation or placement of the material as topsoil for the establishment of turf, the topsoil shall be kept moist to reduce the possibility of coal dust in the air. Also, the Contractor shall provide and all workers in the area shall wear respirators suitable to protect the workers from inhaling coal dust.

3.5.3 Borrow and Disposal Areas

Each borrow and disposal area is subject to the approval of the Contracting Officer. Proposed borrow areas which involve the excavation of wetlands or wooded areas will not be approved by the Contracting Officer. Disposal areas which involve the placement of materials in wetlands or floodplain areas will require a minimum of 7-calendar days for review and approval or disapproval.

3.5.4 Contaminated Materials

The Contractor shall comply with all applicable federal, state and local requirements if contaminated soils, materials, and/or groundwater is/are encountered during construction activities within the contract project work limits. If contaminated materials/areas are encountered, the Contractor shall immediately notify in writing the following regarding such: the Contracting Officer, and each appropriate federal, state, and local agency. All work associated with implementation of a contingency plan and handling and/or disposal of contaminated soils, materials, and/or groundwater shall be performed in accordance with CONTRACT CLAUSE: CHANGES.

3.5.4.1 Accident Prevention Plan

The Contractor's accident prevention plan, as required in CONTRACT CLAUSES:

ACCIDENT PREVENTION, shall specifically address site safety and monitoring with regards to possible encounters with contaminated soils, materials, and/or groundwater. The Contractor's accident prevention plan shall also include a contingency plan to be implemented immediately upon encountering contaminated soils, materials, and/or groundwater.

3.6 DITCHES AND GUTTERS

Ditches and gutters shall be cut accurately to the cross sections and grades indicated. Gutters and ditches shall be finished in a manner that will result in effective drainage. All roots, stumps, rock, and foreign matter in the sides and bottom of ditches and gutters shall be trimmed and dressed or removed to conform to the slope, grade, and shape of the section indicated. Care shall be taken not to excavate ditches and gutters below the grades indicated. Excessive ditch and gutter excavation shall be backfilled to grade with properly placed and compacted material. All ditches and gutters excavated under this section shall be maintained until final acceptance of the work. Satisfactory material excavated from ditches and gutters shall be placed in fill areas.

3.7 BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas shown or from other approved sources, either private or within the limits of the project site, selected by the Contractor. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and drainage of borrow pits and the disposal of debris thereon and restoration shall be considered related operations to the borrow excavation.

3.7.1 Excavation and Borrow Pits

Except as otherwise permitted, borrow pits and other excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of, or used for special purposes. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.7.2 Utilization of Excavated Materials

Material removed from excavations shall be incorporated in the work insofar as practicable. No excavated material that is satisfactory for use as fill shall be wasted without specific written authorization. Material authorized to be wasted shall be stored in designated areas approved for surplus material storage and disposed of offsite. No excavated material shall be disposed of in such a manner as to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any

way.

3.8 EMBANKMENTS

Fills and embankments shall be constructed at the locations and to lines and grades indicated. Fill shall meet the material specifications for the zones indicated on the drawings. The material shall be placed in successive horizontal layers for the full width of the cross section and shall be compacted as specified. Each layer shall be compacted before the overlaying lift is placed.

3.9 STRUCTURES

Excavation and backfilling for structures is specified in Section 02315 EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES.

3.10 LEVEES

3.10.1 Inspection Trench

The inspection trench will be used to locate undesirable subsurface features. Any pipes, tiles, conduits, buried debris, or other unsatisfactory foundation materials encountered shall be removed from within the footprint of the levee or plugged as directed by the Contracting Officer. The Contractor shall notify the Contracting Officer 48 hours prior to start of this work. Observations shall be recorded on the daily report forms attached to this specification, or to a Contractor's special purpose form for observing trench excavations if approved by the Contracting Officer.

a. Inspection Trench Excavation and Observation. An inspection trench will be excavated as shown on the drawings. Immediately after excavating the trench, the Contractor shall inspect and record the soil and water conditions encountered and any other pertinent features. Soils on the base and side slopes shall be identified in accordance with ASTM D 2488. In reaches where caving occurs, the Contractor shall either widen the trench, dewater to keep the trench stable, or assign a competent person to observe the excavation continuously in addition to the excavator operator. Excessive water seepage shall be removed to allow visual inspection. During construction of the inspection trench, the Contractor shall immediately notify the Contracting Officer in the event that soil conditions encountered differ significantly from those shown on the boring logs.

b. Inspection Trench Backfill. The Contracting Officer will observe the trench before backfilling, unless waived for trench stability reasons. All water and mud shall be removed from the trench before backfill is placed. The excavated material may be used for backfill only if it meets the material specified. All inspection trench backfill shall be placed in lifts and compacted as specified for levees in paragraph COMPACTION.

c. Inspection Trench Location. The inspection trench shall generally be located close to the levee centerline. The inspection trench shall be continuous at all points, aligned with smooth curves, and free from abrupt changes in alignment. The Contracting Officer may direct the actual alignment of the inspection trench within the limits of the levee right of way to intercept suspect areas.

3.11 SUBGRADE PREPARATION

All areas upon which fill is to be placed shall be stripped before the fill is started. Material shall not be placed on surfaces that are muddy, frozen, contain frost, or where unsatisfactory material remains in or under the fill. For cohesionless soils, the subgrade surface shall be compacted to at least 100 percent of the Standard Proctor density. For cohesive soils, the subgrade shall be proof rolled with rubber tired equipment and any soft areas shall be brought to the Contracting Officer's attention. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be stepped such that the fill material will bond with the existing surface.

3.11.1 Subgrade Correction

Soft or otherwise unsatisfactory material shall generally be removed and replaced with satisfactory excavated material or other approved material as directed. Low areas resulting from removal of unsatisfactory material shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified.

3.12 FINISHING

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing.

3.12.1 Pavement Subgrade Tolerances

When the final layer of base has been completed, and at the time any additional construction is to be placed thereon, the finished surface of the base shall not vary more than 0.05 feet from the plan elevation.

3.13 PLACING TOPSOIL

Topsoil placement is covered in Section 02920 SEEDING, SODDING AND TOPSOIL. The finished grade shall be such that after subsequent treatment (tillage, topsoiling and planting) the planted grade shall join 1 inch below adjoining surfaced grade of walks, curbs and drives and even with adjoining turfed areas.

3.14 COMPACTION

3.14.1 Moisture Control

Control of moisture in the fill shall be maintained to provide acceptable compaction. Dried or crusted cohesive soils shall be plowed, disked or otherwise broken up before compaction. If water is added to fills, the layer shall be spread in even lifts, moistened as necessary, thoroughly mixed, and compacted. Maintain moisture content for select impervious fill between Wo -3 percent and Wo +1 percent during placement and compaction.

3.14.2 Placement And Compaction

Each layer shall be spread uniformly on an acceptable soil surface. The type of fill, its maximum uncompacted lift thickness, and the minimum compaction requirements (percent of Standard Proctor density) to which each type of fill shall be compacted shall be as listed below.

Fill Zone	Maximum Uncompacted Lift Thickness (inches)	Percent of Standard Proctor Density
General Grading	12	95
Building Subgrades Floor Slabs and Steps	9	100
Structure Backfill	See Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES	
Levees	12	95
Utility Backfill	12	95

a. Fill materials shall be placed in horizontal layers not exceeding 6 inches loose depth when hand operated compactors are used.

b. Embankments and subgrade under pavements shall be compacted to at least the percent of Standard Proctor density as follows:

(1) For fill sections the top 36 inches below the aggregate base course shall be placed in uncompacted lifts not exceeding 9 inches and compacted to at least 100 percent of the Standard Proctor density.

(2) For cut sections in cohesionless soils the subgrade surface shall be compacted to at least 100 percent of the Standard Proctor density. For cut sections in cohesive soils, the subgrade shall be proof rolled and any soft areas shall be brought to the Contracting Officer's attention.

3.15 TESTING

3.15.1 General

All testing expenses shall be the Contractor's responsibility. Prior to sampling and testing the work, testing laboratories shall be inspected and approved in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. The Contracting Officer reserves the right to direct the location and select the material for samples to be tested and to direct where and when moisture-density tests shall be performed.

3.15.2 Field Density Tests

Report forms for summaries of field density tests shall include at a minimum, the information shown below. Additional data required by the applicable ASTM test methods shall be kept on file by the Contractor. Tests shall be numbered sequentially throughout the job, and retests shall reference the original test number (1A, 1B, etc.).

a. Test Number

b. Dry density, water content and gravel content of field test

c. Proctor Number, maximum dry density, optimum water content, and gravel content

d. Relative Compaction

e. Each test shall be plotted on the graphic presentation of the applicable Proctor test.

3.15.3 Proctor Tests

Report forms for summaries of Proctor tests shall include the minimum information. Additional data required by the applicable ASTM test methods shall be kept on file by the Contractor. Jar samples shall be retained by the testing laboratory for each Proctor test until field testing is completed.

a. Test Number and method

b. Sample location and visual soil description

c. Maximum dry density, and optimum water content

d. Gravel contents in sample and test specimens

3.15.4 Treatment of Oversize Particles for Density Tests

The fine gravel contents shall be corrected by selecting an appropriate Proctor sample. The fine gravel content shall be the particles retained on the No. 4 sieve and passing the 3/4 inch sieve. The fine gravel content of the field density test shall be within ±5 percent of the fine gravel content of the Proctor sample.

The oversize fraction shall be particles retained on the 3/4 inch sieve. For oversize fractions greater than 5 percent, the oversize particles shall be corrected in accordance with the Finer Fraction Method specified in ASTM D 4718.

Each sand cone test shall report the gravel content retained on the No. 4, 3/8 inch and 3/4 inch sieve as appropriate for the Proctor method referenced.

Where nuclear testing is used and lack of uniformity in the soil due to layering, rock or voids is suspected, the test volume site shall be dug up and visually examined to determine if the test material is representative of the full material in general and if rock correction is required.

3.15.5 Corrective Action

Tests of materials which do not meet the contract requirements (failing test) will not be counted as part of the required testing. Each such failing test must be retaken at the same location as the failing test was taken. If testing indicates material does not meet the contract requirements, the material represented by the failing test shall not be placed in the contract work or shall be recompacted or removed. The quantity of material represented by the failing test shall be determined by the Contracting Officer up to the quantity represented by the testing frequency. The Contractor may increase testing frequency in the vicinity of

a failing test in order to reduce removal requirements, as approved by the Contracting Officer. Such increases in testing frequency shall be at the Contractor's expense and at no additional cost to the Government.

3.15.6 Testing Schedule

a. Moisture-Density Relations (ASTM D 698)

Select impervious fill for use in the two levee reaches, a minimum of two tests per borrow site per major soil unit.

b. In-Place Densities (ASTM D 1556 or ASTM D 2922)

1) Typical, 2 tests per individual levee reach

2) Structure foundations and floor slabs. See Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES.

3) Utility trench backfill. See Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS.

c. Percent Passing No. 200 sieve (ASTM C 117)

1) Select Granular Fill, 1 test per 1000 cubic yards of fill placed, not less than 1 test for each source placed

2) Granular Fill, 1 test per 5000 cubic yards of fill placed, not less than 1 test for each source

d. Sieve Analysis, (ASTM C 136)

1) Select Granular Fill, 1 test for each source

e. Plasticity Index (ASTM D 4318)

1) Cohesive soils, 1 test for each Proctor test

2) Impervious fill, 1 test per 5000 cubic yards of fill

3) Select impervious fill, 2 tests per borrow site per major soil unit

f. Clay Faction (percent smaller than 0.002 mm, determined in accordance with ASTM D 422)

1) Select impervious fill, 2 tests per borrow site per major soil unit

3.16 NUCLEAR DENSITY TESTING EQUIPMENT

Nuclear density testing equipment shall be used in general accordance with ASTM D 2922 and ASTM D 3017. In addition, the following conditions shall apply:

a. Prior to using the nuclear density testing equipment on the site, the Contractor shall submit to the Contracting Officer a certification that the operator has completed a training course approved by the nuclear density testing equipment manufacturer, record of the most recent calibration of the equipment, and a copy of the most recent

statistical check of the standard count precision.

b. The first test and every tenth test thereafter shall include a sand cone correlation test. The sand cone test shall be centered over the prepared surface for the nuclear test, shall include a nominal 6 inch diameter sand cone, and shall include a minimum wet soil weight of 6 pounds extracted from the hole. In addition, testing of aggregate base soils shall include a minimum of 3 sand cone correlations for each day of testing; and testing of bituminous shall include a minimum of 3 core densities for each day of testing. The density correlations shall be submitted with test results. Each transmittal including density test data shall include a summary of all density correlations for the job neatly prepared on a summary sheet including at a minimum:

1) date, meter serial number and operators initials.

2) standard count and adjustment data for each test.

3) material type.

4) probe depth.

5) moisture content by each test method and the deviation.

6) wet density by each test method and the deviation.

c. The nuclear density testing equipment shall be capable of extending a probe 6 inches minimum down into a hole. The probe shall generally be extended to the maximum depth obtainable.

d. Nuclear density testing equipment used within 2 vertical feet from the existing ground water level, 5 horizontal feet from a vertical wall or massive concrete structure, or in a trench shall have the standard count changed before and after each test, or the manufacturers published correction procedure shall be followed.

e. Nuclear density testing equipment shall not be used during rain.

3.17 SUBGRADE AND EMBANKMENT PROTECTION

Compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified herein to the required density prior to further construction thereon. Subgrades not meeting the specifications for finish, material type and density at the time of surface material placement shall be corrected at the Contractor's expense. Cohesive embankments and subgrades shall be kept crowned or sloped for drainage. Newly graded areas shall be protected from traffic and erosion. Any settlement or washing away that may occur from any cause shall be repaired. No base course or pavement shall be laid until the subgrade has been checked and approved by the Contracting Officer. Ditches and drains along subgrade shall be maintained to provide effective drainage. All work shall implement best management practices for erosion control.

-- End of Section --

DAILY REPORT FORM FOR EARTHWORK OBSERVATION

Project Name:	Date:
Contract Number: DACW37- - -	Temperature
QC Technician/Inspector:	Precipitation
Earthwork Contractor:	

Sunny ☐ partly cloudy ☐ overcast ☐ windy ☐ Other _____

Stripping and Excavation

Area (sta., Elevation)	Depth/Thickness Removed	Excavated Material (ASTM D 2488)	Base Material (ASTM D 2488)

Excavation Equipment:

Description	No. Operating	Type (Make & Model or Capacity)
Dozers		
Backhoes		
Wheel Loaders		
Other_____		

Fill Placement

Area (Sta., Elevation) (Grids, depth below FFE)	Fill Material (ASTM D 2488)	Lift Thickness & Number of Passes

Hauling/Placing Equipment:

Description	No. Operating	Type (Make & Model or Capacity)
Trucks		
Scrapers		
Compactors		
Dozers/Graders		
Other_____		

Density Tests Taken (list numbers): _____

Notes: _____

_____

DAILY REPORT FORM FOR INSPECTION TRENCH

Project Name:	Date:
Contract Number: DACW37- - -	Temperature
QC Technician/Inspector:	Precipitation
Earthwork Contractor:	

Sunny ☐ partly cloudy ☐ overcast ☐ windy ☐ Other _____

Soil Stratigraphy

Zone (label in sketch)	Soil Description (ASTM D 2488)	Water Conditions
Trench base soils		

Sketch of Trench Profile

Beginning Sta. Ending Sta.

Trench Width: _____

Side Slopes (vert., 1V:1H, etc.): _____

Pipes, tiles, or Conduits: _____

(indicate sta., depth or elevation, leakage, etc.) _____

Excavation Equipment:

Description	No. Operating	Type (Make & Model or Capacity)
Backhoes		
Other_____		

Fill Material: _____

Borrow Area: _____

Compaction Equipment: _____

Lift Thickness: _____

Number of passes: _____

Density Tests Taken (list numbers): _____

Notes: _____

_____

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02315

EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES

PART 1 GENERAL

1.1 REFERENCES
1.2 DEGREE OF COMPACTION
1.3 LINE OF PROTECTION
1.4 SUBMITTALS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Satisfactory Materials
2.1.2 Unsatisfactory Materials
2.1.3 Cohesionless and Cohesive Materials
2.1.4 Granular Fill
2.1.5 Till Backfill

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING
3.2 TOPSOIL
3.3 EXCAVATION
3.3.1 Pad for Portable Pump Excavation
3.4 DRAINAGE AND DEWATERING
3.4.1 Drainage
3.4.2 Dewatering
3.5 SHORING
3.6 CLASSIFICATION OF EXCAVATION
3.7 BLASTING
3.8 UTILITY AND DRAIN TRENCHES
3.9 BORROW
3.10 EXCAVATED MATERIALS
3.11 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE
3.12 SUBGRADE PREPARATION
3.13 FILLING AND BACKFILLING
3.14 TESTING
3.14.1 In-Place Densities
3.14.1.1 In-Place Density of Paved Area Subgrades
3.14.1.2 In-Place Density of Structure Subgrade
3.14.1.3 In-Place Density of Fills and Backfills
3.14.2 Optimum Moisture and Laboratory Maximum Density
3.14.3 Plasticity Index
3.15 GRADING
3.16 TOPSOIL AND SEEDING
3.17 PROTECTION

-- End of Section Table of Contents --

SECTION 02315

EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 698	(1998) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4318	(1998) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 DEGREE OF COMPACTION

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698, abbreviated as percent laboratory maximum density.

1.3 LINE OF PROTECTION

Line of protection includes levee, floodwall, and closures.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Testing;

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

Satisfactory materials for general and structural backfill for structures located on the riverside of the levee and within the line of protection, pump stations, and storm sewer structures shall be comprised of native soils classified by ASTM D 2487 as SC, CL, CL-ML, and CH, unless otherwise shown.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 3 inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM shall be identified as cohesionless only when the fines are nonplastic.

2.1.4 Granular Fill

Granular material shall be satisfactory material containing not more than 12 percent by weight of material passing the No. 200 sieve. For free draining select granular fill, the material shall contain not more than 5 percent by weight of material passing the No. 200 sieve.

2.1.5 Till Backfill

Till backfill shall meet the requirements for satisfactory material, be classified by ASTM D 2587 as CL, and identified by the Government Geologist as till. The Contractor shall notify the Contracting Officer 30 day in advance of placing till backfill so that the Contracting Officer can evaluate the material for suitability.

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

Clearing and grubbing is specified in Section 02230 CLEARING AND GRUBBING.

3.2 TOPSOIL

Stripping topsoil is specified in Section 02300 EARTHWORK.

3.3 EXCAVATION

Excavation shall conform to the dimensions and elevations indicated for each building, structure, and footing except as specified, and shall include trenching for utility and foundation drainage systems to a point 5 feet beyond the building line of each building and structure and all work incidental thereof. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms. Excavations

below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed and replaced with satisfactory material; and payment will be made in conformance with the CHANGES clause of the CONTRACT CLAUSES. Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced, at no additional cost to the Government, with satisfactory materials to the indicated excavation grade; except that concrete footings shall be increased in thickness to the bottom of the overdepth excavations. Satisfactory material shall be placed and compacted as specified in paragraph FILLING AND BACKFILLING. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

3.3.1 Pad for Portable Pump Excavation

Excavation is required for the construction of the pads for portable pumps in Ponding Areas 2A and 4A. The elevations for the base of the excavations are based on excavating to the top of the till unit. The Contractor shall notify the Contracting Officer 24 hours in advance of performing these excavations so that the Contracting Officer can be present to observe the work. If the Contracting Officer determines that additional excavation is required to reach the top of the till unit, the Contractor shall perform the additional excavation and all additional work associated with the additional excavation will be paid for in accordance with the contract clause: CHANGES.

3.4 DRAINAGE AND DEWATERING

3.4.1 Drainage

Surface water shall be directed away from excavation and construction sites to prevent erosion and undermining of foundations. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site, the area immediately surrounding the site, and the area affecting operations at the site shall be continually and effectively drained.

3.4.2 Dewatering

See Section 01000 GENERAL for dewatering requirements. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 2 feet below the working level. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.

Crushed rock or granular soils are not allowed beneath structure foundations, unless otherwise shown. Other methods to create a dry, stable subgrade on which to place reinforcement and concrete shall be used that

will not create a permeable condition beneath the structure. Remove to the maximum extent possible, pervious materials incorporated into dewatering systems. Prior to placement of backfill the Contracting Officer will determine if materials used in dewatering are removed satisfactorily.

3.5 SHORING

See Section 01000 GENERAL for shoring requirements.

3.6 CLASSIFICATION OF EXCAVATION

Excavation will be unclassified regardless of the nature of material encountered.

3.7 BLASTING

Blasting will not be permitted.

3.8 UTILITY AND DRAIN TRENCHES

Trenches for underground utilities systems and drain lines shall be excavated to the required alignments and depths. The bottoms of trenches shall be graded to secure the required slope and shall be tamped if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length.

3.9 BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, approved materials shall be obtained by the Contractor at no additional cost to the Government. Borrow material shall be selected to meet the requirements and conditions of the particular backfill for which it is to be used.

3.10 EXCAVATED MATERIALS

Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required under this section or shall be separately stockpiled if it cannot be readily placed. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of off site in accordance with Section 02300 EARTHWORK.

3.11 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Excavation to final grade shall not be made until just before concrete is to be placed. For pile foundations, the excavation shall be stopped at an elevation of from 6 to 12 inches above the bottom of the footing before driving piles. After pile driving has been completed, the remainder of the excavation shall be completed to the elevations shown. All surfaces shall be protected from erosion resulting from ponding or flow of water.

3.12 SUBGRADE PREPARATION

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical

to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Minimum subgrade density shall be as specified in paragraph FILLING AND BACKFILLING.

3.13 FILLING AND BACKFILLING

Satisfactory materials shall be used in bringing fills and backfills to the lines and grades indicated and for replacing unsatisfactory materials. Satisfactory materials shall be placed in horizontal layers not exceeding 8 inches in loose thickness, or 6 inches when hand-operated compactors are used. After placing, each layer shall be plowed, disked, or otherwise broken up, moistened or aerated as necessary, thoroughly mixed and compacted as specified. Backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed, and the excavation cleaned of trash and debris. Backfill shall be brought to indicated finish grade. Backfill shall not be placed in wet or frozen areas. Where pipe is coated or wrapped for protection against corrosion, the backfill material up to an elevation 2 feet above sewer lines and 1 foot above other utility lines shall be free from stones larger than 1 inch in any dimension. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted in layers not more than 4 inches in compacted thickness with power-driven hand tampers suitable for the material being compacted. Backfill shall be placed carefully around pipes to avoid damage to coatings, or wrappings. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls. As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall. Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density specified below:

	Percent Laboratory maximum density	
	Cohesive material	Cohesionless material
Fill, embankment, and backfill		
Under structures, paved areas, around footings, and in trenches	100	100
Under grassed areas	95	95
Subgrade		

	Percent Laboratory maximum density	
	Cohesive material	Cohesionless material
Under structures, steps, and paved areas, top 12 inches	100	100

Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified herein before to the required density prior to further construction thereon. Recompaction over underground utilities shall be by hand tamping.

3.14 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

3.14.1 In-Place Densities

In-place density and moisture content test results shall be included with the Contractor's daily construction quality control reports.

3.14.1.1 In-Place Density of Paved Area Subgrades

One test per 100 linear feet per lift or fraction thereof.

3.14.1.2 In-Place Density of Structure Subgrade

One test per 250 square feet per lift or fraction thereof.

3.14.1.3 In-Place Density of Fills and Backfills

Not less than 1 test for each 2 vertical feet of fill per 100 linear feet or fraction thereof.

3.14.2 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material, including borrow material to determine the optimum moisture and laboratory maximum density values. A minimum of two representative tests per source or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density will be made.

3.14.3 Plasticity Index

Tests shall be made to determine the plasticity index for the till material in accordance with ASTM D 4318 for each source of material, including on-site borrow material. A minimum of two representative test per source or when any change in material occurs which may affect the plasticity index will be made.

3.15 GRADING

Areas within 5 feet of each building and structure line shall be constructed true-to-grade, shaped to drain, and shall be maintained free of trash and debris.

3.16 TOPSOIL AND SEEDING

Placement of topsoil and seeding is specified in Section 02920 SEEDING, SODDING, AND TOPSOIL.

3.17 PROTECTION

Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades re established to the required elevations and slopes.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02316

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED WORK OF OTHER SECTIONS
1.3 DEFINITIONS
1.4 SUBMITTALS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Unyielding Material
2.1.2 Unstable Material
2.1.3 Select Granular Material
2.1.4 Annular Drainage Fill
2.2 PLASTIC MARKING TAPE

PART 3 EXECUTION

3.1 EXCAVATION
3.1.1 Trench Excavation
3.1.1.1 Bottom Preparation
3.1.1.2 Unyielding Material
3.1.1.3 Unstable Material
3.1.1.4 Excavation for Appurtenances
3.1.2 Stockpiles
3.2 BACKFILLING AND COMPACTION
3.2.1 Levees
3.2.2 Bedding and Initial Backfill
3.2.3 Final Backfill
3.2.4 Backfill for Appurtenances
3.2.5 Topsoil and Seed
3.3 TESTING
3.3.1 Testing of Backfill Materials
3.3.2 Field Density Tests
3.4 SPECIAL REQUIREMENTS
3.4.1 Burial Depth
3.4.2 Plastic Marking Tape
3.5 DISPLACEMENT OF SEWERS

-- End of Section Table of Contents --

SECTION 02316

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 698	(1998) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D 1556	(1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

NDDOT	(1997) Standard Specifications for Road and Bridge Construction

1.2 RELATED WORK OF OTHER SECTIONS

Dewatering is covered in Section 01000 GENERAL. Material definitions, backfill compaction and testing requirements are covered in Sections 02300 EARTHWORK and 02630 STORM-DRAINAGE SYSTEM.

1.3 DEFINITIONS

Reference to pipes shall include conduits, cables, or other utility systems. Appurtenant structures include manholes, catch basins, inlets, outlets, headwalls, or similar structures.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Testing;

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

PART 2 PRODUCTS

2.1 MATERIALS

In addition to the definitions below, material definitions shall be as specified in Section 02300 EARTHWORK.

2.1.1 Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

2.1.2 Unstable Material

Unstable material shall consist of materials too soft and/or compressible to properly support the pipe or appurtenant structure.

2.1.3 Select Granular Material

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 5 percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the 3/4 inch sieve.

2.1.4 Annular Drainage Fill

Annular drainage fill shall be a well-graded sand conforming to the requirements in NDDOT, Section 816.01 Fine Aggregate for Concrete.

2.2 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking

and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in TABLE 1 and shall bear a continuous printed inscription describing the specific utility.

TABLE 1. Tape Color

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone, Telegraph, Television, Police, and Fire Communications
Blue:	Water Systems
Green:	Sewer Systems

PART 3 EXECUTION

3.1 EXCAVATION

Unless otherwise indicated, trench excavation shall be by open cut except that short sections may be jacked or bored if the utility can be safely and properly installed and ground loss can be properly controlled. All excavation shall be constructed in accordance with the Safety and Health Requirements Manual (EM 385-1-1) and OSHA Standards. Allowable trench widths, depths, side slopes, sheet and bracing requirements, and other considerations are given in the OSHA Standard; and an abbreviated version is given in the Safety and Health Requirements Manual. Provide full access to public/private premises and fire hydrants so as to prevent serious disruption of travel. Protect and maintain benchmarks and monuments during excavations.

3.1.1 Trench Excavation

Excavation shall be performed to the lines and grades indicated. During excavation, material satisfactory for backfilling shall be stockpiled in a neat and orderly manner at a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or caving. Topsoil shall be stockpiled separately from suitable backfill material. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized over excavation shall be backfilled at no additional cost to the Government.

3.1.1.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Pipe shall rest on undisturbed or properly placed and compacted soil along its entire length. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.1.2 Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 8 inches below the required grade and replaced with select granular fill, except as provided below.

For levees and all utility systems passing through or beneath levees,

the replaced fill shall meet the requirements for the zone where it is located. Use of material more pervious than surrounding soils is not acceptable.

3.1.1.3 Unstable Material

Where wet, soft, unsuitable or otherwise unstable soil incapable of properly supporting pipe is encountered in the bottom of a trench or excavation, the Contractor shall immediately contact the Contracting Officer prior to proceeding with the associated work. When removal of unstable material is required due to inadequate shoring and sheeting, water removal, control of ground water or other similar operations, such unstable material shall be excavated and replaced with satisfactory material as directed at no additional cost to the Government.

3.1.1.4 Excavation for Appurtenances

Excavation for appurtenances shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.1.2 Stockpiles

Stockpiles of satisfactory material shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed. Excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government.

3.2 BACKFILLING AND COMPACTION

Backfilling shall not begin until construction below finish grade has been approved, storm drainage systems have been inspected, tested and approved; concrete forms have been removed and the excavation cleaned of frost, trash and debris. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls. As far as practicable, backfill shall be brought up evenly on each side of the wall. Trenches not immediately backfilled to grade shall be sloped to drain if practicable. Heavy equipment for spreading and compacting backfill shall not be operated closer to a foundation or other underground structural element than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted with power driven hand tampers suitable for the material being compacted.

Backfill shall consist of satisfactory material meeting the requirements shown and specified. Compaction and testing requirements for backfill shall be as stated in Section 02300 EARTHWORK.

3.2.1 Levees

Where pipes are located within the right of way of levees, all fill materials shall meet the type and classification for the fill zone where the trench is located. The portion of the trench in native soils shall be backfilled with the excavated material that matches the surrounding soils.

3.2.2 Bedding and Initial Backfill

Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with manual tampers to a height above the pipe necessary to prevent damage, but not less than one foot. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.2.3 Final Backfill

Final backfill is all material necessary to complete backfilling at the trench above the bedding and initial backfill. Final backfill shall consist of native impervious fill, unless otherwise required beneath pavements, adjacent to structures, or other project features. Placement and compaction of final backfill shall comply with the requirements listed in Section 02300 EARTHWORK for the fill zone or feature in which the utility trench is located.

3.2.4 Backfill for Appurtenances

After the structure has been constructed and the concrete has been allowed to cure for 7 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for backfill in Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.2.5 Topsoil and Seed

All disturbed topsoil and turf shall be restored to the pre disturbed condition upon completion of the work.

3.3 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

3.3.1 Testing of Backfill Materials

Classification of backfill materials shall be determined in accordance with ASTM D 2487 and the moisture-density relations of soils shall be determined in accordance with ASTM D 698. A minimum of one soil classification and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.3.2 Field Density Tests

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test for each 2 vertical feet of backfill for every 300 feet of installation shall be

performed. One moisture density relationship shall be determined for every 1500 cubic yards of material used. Field in-place density shall be determined in accordance with ASTM D 1556 and ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

3.4 SPECIAL REQUIREMENTS

3.4.1 Burial Depth

Burial Depth of specific utilities is given below:

a. Water lines. Trenches shall be of a depth to provide a minimum cover of 7 feet from the existing ground surface or from the indicated finished grade (whichever is lower) to the top of the pipe, unless otherwise indicated.

b. Cables and Conduits. Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

3.4.2 Plastic Marking Tape

Warning tapes shall be installed directly above the pipe, at a depth of 18 inches below finished grade unless otherwise shown.

3.5 DISPLACEMENT OF SEWERS

After other required tests have been performed and the trench backfill compacted to 2 feet above the top of the pipe, the pipe shall be inspected to determine whether significant displacement has occurred. This inspection shall be conducted in the presence of the Contracting Officer. Pipe sizes larger than 36 inches shall be entered and examined, while smaller diameter pipe shall be inspected by shining a light or laser between manholes or manhole locations, or by the use of television cameras passed through the pipe. If, in the judgement of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects shall be remedied as directed at no additional cost to the Government.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02388

STONE PROTECTION (RIPRAP)

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS

PART 2 PRODUCTS

2.1 STONE SOURCES AND EVALUATION
2.1.1 Alternate Sources
2.1.2 Acceptance of Materials
2.2 RIPRAP
2.2.1 General
2.2.2 Production
2.3 BEDDING MATERIAL
2.4 SOURCE QUALITY CONTROL
2.4.1 Sampling Requirements
2.4.2 Riprap Gradation Testing
2.4.2.1 Riprap Test Method A
2.4.2.2 Riprap Test Method B
2.4.3 Riprap Bedding Gradation Testing
2.4.3.1 Gradation Tests for Riprap Bedding
2.5 STOCKPILES

PART 3 EXECUTION

3.1 CONSTRUCTION TOLERANCES
3.1.1 Subgrades
3.1.2 Layer Thickness
3.1.3 Surface Tolerances
3.2 FOUNDATION PREPARATION
3.3 PLACEMENT OF BEDDING MATERIAL
3.4 PLACEMENT OF RIPRAP
3.4.1 Layer Requirements
3.4.2 Construction Methods
3.5 MAINTENANCE
3.6 CONTRACTOR QUALITY CONTROL

-- End of Section Table of Contents --

SECTION 02388

STONE PROTECTION (RIPRAP)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates

CORPS OF ENGINEERS (COE)

EM 1110-2-1906	(1986) Laboratory Soils Testing

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Gradation Test

Gradation Test Results for riprap. Riprap gradation testing results shall be submitted on the WORKSHEET FOR GRADATION ANALYSIS OF RIPRAP and the gradation curve (ENG Form 4055). A blank copy of each form is included at the end of this section.

SD-07 Certificates

Material Sources; G, ED.

The Contractor shall designate in writing only one source or one combination of sources from which he proposes to furnish stone. The Contractor shall state in writing methods of processing and handling riprap, and shall notify the Contracting Officer when production methods are changed.

Certified Weight Scale Tickets;

Copies of all certified weight scale tickets shall be furnished to the Contracting Officer at a frequency as directed. The tickets do not need to be formally submitted through the submittal process.

PART 2 PRODUCTS

2.1 STONE SOURCES AND EVALUATION

Stone and aggregate materials may be quarried rock or durable fieldstone and shall be produced or obtained from the sources listed in Section 00830 ATTACHMENTS. The rock supplied shall be composed of a quality fieldstone or be quarried from one rock formation to provide a product of uniform appearance. The Contractor shall not supply rock from various formations, or mix fieldstone with quarried rock, unless approved by the Contracting Officer. It is the Contractor's responsibility to determine that the stone source or combination of sources selected is capable of providing the quality, quantities and gradation needed and at the rate needed to maintain the scheduled progress of the work.

2.1.1 Alternate Sources

If the Contractor proposes to furnish stone materials from a source not listed in Section 00830 ATTACHMENTS, the Government Geologist will make such investigations and evaluations as necessary to determine whether or not materials meeting the requirements specified can be produced from the proposed source. Alternate sources from which the Contractor proposes to obtain stone materials shall be selected and submitted for approval at least 30 days in advance of the time when the material will be required.

2.1.2 Acceptance of Materials

Acceptance of a source of stone is not to be construed as acceptance of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for stone as determined by the Contracting Officer. The Contracting Officer also reserves the right to reject individual units of produced specified materials in stockpiles at the quarry, all transfer points, and at the project construction site when such materials are determined to be unsuitable.

2.2 RIPRAP

Riprap gradation shall meet the requirements for riprap indicated in the following tables. The stone shall be well graded within the limits specified.

PERCENT SAMPLE BY WEIGHT BETWEEN WEIGHT LIMITS	WEIGHT OF INDIVIDUAL STONES (DESIGN SP. WT. = 165 LB/CF)	
R20 RIPRAP		
100	85	40
50	35	20
15	20	5
5	15	2

PERCENT SAMPLE BY WEIGHT BETWEEN WEIGHT LIMITS	WEIGHT OF INDIVIDUAL STONES (DESIGN SP. WT. = 165 LB/CF)	
R30 RIPRAP		
100	140	60
50	60	30
15	30	10
5	25	5

PERCENT SAMPLE BY WEIGHT BETWEEN WEIGHT LIMITS	WEIGHT OF INDIVIDUAL STONES (DESIGN SP. WT. = 165 LB/CF)	
R45 RIPRAP		
100	205	90
50	85	45
15	40	15
5	35	8

2.2.1 General

All stone shall be durable material. Stone for riprap shall have a specific gravity between 2.55 and 2.75 unless approved by the Contracting Officer. Stone shall be of a suitable quality to ensure permanence in the structure and in the climate in which it is to be used. It shall be free from cracks, blast fractures, bedding, seams and other defects that would tend to increase its deterioration from natural causes. The stone shall be clean and reasonably free from soil, quarry fines, and shall contain no refuse. Any foreign material adhering to or combined with the stone as a result of stockpiling shall be removed prior to placement. Neither the breadth nor the thickness of any piece of stone shall be less than one-third of its length. Occasional pieces of stone slightly larger than the maximum weight will be permitted provided the gradation and voids are not unduly affected and that surface tolerances are met.

2.2.2 Production

Riprap shall be handled and selectively loaded onto trucks in a manner to avoid segregation and provide a distribution of stone sizes consistent with the gradation band and test samples. Each truckload shall be representative of the gradation requirements.

2.3 BEDDING MATERIAL

Bedding material shall consist of cobbles, gravel, and sand or crushed stone and shall be well graded. The bedding material shall be composed of tough, durable particles, adequately free from thin, flat and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities considered objectionable by the Contracting Officer. The aggregate shall meet the quality requirements of ASTM C 33. Grading shall conform to the following requirements:

U.S. STANDARD SIEVE	PERMISSIBLE LIMITS PERCENT BY WEIGHT, PASSING
B1 BEDDING STONE	
4 in.	100
3 in.	85-100
1-1/2 in.	67-85
3/4 in.	50-67
3/8 in.	33-49
No. 4	15-32
No. 10	0-10
No. 20	0-5

U.S. STANDARD SIEVE	PERMISSIBLE LIMITS PERCENT BY WEIGHT, PASSING
B2 BEDDING STONE	
6 in.	100
4 in.	79-100
3 in.	71-88
1-1/2 in.	54-71
3/4 in.	38-54
3/8 in.	22-38
No. 4	7-22
No. 10	0-5

The bedding materials shall be well-graded between the limits shown. At least one test shall be performed on each 1000 tons to be delivered to the project site in accordance with ASTM C 136. All points on individual grading curves obtained from representative samples of bedding material shall lie between the boundary limits as defined by smooth curves drawn through the tabulated gradation limits plotted on ENG Form 2087 or similar form. The individual gradation curves within these limits shall not exhibit abrupt changes in slope denoting either gap grading or scalping of certain sizes or other irregularities which would be detrimental to the proper functioning of the filter.

2.4 SOURCE QUALITY CONTROL

Sampling and testing shall be performed by and at the expense of the Contractor at no additional cost to the Government. Gradation tests shall be performed by either Method A or B at the frequency listed below. A satisfactory gradation test shall be obtained prior to any hauling and delivery of materials. All tests, including failing tests shall be submitted. Tests performed on material which do not meet gradation and shape requirements will not be counted as part of the tests required. The Contracting Officer shall be informed immediately of test results and draft copies of test results shall be furnished at the Contracting Officers request.

2.4.1 Sampling Requirements

The Contracting Officer shall direct the time and location of sampling, unless waived. Samples shall be taken from stockpiles or loaded trucks, and not directly from conveyers or chutes.

2.4.2 Riprap Gradation Testing

a. Notification. The Contracting Officer shall be informed 24 hours before each riprap test.

b. Testing Frequency. At least 1 gradation test shall be performed per source prior to delivery to the project site. Perform 1 test of riprap stockpiled or delivered to the project site.

c. Sample Size. The sample shall have a minimum gross weight not less than 25 times the maximum stone size in the specified gradation (25 * W_{100}).

2.4.2.1 Riprap Test Method A

Test method A shall consist of weighing all stones larger than 5 pounds in a sample. Five to seven weight classes shall be selected within the range of stone sizes. Each stone shall be weighed and recorded on the Work Sheet for Gradation Analysis of Riprap Method A. The weight of stones shall be summed for each weight class; after which calculations and a plot of the gradation shall be completed in accordance with accepted practice for soil and aggregate gradations.

2.4.2.2 Riprap Test Method B

Test Method B shall consist of separating the stones into 5 to 7 piles, ordered by size. The sample shall be separated on a clean, hard surface that is free of smaller stones that could become mixed with the sample. The stones shall be visually screened to place them into appropriate piles. All stones shall be separated and placed into a pile before weighing. After separating, the smallest and largest rock in each pile shall be weighed and recorded. The stones shall be adjusted as necessary so that the weight classes do not overlap. After adjustment is adequate and weight classes have been established, each pile of stone shall be weighed and recorded on the Work Sheet for Gradation Analysis of Riprap Method B. Calculations and a plot of the gradation shall be completed in accordance with accepted practice for soil and aggregate gradations.

2.4.3 Riprap Bedding Gradation Testing

a. Notification: The Contracting Officer shall be informed 24 hours before each riprap bedding test.

b. Testing frequency: At least 1 gradation test shall be performed per source prior to delivery to the project site. Perform 1 test of riprap bedding stockpiled or delivered to the project site.

c. Sample size: The sample shall have a minimum gross weight of 150 pounds.

2.4.3.1 Gradation Tests for Riprap Bedding

The sampling and testing procedures for gradation tests for bedding shall be in accordance with EM 1110-2-1906. Report results on ENG FORM 2087, provided at the end of this Section.

2.5 STOCKPILES

Stockpiles shall be formed by a series of layers or truckload dumps, where the rock essentially remains where it is placed. Subsequent layers shall be started 10 feet from the edge of the previous layer so that the rock will not roll down the edges of the pile. Any stone which has become contaminated with soil or refuse shall not be put into the work unless the contaminating material has been removed prior to placement.

PART 3 EXECUTION

3.1 CONSTRUCTION TOLERANCES

Work shall generally meet the required elevations, slope and grade; and the outer surfaces shall be even and present a neat appearance.

3.1.1 Subgrades

Areas on which stone protection will be placed shall be graded and/or dressed to conform to cross sections shown on the contract drawings within 2 inches above or below the neat lines. The surface shall be reasonably smooth to match tolerances normally obtained by rough grading with bladed equipment. For subaqueous construction in greater than 3 feet of water, the tolerance shall be 6 inches.

3.1.2 Layer Thickness

Any layers found to be less than 80% of the specified thickness shall be corrected. This tolerance shall only be exceeded on isolated spot checks, and if the tolerance is commonly exceeded, the Contractor shall change his construction methods to improve the quality control. If it is necessary to estimate riprap quantities for changes, the volume shall be based on neat line dimensions and the plan dimension for thickness. A conversion factor of 1.5 tons/CY shall be used to determine quantity requirements, unless otherwise directed by the Contracting Officer.

3.1.3 Surface Tolerances

The finished surface tolerance above the neat line shall generally not deviate from the lines and grades shown by more than half (1/2) the average stone dimension of the gradation range. Riprap that has a rough and uneven surface shall be reworked by hand to stabilize stones that wobble and are out of tolerance, except where the Contracting Officer approves use of equipment. Rearranging of individual stones shall be required to the extent necessary to obtain a well-graded distribution of stone sizes.

3.2 FOUNDATION PREPARATION

Foundation areas shall be excavated or filled to the lines and grades shown. Filling shall be with earth similar to the adjacent material and shall be well compacted. Immediately prior to placing riprap, the prepared subgrade will be inspected by the Contracting Officer unless waived; and no material shall be placed thereon until that area has been approved.

3.3 PLACEMENT OF BEDDING MATERIAL

Bedding material shall be spread uniformly to the slope lines and grades as indicated on the contract drawings. Placement shall begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. Placing of bedding material by methods which tend to segregate the particle sizes within the layer will not be permitted. Compaction of material will not be required, but shall be finished to present an adequately even surface, free from mounds or windrows.

3.4 PLACEMENT OF RIPRAP

3.4.1 Layer Requirements

Riprap shall be placed in a manner which will produce a well-graded mass of rock with the minimum practicable percentage of voids. The large stones shall be well distributed. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones.

3.4.2 Construction Methods

Unsegregated stone shall be placed in a systematic manner. Riprap shall be placed to its full course thickness in one operation and in such manner as to avoid displacing underlying material. Placement shall typically begin at the bottom of the area to be covered and continue up slope. Subsequent loads of material shall be placed against previously placed material in such a manner as to ensure a relatively homogenous mass. Final finish of slope shall be performed as the material is placed.

Placing riprap in layers will not be permitted. Placing riprap by dumping it into chutes, or by any method likely to cause segregation of the various sizes, shall not be permitted. Placing riprap by dumping it at the top of the slope and pushing it down the slope shall not be permitted. No equipment shall be operated directly on the completed stone protection system. Dump trucks shall be equipped with bottom hinged tailgates if rock is directly placed into position with the trucks.

3.5 MAINTENANCE

The Contractor shall maintain the stone protection and underlying works until accepted by the Contracting Officer. When appropriate, the Contractor shall place stone protection in a timely manner to reduce risk of scour. Any material displaced prior to acceptance and due to the Contractor's negligence or neglect shall be replaced at the Contractor's expense.

3.6 CONTRACTOR QUALITY CONTROL

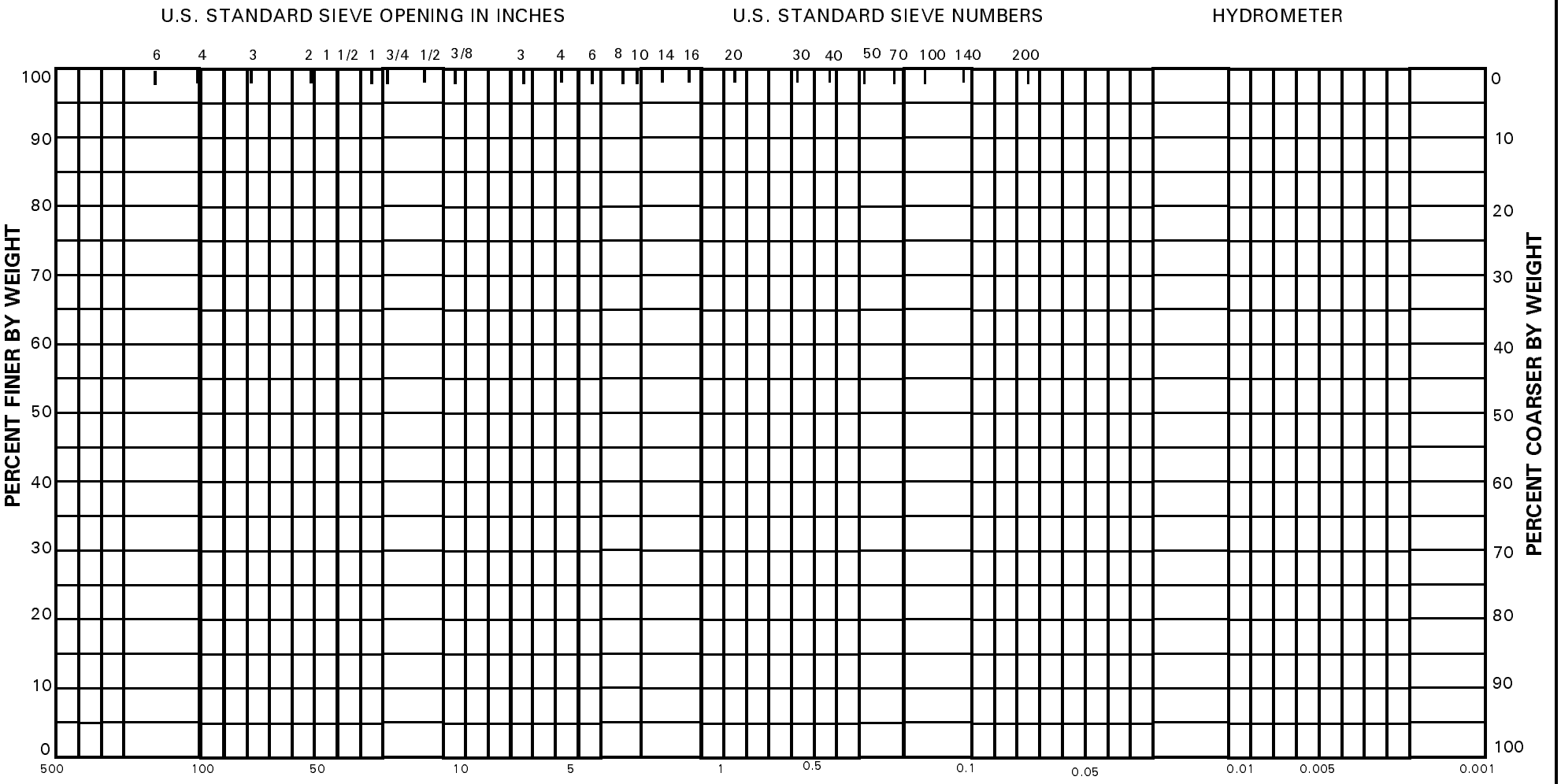
The Contractor shall establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. The Contractor shall maintain records of his quality control tests, inspections and corrective actions. Quality control measures shall cover all construction operations including, but not limited to, the placement of all materials to the slope and grade lines shown and in accordance with this section.

In addition to the Contractor's system to establish and maintain quality control for stone placement operations, the following information shall be recorded and promptly provided to the Contracting Officer on request:

a. Record tonnage of stone placed in completed sections of the work and check quantity for compliance with design sections.

b. Check for uniform thickness of material layers.

-- End of Section --



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

Project

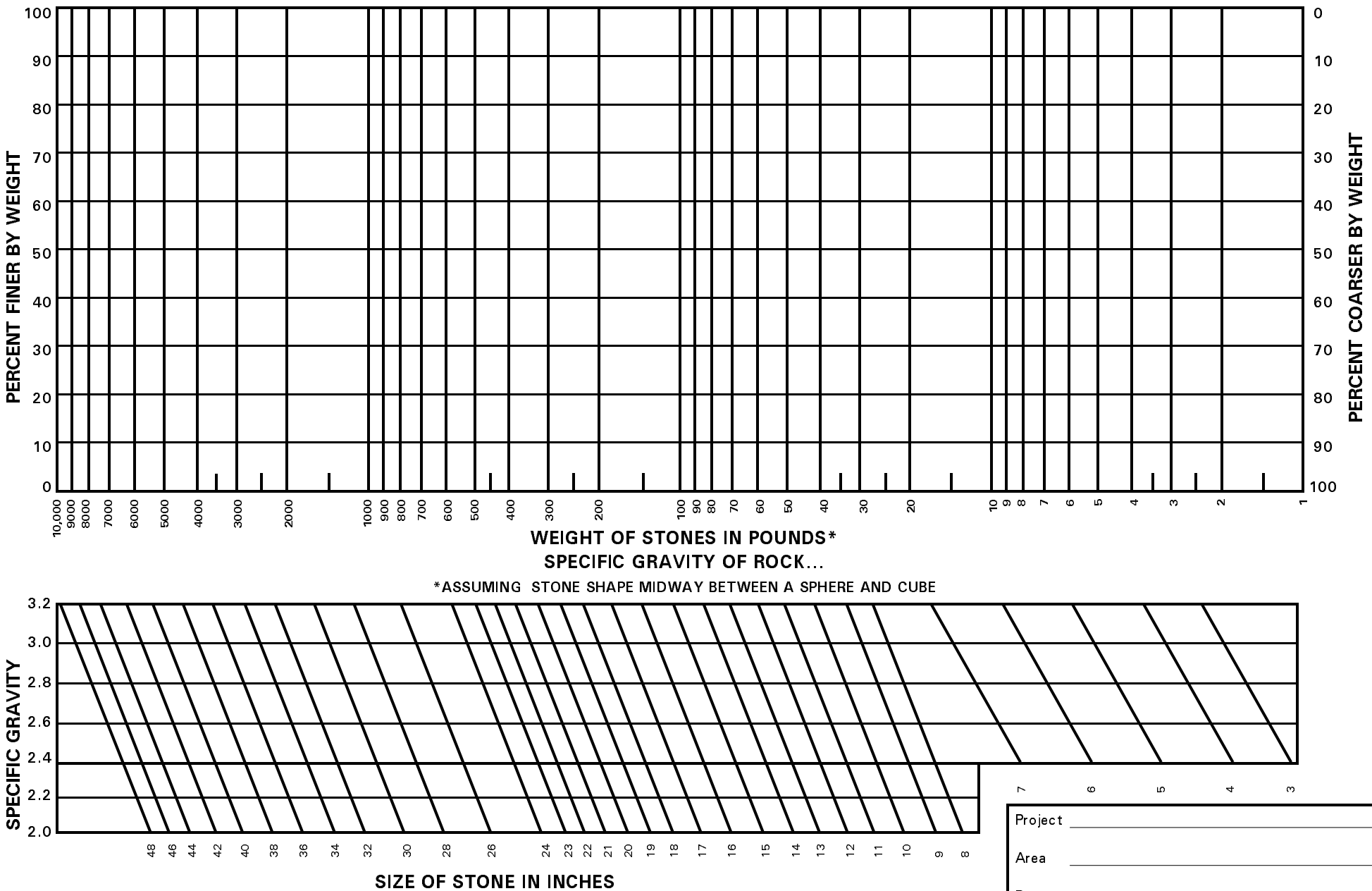
Area

Boring

Date

GRADATION CURVES

ENG FORM 2087, 1 MAY 63 (EM 1110-2-1906) (Proponent: CECW-EG)



Project _____

Area _____

Date _____

RIPRAP GRADUATION CURVES

WORK SHEET FOR GRADATION ANALYSIS OF RIPRAP
METHOD A

Project Name:	Date:
Riprap Type:	Test No.
Source, Quarry, or Pit:	
Sample Location:	Test Made By:

Part 1. Weigh all stones larger than 5 pounds and record.

(1) PASSING WT.							5 lbs.
(2) RETAINED WT.						5 lbs.	PAN
(3) -------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
-------							-------
(4) TOTALS							

Rows (1) & (2) Enter 5 to 7 weight classes to yield approx. 75%, 50%, 30%, and 15% finer points.

Row (3) List weight of each stone. Attach additional sheets if necessary.

Row (4) Add all individual stone weights listed in each column.

Part 2. Summary Table.

(5) WEIGHT CLASSES		(6)	(7)	(8)
PASSING (stone wt. in lbs.)	RETAINED (stone wt. in lbs.)	TOTAL WEIGHT EACH CLASS (lbs.)	CUMMULATIVE WEIGHT PASSING (lbs.)	TOTAL PERCENT PASSING (%)
	5 lbs.			
5 lbs.	PAN			
SAMPLE TOTAL			--------	--------

Column (5) Enter same weight classes used in Rows (1) and (2).

Column (6) Enter weights of material from Row (4)

Column (7) Add column (6) from bottom up to get cumulative weight passing.

Column (8) Divide column (7) by sample total to get total percent passing.

WORK SHEET FOR GRADATION ANALYSIS OF RIPRAP
METHOD B

Project Name:	Date:
Riprap Type:	Test No.
Source, Quarry, or Pit:	
Sample Location:	Test Made By:

Part 1. Separate rock into 5 to 7 piles, ordered by size. The largest pile should contain 2 to 5 stones. Intermediate piles between the largest stones and those smaller than 5 pounds should be approximately equal in total weight. Separate all stones before weighing.

Part 2. Summary Table.

(1) WEIGHT CLASSES		(2)	(3)	(4)
PASSING (stone wt. in lbs.)	RETAINED (stone wt. in lbs.)	TOTAL WEIGHT EACH CLASS (lbs.)	CUMMULATIVE WEIGHT PASSING (lbs.)	TOTAL PERCENT PASSING (%)
	5 lbs.			
5 lbs.	PAN			
SAMPLE TOTAL			--------	--------

Column (1) Weight the smallest and largest stone in each pile. If weight classes overlap, adjust stones as necessary and repeat.
Column (2) Weigh the total amount of rock in each pile and record.
Column (3) Add column (2) from bottom up to get cumulative weight passing.
Column (4) Divide column (3) by sample total to get total percent passing.

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02630

STORM-DRAINAGE SYSTEM

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING
1.3.1 Delivery and Storage
1.3.2 Handling

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS
2.1.1 Concrete Pipe
2.1.2 Corrugated Steel Pipe
2.2 DRAINAGE STRUCTURES
2.2.1 Flared End Sections
2.3 MISCELLANEOUS MATERIALS
2.3.1 Concrete
2.3.2 Mortar
2.3.3 Precast Reinforced Concrete Manholes
2.3.4 Frame and Cover Castings
2.3.5 Chimney Seal
2.3.6 Aluminum Gratings
2.3.7 Joints
2.3.7.1 Flexible Watertight Joints
2.4 CHIMNEY SEALS
2.5 STEEL LADDER
2.5.1 Cast-In-Place Concrete Structures
2.5.2 Precast Concrete Manholes
2.6 DOWNSPOUT BOOTS

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS AND DRAINAGE STRUCTURES
3.1.1 Trenching
3.1.2 Removal of Unstable Material
3.2 BEDDING
3.2.1 Concrete Pipe Requirements
3.2.2 Corrugated Metal Pipe
3.3 PLACING PIPE
3.3.1 Concrete Pipe
3.3.2 Multiple Culverts
3.3.3 Corrugated Metal Pipe
3.3.4 Jacking Pipe
3.4 JOINTING
3.4.1 Concrete Pipe
3.4.1.1 Flexible Watertight Joints

3.4.2 Corrugated Metal Pipe
3.4.2.1 Field Joints
3.4.2.2 Flexible Watertight, Gasketed Joints
3.5 DRAINAGE STRUCTURES
3.5.1 Manholes
3.6 STEEL LADDER INSTALLATION
3.7 BACKFILLING
3.7.1 Backfilling Pipe in Trenches
3.7.2 Backfilling Pipe in Fill Sections
3.7.3 Movement of Construction Machinery
3.7.4 Compaction
3.7.4.1 Minimum Density
3.7.5 Determination of Density

-- End of Section Table of Contents --

SECTION 02630

STORM-DRAINAGE SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48	(2000) Gray Iron Castings
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 240/A 240M	(1996) Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 536	(1984; R 99) Ductile Iron Castings
ASTM A 760/A 760M	(2000) Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 798/A 798M	(1997a) Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM C 76	(1999) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 76M	(1999a) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 231	(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(1997ael) Mortar for Unit Masonry
ASTM C 443	(2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 923	(1998) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Materials
ASTM D 1557	(1998) Laboratory Compaction Characteristics of Soil Using Modified

	Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m))
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM F 593	(1998) Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	(1998) Stainless Steel Nuts

AMERICAN RAILWAY ENGINEERING & MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe;

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

Concurrent copies of all correspondence, submittals, plans, and any other documentation between the Contractor and the Red River Valley and Western Railroad Company pertaining to the construction of the 42 inch storm sewer pipe beneath the railroad embankment.

SD-07 Certificates

Pipe Certification; G, ED
Hydrostatic Test on Watertight Joints; G, ED
Determination of Density; G, ED
Frame and Cover Castings; G, ED

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the Contracting Officer.

1.3.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe

ASTM C 76 with pipe class as indicated on drawings. Concrete pipe outlets through the levees, from the pump stations and discharge chambers, shall be constructed of pipe sections a maximum of 4 feet in length.

2.1.2 Corrugated Steel Pipe

ASTM A 760/A 760M, zinc or aluminum (Type 2) coated pipe of either:

a. Type I pipe with annular or helical 2-2/3 by 1/2 inch corrugations.

b. Type IR pipe with helical 3/4 by 3/4 by 7-1/2 inch corrugations.

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design meeting requirements of ASTM C 76.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements under Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7

percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall be as shown on the drawings. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be potable, clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure. Joints shall meet the requirements of paragraph JOINTS.

2.3.4 Frame and Cover Castings

Frame and cover for gratings shall be cast gray iron, ASTM A 48, Class 35B or cast ductile iron, ASTM A 536, Grade 65-45-12. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.5 Chimney Seal

Contractor may provide a standard type manhole casting with chimney seal in place of providing a floating type manhole casting. Provide chimney seals on all inlet castings. Provide extensions as required.

If this option is chosen, new or existing manhole cones used for this installation must have a vertical top segment of 2 inches minimum length as shown on Chimney Seal & Casting Detail Option. For installation on existing manhole cone with 2 inch vertical top segment, this option may also be used is an adjusting ring is fastened to top of existing manhole as shown on drawings and as specified. Standard type manhole castings used in place of a floating type manhole casting shall have flanges drilled to receive rebar as shown on drawings.

Chimney seals shall be manufactured by Cretex Specialty Products, or approved equal. The sleeve and extension shall be extruded from a high-grade rubber compound conforming to the applicable requirements of ASTM C 923. The bands used for compressing the sleeve and extension against the manhole shall be fabricated from 16 gauge stainless steel conforming to ASTM A 240/A 240M Type 304. Screws, bolts and nuts used on this band shall be stainless steel conforming to ASTM F 593 and ASTM F 594, Type 304.

2.3.6 Aluminum Gratings

Aluminum gratings shall be in accordance with Section 05500 MISCELLANEOUS METAL.

2.3.7 Joints

2.3.7.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for rubber-type gaskets shall conform to ASTM C 443. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches.

b. Test Requirements: Watertight joints shall be visually inspected after installation. Any unsatisfactory joint shall be removed and replaced at the Contractor's expense and at no additional cost to the Government.

2.4 CHIMNEY SEALS

Chimney seals shall be provided with manhole castings and inlet castings. Extensions shall also be provided as required. When chimney seals are used, manhole cones shall have a minimum vertical top segment of 2 inches. The sleeve and extension shall be extruded from a high-grade rubber compound conforming to the applicable requirements of ASTM C 923. The bands used for compressing the sleeve and extension shall be fabricated from 16 gauge stainless steel conforming to ASTM A 240/A 240M Type 304. Screws, bolts and nuts shall be stainless steel conforming to ASTM F 593 and ASTM F 594, Type 304. Chimney seals shall be manufactured by Cretex Specialty Products, or approved equal.

2.5 STEEL LADDER

2.5.1 Cast-In-Place Concrete Structures

Steel ladder shall be provided for cast-in-place concrete structures, including pump stations, discharge chambers, and junction manholes, as shown. These ladders shall be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. The two stringers shall be a minimum 3/8 inch thick and 2-1/2 inches wide. Ladders shall be in accordance with Section 05500 MISCELLANEOUS METAL. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

2.5.2 Precast Concrete Manholes

Steel ladders shall be provided for precast manholes 12 feet in depth or greater. Ladders shall be as shown. Ladders shall be in accordance with Section 05500 MISCELLANEOUS METAL. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

Manhole steps shall be provided for manholes less than 12 feet in depth. Manhole steps shall be a minimum of 12 inches wide with rungs spaced maximum 16 inches apart. Manhole steps shall be polypropylene-coated steel and shall be in accordance with Section 05500 MISCELLANEOUS METAL.

2.6 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48, Class 30B or 35B. Shape and size shall be as indicated.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS AND DRAINAGE STRUCTURES

Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains shall be in accordance with the applicable portions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS, Section 02300 EARTHWORK, and the requirements specified below. Excavation and backfill for junction manholes, discharge chambers, and pump stations shall be in accordance with Section 02315 EXCAVATION, FILLING AND BACKFILLING FOR STRUCTURES.

3.1.1 Trenching

The width of trenches at any point below the top of the pipe shall be as specified on drawings. Sheeting and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

3.1.2 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

Aggregate bedding material, as specified in Section 02316 shall be used. Concrete pipe shall be bedded in aggregate bedding material accurately shaped and rounded to conform to the lowest one-half of the outside portion of circular pipe for the entire length of the pipe. The bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.

3.2.2 Corrugated Metal Pipe

Bedding for corrugated metal pipe and pipe arch shall be in accordance with

ASTM A 798/A 798M. It is not required to shape the bedding to the pipe geometry.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

3.3.1 Concrete Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.3.2 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 3 feet apart, whichever is less, unless specified otherwise.

3.3.3 Corrugated Metal Pipe

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides.

3.3.4 Jacking Pipe

Methods of operation and installation for jacking pipe beneath the railroad embankment shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual and any other requirements as required by the Red River Valley and Western Railroad Company.

3.4 JOINTING

3.4.1 Concrete Pipe

3.4.1.1 Flexible Watertight Joints

Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.4.2 Corrugated Metal Pipe

3.4.2.1 Field Joints

Transverse field joints shall be designed so that the successive connection of pipe sections will form a continuous line free of appreciable irregularities in the flow line. In addition, the joints shall meet the general performance requirements described in ASTM A 798/A 798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts shall be as indicated or where not indicated, shall be as specified in the applicable standards or specifications for the pipe.

3.4.2.2 Flexible Watertight, Gasketed Joints

Installation shall be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations. Watertight joints shall remain uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes

Construction shall be of precast reinforced concrete, complete with frames and cover castings or gratings, and equipped with manhole steps or fixed galvanized steel ladders, as indicated on drawings. Pipe connections to concrete manholes and inlets shall be made with flexible watertight joints.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 6 feet vertically, and shall be installed to provide at least 6 inches of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 12 inches. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Testing shall be in accordance with Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in loose layers not exceeding 12 inches.

3.7.3 Movement of Construction Machinery

When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be replace and joints repaired.

3.7.4 Compaction

3.7.4.1 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under paved roads, including adjacent shoulder areas, the density shall be not less than 95 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control. See Section 02300 EARTHWORK.

b. Under unpaved roads, density shall not be less than 95 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas and levees, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02720

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS

PART 2 PRODUCTS

2.1 AGGREGATE SURFACE COURSE
2.2 MATERIAL SOURCES

PART 3 EXECUTION

3.1 GENERAL
3.1.1 Definitions
3.2 EQUIPMENT
3.3 WEATHER LIMITATION
3.4 STOCKPILING MATERIAL
3.5 PREPARATION OF SUBGRADE
3.6 PROOF-ROLLING
3.7 GRADE CONTROL
3.7.1 Grade and Cross Section Tolerances
3.8 PLACING
3.9 COMPACTION
3.9.1 Requirements
3.9.2 Finishing
3.10 SMOOTHNESS TEST
3.11 THICKNESS CONTROL
3.12 TESTING
3.12.1 Correction
3.13 MAINTENANCE

-- End of Section Table of Contents --

SECTION 02720

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION (NDDOT)

NDDOT 302	(1992)Aggregate Base or Surface Course, Standard Specifications for Road and Bridge Construction
NDDOT 816	(1992)Aggregates, Standard Specifications for Road and Bridge Construction

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 Micrometers (No. 200 Sieve) in Mineral Aggregates by Washing
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Aggregate Sources;

Material sources as specified in Paragraph SOURCE AND SAMPLING.

SD-04 Samples

Aggregate Samples;

Samples of aggregate as specified in Paragraph SOURCE AND SAMPLING.

SD-06 Test Reports

Testing;

Testing results as specified in Paragraph TESTING.

PART 2 PRODUCTS

2.1 AGGREGATE SURFACE COURSE

Aggregate surface course, as indicated on the drawings, is referred to in this section as aggregate base course. Aggregate base course shall meet the requirements of NDDOT 816, gradation for shoulder aggregate surface.

2.2 MATERIAL SOURCES

It shall be the responsibility of the Contractor to make its own investigations for a source of suitable materials and to make its own arrangements with the owners of the pits for procuring the required quantity of suitable material. The Contractor shall designate in writing only one source or one combination of sources from which it proposes to furnish aggregate. A 50 pound sample shall be provided to the Contracting Officer. Approval of samples from a source of aggregate is not to be construed as approval of all materials from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels when such materials are unsuitable for aggregate as determined by the Contracting Officer. Materials produced from an approved source shall meet all the requirements of this section.

PART 3 EXECUTION

3.1 GENERAL

Aggregate base course shall be constructed in accordance with the requirements of NDDOT 302 unless specified otherwise.

3.1.1 Definitions

The term "Engineer" referenced in the state standard specifications shall mean the Contracting Officer.

3.2 EQUIPMENT

All plant, equipment, and tools used in the performance of the work will be subject to approval and shall be maintained in satisfactory working condition at all times. The equipment shall meet the requirements of the referenced state standard specification sections. The base course shall be compacted using a steel-wheeled roller, vibratory smooth drum roller, pneumatic-tired roller, unless other special compaction equipment is approved.

3.3 WEATHER LIMITATION

Base courses shall be placed when the atmospheric temperature is above 35 degrees F. Base shall not be constructed on subgrades that are frozen or contain frost. Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

3.4 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. Materials obtained from different sources shall be stockpiled separately.

3.5 PREPARATION OF SUBGRADE

Prior to constructing the aggregate base course, the subgrade shall be cleaned of all foreign substances. Ruts or soft, yielding spots in the subgrade, areas having inadequate compaction, and deviations of the surface from the requirements specified shall be corrected by loosening and removing soft or unsatisfactory material and by adding satisfactory material with a consistency and texture similar to the surrounding subgrade, reshaping to line and grade, and recompacting to specified density requirements. The finished subgrade shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

3.6 PROOF-ROLLING

The subgrade shall be proof-rolled prior to placing aggregate base. Proof-rolling shall be scheduled at a time when the Contracting Officer can observe, unless waived. Proof-rolling shall be accomplished within the limits of the work by passing a loaded 25 ton dump truck or rubber tired heavy equipment over the entire subgrade at a slow rate of speed. Proof-rolling shall be observed by a qualified observer not riding in the vehicle. Soft or loose areas identified by the proof-rolling and occurring in previously placed fill shall be tested for compaction where directed by the Contracting Officer. Isolated areas of soft cohesive soils shall be subcut and replaced with satisfactory fill of a texture similar to surrounding subgrade soil. Loose zones of non-saturated granular soil shall be compacted. The Contracting officer has the option to direct subgrade correction. Payment will be authorized for subgrade correction of native soils identified as suitable subgrade material in the project documents. Such payment or schedule changes will be negotiated in accordance with CONTRACT CLAUSE 52.243-4: CHANGES. Correction of fill soils not meeting compaction specifications shall be corrected at the Contractor's expense.

3.7 GRADE CONTROL

During construction, the lines and grades, including crown and cross slope indicated for the base course, shall be maintained by means of line and grade stakes placed by the Contractor. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining. The Contractor may use an approved laser system in lieu of a grade stake system. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the area to be constructed.

3.7.1 Grade and Cross Section Tolerances

Subgrade. 0.05 foot above or below prescribed elevation.

Base Courses. 0.05 foot below prescribed elevation.

3.8 PLACING

The mixed material shall be placed on the prepared subgrade or subbase in loose lifts not exceeding 6 inches in thickness. The layers, when

compacted, shall be true to the grades or levels required, with the least possible surface disturbance. If base course becomes contaminated by traffic or sedimentation, the surface shall be cleaned prior to completing subsequent work by sweeping with power sweepers, power brooms, or hand brooms.

3.9 COMPACTION

3.9.1 Requirements

Each layer shall be compacted until there is no further evidence of consolidation. Water shall be applied to the base material during the mixing, spreading, and compacting operations when and in the quantities the Contrcting Officer considers necessary for proper compaction.

3.9.2 Finishing

The surface of the top layer shall be finished to grade and cross section shown. Finished surface shall be of uniform texture. Light blading during compaction may be necessary for the finished surface to conform to the lines, grades, and cross sections. Should the surface for any reason become rough, corrugated, uneven in texture, or traffic marked prior to completion, such unsatisfactory portion shall be scarified, reworked, or replaced as directed.

3.10 SMOOTHNESS TEST

The surface of the top layer shall not deviate more than 1/2 inch when tested with a 10 footstraightedge applied parallel with and at right angles to the centerline of the area to be paved. Deviations exceeding 1/2 inch shall be corrected.

3.11 THICKNESS CONTROL

The thickness of the base course shall be measured at intervals of one measurement for at least each 500 square yards of base course. The depth measurement shall be made by test holes at least 3 inches in diameter. The work shall be scheduled when the Contracting Officer can observe the testing; and the Contracting Officer shall select the locations of the test holes, unless waived.

3.12 TESTING

The following tests shall be performed by and at the expense of the Contractor. Samples shall be taken when and where directed. Tests of materials not meeting the requirements specified will not be counted as part of the required tests. Copies of test results shall be submitted to the Contracting Officer.

Sieve Analysis (ASTM C 117 and ASTM C 136)

Aggregate Base. One test prior to placing or hauling and one test per 250 cy or fraction thereof (in place measure)

3.12.1 Correction

When any source of materials is changed or deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place

unacceptable material shall be replaced.

3.13 MAINTENANCE

The base course shall be maintained in a condition that will meet specification requirements until accepted.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02920

SEEDING, SODDING and TOPSOIL

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 SOURCE INSPECTION
1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING
1.4.1 Inspection
1.4.2 Storage
1.4.3 Handling
1.4.4 Soil Amendments

PART 2 PRODUCTS

2.1 SEED
2.1.1 Seed Classification
2.1.2 Permanent Seed Species and Mixtures
2.1.3 Temporary Seed Species
2.1.4 Quality
2.2 SOD
2.2.1 Quality
2.2.2 Harvesting
2.2.3 Delivery
2.3 TOPSOIL
2.4 SOIL AMENDMENTS
2.4.1 Fertilizer
2.4.2 Organic Material
2.4.2.1 Rotted Manure
2.4.2.2 Recycled Compost
2.5 MULCH
2.5.1 Straw Mulch
2.5.2 Paper Fiber
2.6 WATER
2.7 PESTICIDE
2.8 HERBICIDE

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS
3.1.1 Notification
3.1.2 Seeding Time
3.1.3 Seeding Conditions
3.1.4 Restoration of Turf Areas Damaged by Contractor's Operations
3.2 SOIL TEST
3.3 SITE PREPARATION
3.3.1 Finished Grade and Topsoil
3.3.2 Spreading Topsoil
3.3.2.1 Equipment
3.3.2.2 Stripped Materials

3.3.3 Tillage
3.3.4 Treatments
3.3.5 Prepared Surface
3.4 SEEDING
3.4.1 Equipment
3.4.2 Broadcast Seeding
3.4.3 Drill Seeding
3.4.4 Hydroseeding (Optional)
3.4.5 Mulching
3.4.5.1 Hay or Straw Mulch
3.4.5.2 Mechanical Anchor
3.4.5.3 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper
3.4.6 Initial Watering
3.4.7 Native Grasses
3.5 SODDING
3.5.1 Placement
3.5.2 Rolling and Watering
3.6 RESTORATION AND CLEAN UP
3.7 MAINTENANCE
3.7.1 Maintenance Watering
3.7.2 Mowing
3.7.3 General Maintenance
3.7.3.1 Repair or Reinstall
3.7.4 Maintenance Record
3.8 ACCEPTANCE
3.9 SURFACE EROSION CONTROL

-- End of Section Table of Contents --

SECTION 02920

SEEDING, SODDING and TOPSOIL

PART 1 GENERAL

Wherever possible, all seed shall be drilled. Other seeding methods are subject to approval. Existing turf areas which have been damaged during the contract operations, and which are outside of the limits designated to be seeded, shall be restored following the requirements in this section, at no additional cost to the Government.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01	(Aug 95) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4972	(1995a) pH of Soils
ASTM D 5268	(1992; R 1996) Topsoil Used for Landscaping Purposes

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION (NDDOT)

NDDOT SS Section 708	(1997) Standard Specifications for Road and Bridge Construction - Erosion Control

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Literature;

The Contractor shall submit manufacturer's literature discussing physical characteristics, applications, guarantees, and installation of the seed, mulch, and fertilizer. The Contractor shall submit manufacturer's literature for equipment showing application and installation instructions.

SD-04 Samples

Samples;

Samples shall be provided for the following:

a. A 5 pound sample for each source of topsoil brought from off-site.

b. A 2 pound sample for each type of soil amendment proposed for use.

c. A 2 pound sample for each type of mulch proposed for use.

SD-06 Test Reports

Soil Test;

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

Seed Test;

The Contractor shall submit test reports for a purity and germination test following the Association of Official Seed Analysts (AOSA) rules for each seed mixture. The test reports shall indicate the purity percentage, germination percentage, and amount of Pure Live Seed (PLS) per bag for each species.

Water Test;

Water from sources other than municipal water supply shall be tested for salinity and pH.

Quantity Check;

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Maintenance Record;

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants.

Seed Order for Native Grasses;

Contractor shall submit proof of seed order for native grass seed mixes as specified within this section within 30 days of notice to proceed.

SD-07 Certificates

Experience for Native Grasses;

The Contractor shall submit a statement indicating that the work to establish the turf will be supervised by an individual with a minimum of 5 years experience with establishment and restoration of native plant communities.

Certificates of Compliance;

Prior to the delivery of materials, certificates of compliance attesting

that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Seed. Mixture percentage, percent pure live seed, percent germination, weed seed content, and date tested.

b. Topsoil. Gradation, pH, organic matter content, textural class, soluble salts.

c. Fertilizer. Chemical analysis and composition percent.

d. Organic Material. Composition and source.

e. Mulch. Composition and source.

1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed materials shall be delivered in manufacturer's original, unopened containers with labels and tags intact and legible. Seed that is wet, moldy, or bears a test date more than five months old shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.4.2 Storage

Materials shall be stored on-site in areas provided by the Contractor. The storage areas shall be made accessible to the Contracting Officer so that application rates can be verified. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment materials shall be stored according to manufacturer's instructions and not with seed.

1.4.3 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.4 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

PART 2 PRODUCTS

2.1 SEED

Substitutions will not be allowed without written request from the Contractor and approval from the Contracting Officer. The mixing of seed may be done by the seed supplier prior to delivery, or on site in the presence of the Contracting Officer. Seed for native grass and forbe species shall be gathered from within 500 miles of the jobsite.

2.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for mixture percentage, purity, germination, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.2 Permanent Seed Species and Mixtures

Permanent grass seed species and mixtures shall be proportioned by weight as follows:

GRASS SPECIES

Class I (Low Maintenance Turf)

COMMON NAME	BOTANICAL NAME	% OF MIX
Bluegrass, Kentucky "Nublue"	Poa pratensis	20.00
Bluegrass, Kentucky "Able 1"	Poa pratensis	20.00
Bluegrass, Kentucky "Park"	Poa pratensis	20.00
Fescue, creeping red "Cindy"	Festuca rubra	20.00
Ryegrass, Perennial "Academy"	Lolium perene	20.00
	Total:	100.00

Rate: 100 lbs/acre.
Description: Specified hardy turf mix. General purpose seed mix for levees and miscellaneous areas. Use wherever 4 inch topsoil is required.

Fairway Mixture

COMMON NAME	BOTANICAL NAME	% OF MIX
Bluegrass, Kentucky "Nuglade"	Poa pratensis	25.00
Bluegrass, Kentucky "Nublue"	Poa pratensis	25.00
Bluegrass, Kentucky "Able 1"	Poa pratensis	25.00
Ryegrass, Perennial "Academy"	Lolium perene	25.00
	Total:	100.00

Rate: 160 lbs/acre.
Description: Specified seed mix for golf course fairways. Use wherever 8 inch topsoil is required.

2.1.3 Temporary Seed Species

Seed species for winter erosion protection, temporary surface erosion control, or overseeding shall consist of 10 pounds of oats per acre.

2.1.4 Quality

Weed seed shall be a maximum 1/2 of 1 percent by weight of the total mixture. Innoculent shall consist of the proper bacteria applied in the amount and manner recommended by the manufacturer to all legumes in the seed mix.

2.2 SOD

Sod shall be nursery grown as classified in the ASPA Guideline Specifications to Sodding. Sod shall be 100 percent mineral sod. Sod grown in peat soils will not be accepted. Sod shall consist of at least 75 percent Kentucky Blue Grass (Poa pratensis). Acceptable varieties include park, newport, glade, nugget, touch down, rugby, and parade.

2.2.1 Quality

Sod shall be machine cut at a uniform soil thickness of 5/8 inch, plus or minus 1/4 inch, at the time of cutting. Measurement of thickness shall exclude top growth and thatch. Standard size sections of sod shall be strong enough that when grasped at one end, can be picked up and handled without damage. Sod shall not be harvested or transplanted when moisture content, either excessively dry or wet, may adversely affect its survival. Broken pads and pads with torn or uneven ends will not be accepted. The pieces of sod shall not vary more than 1/2 inch in width.

2.2.2 Harvesting

Before harvesting, the turf shall be mowed uniformly at a height of 1 to 1-1/2 inches. Sod shall be harvested, delivered and transplanted within a period of 36 hours. Sod not transplanted within this time period shall not be installed without the inspection and approval of the Contracting Officer.

2.2.3 Delivery

Sod Pallets shall be sprinkled with water and covered with moist burlap, straw, or other approved covering and protected from exposure to wind and direct sunlight. Covering shall be such that air can circulate and heating will not develop.

2.3 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.4 SOIL AMENDMENTS

Soil amendments required under this contract consist of fertilizer. Soil amendments consisting of pH adjuster, organic material and soil conditioners may be added at the Contractor's option if approved by the Contracting Officer, or shall be added if directed by the Contracting Officer and will be negotiated in accordance with contract clause: CHANGES.

2.4.1 Fertilizer

The nutrients ratio shall be 20 percent nitrogen, 20 percent phosphorus, and 20 percent potassium. Fertilizer shall be controlled release commercial grade, free flowing, and uniform in composition.

2.4.2 Organic Material

Organic material shall consist of either rotted manure, recycled compost, or worm castings. Bonemeal and decomposed wood derivatives shall not be used.

2.4.2.1 Rotted Manure

Rotted manure shall be unleached horse, chicken or cattle manure containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials. It shall contain no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds and be free of stones, sticks, and soil.

2.4.2.2 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. Compost shall be derived from vegetable food products; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

2.5 MULCH

2.5.1 Straw Mulch

Straw mulch materials shall consist of wheat, oat, or rye straw, hay, grass, or other plants approved by the Contracting Officer. Mulch materials shall be native to the region. The mulch material shall be air dry, reasonably light in color, and shall not be musty, moldy, caked, or otherwise of low quality. The mulch shall be seed free or fumigated to prevent introduction of weeds. The use of mulch that contains noxious weeds will not be accepted. Dry mulching material which breaks and does not bend is unacceptable. Mulch shall have a consistency for placing with commercial mulch blowing equipment.

2.5.2 Paper Fiber

Paper fiber mulch shall be clean, recycled newsprint that is shredded for the purpose of mulching seed.

2.6 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

2.7 PESTICIDE

Pesticide shall not be applied without written approval of the Contracting Officer.

2.8 HERBICIDE

Herbicide shall be broad spectrum that leaves no lasting harmful residues and allows planting within 10 to 14 days after application. The herbicide shall be glyphosate based. Herbicide shall be applied per manufacturer's recommendations.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Notification

The Contractor shall notify the Contracting Officer 24 hours in advance of beginning seeding or any changes in turf establishment operations.

3.1.2 Seeding Time

Seed shall be installed before June 15 and after September 1, per NDDOT SS Section 708. No finished construction area shall be left untopsoiled and unseeded during the winter months. When substantially complete areas are not seeded within the specified seeding times for fall planting, a temporary winter cover shall be placed.

3.1.3 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.1.4 Restoration of Turf Areas Damaged by Contractor's Operations

The Contractor shall restore all turf areas damaged by the Contractor's operations. Damaged turf areas on the golf course shall be restored with 8 inches of topsoil and seed. All other damaged turf areas shall be restored with 4 inches of topsoil and seed. The requirements of this section shall be met for restoration of turf areas damaged by the Contractor's operations. Note that restoration of turf damaged by the Contractor's operations will not be included in the quantities of topsoil and seed to be measured for payment and that all costs for restoration of damaged turf shall be included in the price bid for the item to which the damaged turf pertains. This includes restoration of turf in the vicinity of the storm sewer excavations.

3.2 SOIL TEST

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, and organic matter content. The samples shall be taken at locations directed by the Contracting Officer, unless waived. The tests shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species specified.

3.3 SITE PREPARATION

3.3.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed prior to the commencement of the seeding operation. All vegetation, including live roots, shall be completely removed or treated with herbicide prior to spreading topsoil or placing sod.

3.3.2 Spreading Topsoil

Topsoil shall be distributed and spread uniformly to one half the thickness shown on the plans and tilled to a depth of 2 inches into the subgrade. The remaining half of the topsoil shall then be placed. Surface irregularities resulting from topsoiling or other operations shall be leveled to prevent depressions.

3.3.2.1 Equipment

Topsoil shall be spread using a bladed dozer having ground pressure less than 4.5 psi and operating weight less than 35,000 pounds, or with rubber tired equipment having operating weight less than 10,000 pounds. The work shall be coordinated such that equipment for hauling the topsoil does not travel over the topsoil in place. Areas compacted by construction operations shall be completely pulverized by tillage.

3.3.2.2 Stripped Materials.

Topsoil obtained from stripping operations shall be kept separate from other unusable excavated materials, brush, litter, objectionable weeds, roots, stones, and other materials that would interfere with planting and maintenance operations. Unusable material shall be removed and properly disposed of.

3.3.3 Tillage

Topsoil on slopes up to a maximum 3H:1V slope shall be tilled to a nominal 3 inch depth by plowing, discing, harrowing, rototilling or other approved method. On slopes between 3H:1V and 1:1, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method.

3.3.4 Treatments

Fertilizers shall be applied per manufacturer's directions. The fertilizer shall be applied at the rate recommended by the soil test. Fertilizer may be incorporated as part of the tillage operation. The Contractor shall assume full responsibility for any loss or damage to seed or sod arising from improper use of herbicides or other chemicals or due to failure to allow sufficient time to permit dissipation of toxic residues, whether or not such materials are specified herein.

3.3.5 Prepared Surface

The prepared surface shall be 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris. Debris and stones over a minimum 1-1/2 inches in any dimension shall be removed from the surface. Drainage patterns shall be maintained as indicated on drawings. Tolerance for prepared surfaces shall be within 1 inch of the plan elevation. The prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.4 SEEDING

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.4.1 Equipment

Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved.

3.4.2 Broadcast Seeding

In areas inaccessible to drill seeding, seed shall be broadcast by hand. Seed shall be uniformly broadcast at the rate specified for the mix. Half the total rate of seed application shall be sown with sower moving in one direction, and the remainder with sower moving at right angles to first sowing. Seed shall be covered a maximum 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device. Seed shall not be broadcast when wind speed exceeds 5 miles per hour.

3.4.3 Drill Seeding

Seed shall be uniformly drilled to a depth of 1/2 to 3/4 inches at the rate specified for the mix. Equipment shall have drills a maximum 6 inches distance apart. Row markers shall be used with the drill seeder. Seed shall be drilled in two directions, applying approximately half the seed in each direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations. When slopes exceed 1 vertical on 5 horizontal, baffle plates spaced not more than 6 inches apart shall be installed in the seed box.

3.4.4 Hydroseeding (Optional)

The hydroseeding operation shall apply the seed, mulch, and fertilizer simultaneously. The seed shall be applied at the rate indicated in the Seed Mixture Table. The fertilizer shall be applied at a rate proposed by the Contractor and agreed to by the Contracting Officer. The mulch shall be applied at a rate of about 1 ton per acre. During application, the spray shall be directed to obtain a uniform material distribution as evidenced by a formation of a "blotter-like" cover, with about 5% void area. The mulch shall permit percolation of water to the underlying soil. The seed mixed with water and fertilizer shall be applied within 1 hour after adding to the tank.

3.4.5 Mulching

3.4.5.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 2 tons per acre, except as modified for native grasses. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.4.5.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other

suitable equipment.

3.4.5.3 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.4.6 Initial Watering

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 3 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed by Contracting Officer.

3.4.7 Native Grasses

Hay or straw mulch shall be spread uniformly at the rate of 2 tons per acre. Areas seeded with native grasses, except slopes steeper than 3H:1V, shall be firmed with a roller not exceeding 90 pounds per foot roller width. Seed drills equipped with rollers are acceptable.

3.5 SODDING

3.5.1 Placement

Sod shall be carefully placed with the first row laid in a straight line and subsequent rows placed parallel to and abutted tightly against each other. Sod shall be placed with staggered end joints and without stretching or overlapping. On slope areas sodding shall be started at the bottom of the slope. On 1:3 or steeper slopes, sod shall be laid across the angle of the slope and secured by tamping, pegging or other approved methods of temporarily securing each piece. In areas where concentrated flow of water is expected, sod shall be laid at right angles to the flow. After the sodding operation has been completed, the edges of the sodded area shall blend smoothly into the surrounding area.

3.5.2 Rolling and Watering

After completion of the sod placement in each area, the Contractor shall water the sod immediately, and the entire area shall be lightly rolled. The sod shall be watered to a depth sufficient such that the underside of the sod pad and the soil immediately below the pad are thoroughly wet. Watering operations shall be properly supervised to prevent run-off. The Contractor shall arrange for an adequate water supply and all equipment necessary for water application shall be supplied including all pumps, hoses, pipelines, and sprinkling equipment until final acceptance is made.

3.6 RESTORATION AND CLEAN UP

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades, providing signage, or as directed by Contracting Officer. Existing turf areas, pavements, riprap areas and other project features that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense. Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.7 MAINTENANCE

3.7.1 Maintenance Watering

The Contractor shall be responsible for watering after planting to promote adequate growth and development. Water shall be distributed with equipment that does not erode or disturb the mulch. If the grass wilts, or if the soil becomes crusted and desiccated during germination, the Contracting Officer may direct watering. Watering directed by the Contracting Officer shall be performed within 48 hours after notice by the Contracting Officer to the Contractor; and shall place about 10,000 gallons per acre.

3.7.2 Mowing

a. Bluegrass predominant seed mixes: Mowing shall be done as needed to maintain lawn areas at a nominal height of 3 inches until final acceptance, except not more than 1/3 of the grass leaf shall be removed by the initial cutting. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas. Seeded areas shall be mowed immediately prior to final inspection.

b. Native Grasses: Areas seeded with native grasses shall be mowed during the first growing season to control pioneering weeds and other competition. For the purposes of this project a weed is defined as any plant not included in the seed mix. Mowing should be done before the general height is 6 to 10 inches, or when the weedy foliar cover reaches 50 percent of the seeded area, or when the weed species begin to flower. The first mowing shall be set at a height of 3 inches with the following mowings to be set at a height of 4 to 8 inches. Rotary, flail, or sickle bar type mowing equipment is acceptable.

3.7.3 General Maintenance

Maintenance of the seeded areas shall include eradicating weeds, protecting embankments and ditches from surface erosion, maintaining erosion control materials and mulch, protecting installed areas from traffic, mowing, watering, and post-fertilization. If any portion of the surface becomes rilled, gullied, damaged, or destroyed, that portion shall be repaired to re-establish the area without additional cost to the government. The Contractor shall control erosion during the maintenance period by using ditch checks, sod swales, silt fences or other methods until a proper stand of turf is established.

3.7.3.1 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be properly filled. Mulch material that has been removed by wind or other causes shall be replaced and secured. Maintenance shall include protecting embankments and ditches from erosion and maintaining erosion control material.

3.7.4 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

3.8 ACCEPTANCE

Turf establishment after seeding shall extend for 12 months after completion of the seeding on the entire project, unless desired growth is established, and shortening the period of the Contractor's responsibility for acceptably established areas is authorized by the Contracting Officer.Grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch high.

a. Bluegrass predominant seed mixes. A stand of turf is defined as a uniform stand of grass that is at least 2 inches tall with a minimum of 100 grass plants per square foot and reasonably free of weeds and visual imperfections as assessed by the Contracting Officer.

b. Native Grasses. A proper stand of turf from the seeding of native grasses is defined as a minimum of 2 to 4 plants per square foot and where no gaps larger than 6 inches in diameter occur anywhere in the turfed area. Only plants specified in the seed mix table will be considered.

3.9 SURFACE EROSION CONTROL

Where directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material and deviation to finished grade. When directed by Contracting Officer and during contract delays affecting the seeding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded with a temporary seed crop.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03100

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DESIGN
1.4 STORAGE AND HANDLING

PART 2 PRODUCTS

2.1 FORM MATERIALS
2.1.1 Forms For Class A and Class B Finish
2.1.2 Forms For Class C Finish
2.1.3 Forms For Class D Finish
2.1.4 Retain-In-Place Metal Forms
2.1.5 Pan-Form Units
2.1.6 Form Ties
2.1.7 Form Releasing Agents

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Formwork
3.2 CHAMFERING
3.3 COATING
3.4 REMOVAL OF FORMS

-- End of Section Table of Contents --

SECTION 03100

STRUCTURAL CONCRETE FORMWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 347R	(1994) Guide to Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA ANSI/AHA A135.4	(1995) Basic Hardboard

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Formwork;

Drawings showing details of formwork, including dimensions of fiber voids, joints, supports, studding and shoring, and sequence of form and shoring removal.

SD-03 Product Data

Form Materials;

Manufacturer's data including literature describing form materials, accessories, and form releasing agents.

Form Releasing Agents;

Manufacturer's recommendation on method and rate of application of form releasing agents.

SD-05 Design Data

Design;

Design analysis and calculations for form design and methodology used in the design.

1.3 DESIGN

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

1.4 STORAGE AND HANDLING

Fiber voids shall be stored above ground level in a dry location. Fiber voids shall be kept dry until installed and overlaid with concrete.

PART 2 PRODUCTS

2.1 FORM MATERIALS

2.1.1 Forms For Class A and Class B Finish

Forms for Class A and Class B finished surfaces shall be plywood panels conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels. Forms for round columns shall be the prefabricated seamless type.

2.1.2 Forms For Class C Finish

Forms for Class C finished surfaces shall be shiplap lumber; plywood conforming to DOC PS 1, Grade B-B concrete form panels, Class I or II; tempered concrete form hardboard conforming to AHA ANSI/AHA A135.4; other approved concrete form material; or steel, except that steel lining on wood sheathing shall not be used. Forms for round columns may have one vertical seam.

2.1.3 Forms For Class D Finish

Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.

2.1.4 Retain-In-Place Metal Forms

Retain-in-place metal forms for concrete slabs and roofs shall be as specified in Section 05300 STEEL DECKING.

2.1.5 Pan-Form Units

Pan-form units for one-way or two-way concrete joist and slab construction shall be factory-fabricated units of the approximate section indicated.

Units shall consist of steel or molded fiberglass concrete form pans. Closure units shall be furnished as required.

2.1.6 Form Ties

Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inchin diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.

2.1.7 Form Releasing Agents

Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Formwork

Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE and conforming to construction tolerance given in TABLE 1. Where concrete surfaces are to have a Class A or Class B finish, joints in form panels shall be arranged as approved. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse. Form ties that are to be completely withdrawn shall be coated with a nonstaining bond breaker.

3.2 CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms.

3.3 COATING

Forms for Class A and Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4 REMOVAL OF FORMS

Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before 24 hours have elapsed since concrete placement. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:	In any 10 feet of length ---------- 1/4 inch
a. In the lines and surfaces of columns, piers, walls and in arises	Maximum for entire length ---------- 1 inch
b. For exposed corner columns,control-joint grooves, and other conspicuous lines	In any 20 feet of length ---------- ---- 1/4 inch Maximum for entire length---------- 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length ----------1/4 inch In any bay or in any 20 feet of length---------- 3/8 inch
a. In slab soffits, ceilings, beam soffits, and in arises, measured before removal of supporting shores	Maximum for entire length ---------- 3/4 inch
b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	In any bay or in any 20 feet of length ---------- ----- 1/4 inch Maximum for entire length---------- 1/2 inch
3. Variation of the linear building lines from established position in plan	In any 20 feet --------- 1/2 inch Maximum ----------1 inch

TABLE 1

TOLERANCES FOR FORMED SURFACES

4.	Variation of distance between walls, columns, partitions	1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay,and not more than 1 inch total variation
5.	Variation in the sizes and locations of sleeves, floor openings, and wall opening	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
6.	Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls	Minus ---------- 1/4 inch Plus ---------- 1/2 inch
7.	Footings:	
	a. Variation of dimensions in plan	Minus ---------- 1/2 inch Plus ---------- 2 inches when formed or plus 3 inches when placed against unformed excavation
	b. Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 2 inches
	c. Reduction in thickness of specified thickness	Minus ---------- 5 percent
8.	Variation in steps:	Riser ---------- 1/8 inch
	a. In a flight of stairs	Tread ---------- 1/4 inch
	b. In consecutive steps	Riser ---------- 1/16 inch Tread ---------- 1/8 inch

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03150

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 CONTRACTION JOINT STRIPS
2.2 PREFORMED EXPANSION JOINT FILLER
2.3 SEALANT
2.3.1 Preformed Polychloroprene Elastomeric Type
2.3.2 Lubricant for Preformed Compression Seals
2.3.3 Field-Molded Type
2.4 WATERSTOPS
2.4.1 Non-Metallic Materials
2.4.2 Non-Metallic Hydrophilic
2.5 COMPRESSION SEALS

PART 3 EXECUTION

3.1 JOINTS
3.1.1 Contraction Joints
3.1.1.1 Joint Strips
3.1.1.2 Sawed Joints
3.1.2 Expansion Joints
3.1.3 Joint Sealant
3.1.3.1 Joints With Preformed Compression Seals
3.1.3.2 Joints With Field-Molded Sealant
3.2 WATERSTOPS, INSTALLATION AND SPLICES
3.2.1 Rubber Waterstop
3.2.2 Polyvinyl Chloride Waterstop
3.2.3 Quality Assurance
3.2.4 Non-Metallic Hydrophilic Waterstop Installation
3.3 CONSTRUCTION JOINTS

-- End of Section Table of Contents --

SECTION 03150

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 919	(1984; R 1998) Use of Sealants in Acoustical Applications
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2628	(1991; R 1998) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D 2835	(1989; R 1998) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D 3542	(1998) Preformed Polychloroprene Elastomeric Joint Seals for Bridges
ASTM D 5249	(1995) Backer Material for Use With Cold and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints

CORPS OF ENGINEERS (COE)

COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Waterstops;

Shop drawings and fabrication drawings provided by the manufacturer or prepared by the Contractor.

SD-03 Product Data

Preformed Expansion Joint Filler;
Sealant;
Waterstops;

Manufacturer's literature, including safety data sheets, for preformed fillers and the lubricants used in their installation; field-molded sealants and primers (when required by sealant manufacturer); preformed compression seals; and waterstops.

SD-04 Samples

Lubricant for Preformed Compression Seals;

Specimens identified to indicate the manufacturer, type of material, size and quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 9 ft of 1 inch nominal width or wider seal or a piece not less than 12 ft of compression seal less than 1 inch nominal width. One quart of lubricant shall be provided. Sample compression seals shall be submitted in the proposed color.

Non-metallic Materials;

Specimens identified to indicate manufacturer, type of material, size, quantity of material, and shipment or lot represented. Each sample shall be a piece not less than 12 inch long cut from each 200 ft of finished waterstop furnished, but not less than a total of 4 ft of each type, size, and lot furnished. One splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice shall be not less than 12 inches long.

SD-07 Certificates

Waterstops;

Certificates of compliance stating that the joint filler and sealant materials and waterstops conform to the requirements specified.

1.3 DELIVERY AND STORAGE

Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 PRODUCTS

2.1 CONTRACTION JOINT STRIPS

Contraction joint strips shall be 1/8 inch thick tempered hardboard conforming to AHA A135.4, Class 1. In lieu of hardboard strips, rigid polyvinylchloride (PVC) or high impact polystyrene (HIPS) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

2.2 PREFORMED EXPANSION JOINT FILLER

Expansion joint filler shall be preformed material conforming to ASTM D 1751 or ASTM D 1752. Unless otherwise indicated, filler material shall be 3/8 inch thick and of a width applicable for the joint formed. Backer material, when required, shall conform to ASTM D 5249.

2.3 SEALANT

Joint sealant shall conform to the following:

2.3.1 Preformed Polychloroprene Elastomeric Type

ASTM D 2628.

2.3.2 Lubricant for Preformed Compression Seals

ASTM D 2835.

2.3.3 Field-Molded Type

ASTM C 920, Type M for horizontal joints or Type NS for vertical joints, Class 25, and Use NT. Bond breaker material shall be polyethylene tape, coated paper, metal foil or similar type materials. The back-up material shall be compressible, non-shrink, nonreactive with sealant, and non-absorptive material type such as extruded butyl or polychloroprene rubber.

2.4 WATERSTOPS

Intersection and change of direction waterstops shall be shop fabricated.

2.4.1 Non-Metallic Materials`

Non-metallic waterstops shall be manufactured from a prime virgin resin; reclaimed material is not acceptable. The compound shall contain plasticizers, stabilizers, and other additives to meet specified requirements. Rubber waterstops shall conform to COE CRD-C 513. Polyvinylchloride waterstops shall conform to COE CRD-C 572. PVC waterstops shall be used in the continuous floor walls (not transition walls).

2.4.2 Non-Metallic Hydrophilic

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water shall conform to ASTM D 412 as follows: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness shall be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F shall be 3 to 1 minimum.

2.5 COMPRESSION SEALS

Compression seals shall be manufactured from extruded elastomeric neoprene materials or thermo-rubber EPDM materials to blend with the color of the adjacent concrete or brick veneer wall treatment. Neoprene sealer shall meet the requirements of ASTM D 3542, exclusive of recovery and force-deflection material. Sealers made from the EPDM-based material shall meet ASTM D 2000.

PART 3 EXECUTION

3.1 JOINTS

Joints shall be installed at locations indicated and as authorized.

3.1.1 Contraction Joints

Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC or HIPS insert strips into the plastic concrete using a steel parting bar, when necessary, or by cutting the concrete with a saw after concrete has set. Joints shall be approximately 1/8 inch wide and shall extend into the slab one-fourth the slab thickness, minimum, but not less than 1 inch. Contraction joints in slabs on grade shall conform to the requirements specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.1.1.1 Joint Strips

Strips shall be of the required dimensions and as long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC or HIPS strips shall be discarded and the insert left in place. True alignment of the strips shall be maintained during insertion.

3.1.1.2 Sawed Joints

Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

3.1.2 Expansion Joints

Preformed expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8 inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed and oiled wood strip temporarily secured to the top to form a recess to the size shown on the drawings. The wood strip shall be removed after the concrete has set. Contractor may opt to use a removable expansion filler cap designed and fabricated for this purpose in lieu of the wood strip. The groove shall be thoroughly cleaned of laitance, curing compound, foreign materials, protrusions of hardened concrete, and any dust which shall be blown out of the groove with oil-free compressed air.

3.1.3 Joint Sealant

Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant.

3.1.3.1 Joints With Preformed Compression Seals

Compression seals shall be installed with the vacuum equipment capable of installing joint seals to the prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal or concrete and with no more than 5 percent stretching of the seal. The sides of the joint and, if necessary, the sides of the compression seal shall be covered with a coating of lubricant. Butt joints shall be coated with liberal applications of lubricant.

All surfaces to receive the compression seal profile shall be dry, clean, sound concrete free of loose, cracked, delaminated and spalled sections. Repair any sections that do not meet this criteria. The surfaces to receive the seal shall be sandblasted to exposed aggregate. Sandblasting shall increase surface area to increase bond capacity of the adhesive, and remove all laitance and other bond-inhibiting contaminants.

3.1.3.2 Joints With Field-Molded Sealant

Joints shall not be sealed when the sealant material, ambient air, or concrete temperature is less than 40 degrees F. When the sealants are meant to reduce the sound transmission characteristics of interior walls, ceilings, and floors the guidance provided in ASTM C 919 shall be followed. Joints requiring a bond breaker shall be coated with curing compound or with bituminous paint. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with

joint sealant in accordance with the manufacturer's recommendations.

3.2 WATERSTOPS, INSTALLATION AND SPLICES

Waterstops shall be installed at the locations shown to form a continuous water-tight diaphragm. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced. Exposed waterstops shall be protected during application of form release agents to avoid being coated. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by certified trained personnel using approved equipment and procedures.

3.2.1 Rubber Waterstop

Splices shall be vulcanized or shall be made using cold bond adhesive as recommended by the manufacturer. Splices for TPE-R shall be as specified for PVC.

3.2.2 Polyvinyl Chloride Waterstop

Splices shall be made by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. The correct temperature shall be used to sufficiently melt without charring the plastic. The spliced area, when cooled, shall show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

3.2.3 Quality Assurance

Edge welding will not be permitted. Centerbulbs shall be compressed or closed when welding to non-centerbulb type. Waterstop splicing defects which are unacceptable include, but are not limited to the following: 1) Tensile strength less than 80 percent of parent section. 2) Free lap joints. 3) Misalignment of centerbulb, ribs, and end bulbs greater than 1/16 inch. 4) Misalignment which reduces waterstop cross section more than 15 percent. 5) Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness. 6) Misalignment of waterstop splice resulting in misalignment of waterstop in excess of 1/2 inch in 10 feet. 7) Visible porosity in the weld area, including pin holes. 8) Charred or burnt material. 9) Bubbles or inadequate bonding. 10) Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

3.2.4 Non-Metallic Hydrophilic Waterstop Installation

Ends to be joined shall be miter cut with sharp knife or shears. The ends shall be adhered with cyanacryiate (super glue) adhesive. When joining hydrophilic type waterstop to PVC waterstop, the hydrophilic waterstop shall be positioned as shown on the drawings. A liberal amount of a single component hydrophilic sealant shall be applied to the junction to complete the transition.

3.3 CONSTRUCTION JOINTS

Construction joints are specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. If a construction joint coincides with an expansion or contraction joint, it shall be treated as an expansion or contraction joint (as applicable) as specified in this section.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 WELDING
1.4 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 DOWELS
2.2 FABRICATED BAR MATS
2.3 REINFORCING STEEL
2.4 WIRE TIES
2.5 SUPPORTS

PART 3 EXECUTION

3.1 REINFORCEMENT
3.1.1 Placement
3.1.2 Splicing
3.2 DOWEL INSTALLATION

-- End of Section Table of Contents --

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 184/A 184M	(1996) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615/A 615M	(1996ael) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 675/A 675M	(1990a; R 1995e1) Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706/A 706M	(1998) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 767/A 767M	(1997) Zinc-Coated (Galvanized) Steel Bars in Concrete Reinforcement
ASTM A 775/A 775M	(1997e1) Epoxy-Coated Reinforcement Steel Bars

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1998) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1	(1996) Manual of Standard Practice

CORPS OF ENGINEERS ENGINEER MANUAL (EM)

EM 1110-2-2104	(1992) Strength Design for Reinforced - Concrete Hydraulic Structures

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement; G, ED

Detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

SD-07 Certificates

Welding;

A list of qualified welders names.

Reinforcing Steel;

Certified copies of mill reports attesting that the reinforcing steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified herein, prior to the installation of reinforcing steel.

Splicing Lap Lengths;

Certified copies of schedules for splice lengths for all reinforcing bars scheduled for different uses and locations including top bars.

1.3 WELDING

Welders shall be qualified in accordance with AWS D1.4. Qualification test shall be performed at the worksite and the Contractor shall notify the Contracting Officer 24 hours prior to conducting tests. Special welding procedures and welders qualified by others may be accepted as permitted by AWS D1.4.

1.4 DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 DOWELS

Dowels shall conform to ASTM A 675/A 675M, Grade 60. Steel pipe conforming to ASTM A 53, Schedule 80, may be used as dowels provided the ends are

closed with metal or plastic inserts or with mortar.

2.2 FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184/A 184M.

2.3 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated. Cold drawn wire used for spiral reinforcement shall conform to ASTM A 82. In highly corrosive environments or when directed by the Contracting Officer, reinforcing steel shall conform to ASTM A 767/A 767M or ASTM A 775/A 775M as appropriate.

2.4 WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.5 SUPPORTS

Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks. Precast concrete blocks shall have wire ties and shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be galvanized, plastic protected or of stainless steel. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318/318R. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life or safety. Wire tie ends shall face away from the forms.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318/318R at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete cover shall be as indicated or as required by EM 1110-2-2104. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318/318R and shall be made only as required or indicated. Splicing shall be by lapping, except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches.

3.2 DOWEL INSTALLATION

Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled. Dowels shall be accurately positioned and aligned parallel to the finished concrete surface before concrete placement. Dowels shall be rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALIFICATIONS
1.4 GENERAL REQUIREMENTS
1.4.1 Tolerances
1.4.1.1 Floors
1.4.1.2 Floors by the Straightedge System
1.4.2 Strength Requirements and w/c Ratio
1.4.2.1 Strength Requirements
1.4.3 Air Entrainment
1.4.4 Slump
1.4.5 Concrete Temperature
1.4.6 Size of Coarse Aggregate
1.4.7 Special Properties and Products
1.5 MIXTURE PROPORTIONS
1.5.1 Proportioning Studies for Normal Weight Concrete
1.5.2 Proportioning Studies for Flexural Strength Concrete
1.5.3 Average Compressive Strength Required for Mixtures
1.5.3.1 Computations from Test Records
1.5.3.2 Computations without Previous Test Records
1.5.4 Average Flexural Strength Required for Mixtures
1.6 STORAGE OF MATERIALS
1.7 GOVERNMENT QUALITY ASSURANCE INSPECTION AND TESTING
1.7.1 Materials
1.7.2 Fresh Concrete
1.7.3 Hardened Concrete
1.7.4 Inspection

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS
2.1.1 Portland Cement
2.1.2 High-Early-Strength Portland Cement
2.1.3 Pozzolan (Fly Ash)
2.2 AGGREGATES
2.2.1 Fine Aggregate
2.2.2 Coarse Aggregate
2.3 CHEMICAL ADMIXTURES
2.3.1 Air-Entraining Admixture
2.3.2 Accelerating Admixture
2.3.3 Water-Reducing or Retarding Admixture
2.3.4 High-Range Water Reducer
2.3.5 Surface Retarder
2.3.6 Expanding Admixture

2.3.7 Other Chemical Admixtures
2.4 CURING MATERIALS
2.4.1 Impervious-Sheet
2.4.2 Membrane-Forming Compound
2.4.3 Burlap and Cotton Mat
2.5 WATER
2.6 NONSHRINK GROUT
2.7 NONSLIP SURFACING MATERIAL
2.8 LATEX BONDING AGENT
2.9 EPOXY RESIN
2.10 EMBEDDED ITEMS
2.11 JOINT MATERIALS
2.11.1 Joint Fillers, Sealers, and Waterstops
2.11.2 Contraction Joints in Slabs
2.12 FLOWABLE CEMENTITIOUS FILL

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING
3.1.1 Foundations
3.1.1.1 Concrete on Earth Foundations
3.1.2 Previously Placed Concrete
3.1.2.1 Air-Water Cutting
3.1.2.2 High-Pressure Water Jet
3.1.2.3 Wet Sandblasting
3.1.2.4 Waste Disposal
3.1.3 Embedded Items
3.2 CONCRETE PRODUCTION
3.2.1 Batching, Mixing, and Transporting Concrete
3.2.1.1 General
3.3 TRANSPORTING CONCRETE TO PROJECT SITE
3.4 CONVEYING CONCRETE ON SITE
3.4.1 Buckets
3.4.2 Transfer Hoppers
3.4.3 Trucks
3.4.4 Chutes
3.4.5 Belt Conveyors
3.4.6 Concrete Pumps
3.5 PLACING CONCRETE
3.5.1 Depositing Concrete
3.5.2 Consolidation
3.5.3 Cold Weather Requirements
3.5.4 Hot Weather Requirements
3.5.5 Prevention of Plastic Shrinkage Cracking
3.6 JOINTS
3.6.1 Construction Joints
3.6.2 Contraction Joints in Slabs on Grade
3.6.3 Expansion Joints
3.6.4 Waterstops
3.6.5 Dowels and Tie Bars
3.7 FINISHING FORMED SURFACES
3.7.1 Class A Finish and Class B Finish
3.7.2 Class C and Class D Finish
3.7.3 Architectural and Special Finishes
3.8 REPAIRS
3.8.1 Damp-Pack Mortar Repair
3.8.2 Repair of Major Defects
3.8.2.1 Surface Application of Mortar Repair
3.8.2.2 Repair of Deep and Large Defects

3.9 FINISHING UNFORMED SURFACES
3.9.1 General
3.9.2 Rough Slab Finish
3.9.3 Troweled Finish
3.9.4 Non-Slip Finish
3.9.4.1 Broomed
3.10 CURING AND PROTECTION
3.10.1 General
3.10.2 Moist Curing
3.10.3 Membrane Forming Curing Compounds
3.10.4 Impervious Sheeting
3.10.5 Cold Weather Curing and Protection
3.11 SETTING BASE PLATES AND BEARING PLATES
3.11.1 Damp-Pack Bedding Mortar
3.11.2 Nonshrink Grout
3.11.2.1 Mixing and Placing of Nonshrink Grout
3.11.2.2 Treatment of Exposed Surfaces
3.12 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL
3.12.1 Grading and Corrective Action
3.12.1.1 Fine Aggregate
3.12.1.2 Coarse Aggregate
3.12.2 Quality of Aggregates
3.12.3 Scales, Batching and Recording
3.12.4 Batch-Plant Control
3.12.5 Concrete Mixture
3.12.6 Inspection Before Placing
3.12.7 Placing
3.12.8 Vibrators
3.12.9 Curing Inspection
3.12.10 Cold-Weather Protection
3.12.11 Mixer Uniformity
3.12.12 Reports
3.13 FLOWABLE CEMENTITIOUS FILL

-- End of Section Table of Contents --

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214.3R	(1988) Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1991) Hot Weather Concreting
ACI 318/318R	(1999) Building Code Requirements for Structural Concrete and Commentary

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991; R 1996) Burlap Cloth Made From Jute or Kenaf

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 39	(1996) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 78	(1994) Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
ASTM C 94	(1999) Ready-Mixed Concrete

ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173	(1994ael) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(1998) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(1998) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	(1999) Chemical Admixtures for Concrete
ASTM C 618	(1999) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 937	(1997) Grout Fluidifier for Preplaced-Aggregate Concrete
ASTM C 940	(1998a) Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
ASTM C 1017	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(1999) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

CORPS OF ENGINEERS (COE)

COE CRD-C 94	(1995) Surface Retarders
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
COE CRD-C 540	(1971; R 1981) Standard Specification for Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstop

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards
NRMCA TMMB 100	(1994) Truck Mixer Agitator and Front Discharge Concrete Carrier Standards
NRMCA QC 3	(1984) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mixture Proportions; G, ED

The results of trial mixture design studies along with a statement giving the maximum nominal coarse aggregate size and the proportions of ingredients that will be used in the manufacture of

each strength or class of concrete, at least 14 days prior to commencing concrete placing operations. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an approved independent commercial testing laboratory, showing that mixture design studies have been made with materials proposed for the project and that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the mixture design studies without additional tests to show that the quality of the concrete is satisfactory.

SD-06 Test Reports

Testing and Inspection for Contractor Quality Control; G, ED

Certified copies of laboratory test reports, including mill tests and all other test data, for portland cement, blended cement, pozzolan, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

SD-07 Certificates

Qualifications;

Written documentation for Contractor Quality Control personnel.

1.3 QUALIFICATIONS

Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workmen in one of the following grades or shall have written evidence of having completed similar qualification programs:

Concrete Field Testing Technician, Grade I
Concrete Laboratory Testing Technician, Grade I or II
Concrete Construction Inspector, Level II

Concrete Transportation Construction Inspector or
Reinforced Concrete Special Inspector, Jointly certified by American Concrete Institute (ACI), Building Official and Code Administrators International (BOCA), International Conference of Building Officials (ICBO), and Southern Building Code Congress International (SBCCI).

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation.

1.4 GENERAL REQUIREMENTS

1.4.1 Tolerances

Except as otherwise specified herein, tolerances for concrete batching, mixture properties, and construction as well as definition of terms and application practices shall be in accordance with ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing; when forms or shoring are used, the measurements shall be made prior to removal.

1.4.1.1 Floors

For the purpose of this Section the following terminology correlation between ACI 117/117R and this Section shall apply:

Floor Profile Quality Classification From ACI 117/117R	This Section
Conventional Bullfloated	Same
Conventional Straightedged	Same
Flat	Float Finish or Trowel Finish
Very Flat	Same. Use only with F-system

Levelness tolerance shall not apply where design requires floors to be sloped to drains or sloped for other reasons.

1.4.1.2 Floors by the Straightedge System

The flatness of the floors shall be carefully controlled and the tolerances shall be measured by the straightedge system as specified in paragraph 4.5.7 of ACI 117/117R, using a 10 foot straightedge, within 72 hours after floor slab installation and before shores and/or forms are removed. The listed tolerances shall be met at any and every location at which the straightedge can be placed.

Bullfloated	All foundation slabs not exposed to view
Straightedged	All foundation slabs not exposed to view
Float Finish	Pumphouse foundation slabs
Trowel Finish	Pumphouse operation floor slab

1.4.2 Strength Requirements and w/c Ratio

1.4.2.1 Strength Requirements

Specified compressive strength (f'c) shall be as follows:

COMPRESSIVE STRENGTH	STRUCTURE OR PORTION OF STRUCTURE
4500 psi at 28 days	All concrete work

Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II portland cement. Compressive strength shall be determined in accordance with ASTM C 39. Flexural strength shall be determined in accordance with ASTM C 78.

a. Evaluation of Concrete Compressive Strength. Compressive strength specimens (6 by 12 inch cylinders) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. A "test" is defined as the average of two companion cylinders, or if

only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

b. Investigation of Low-Strength Compressive Test Results. When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 psi or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. Non-destructive tests (tests other than test cylinders or cores) shall not be used as a basis for acceptance or rejection. The Contractor shall perform the coring and repair the holes. Cores will be tested by the Government.

c. Load Tests. If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test as being understrength shall be corrected in a manner satisfactory to the Contracting Officer. All investigations, testing, load tests, and correction of deficiencies shall be performed by and at the expense of the Contractor and must be approved by the Contracting Officer, except that if all concrete is found to be in compliance with the drawings and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

d. Evaluation of Concrete Flexural Strength. Flexural strength specimens (beams) shall be fabricated by the Contractor and laboratory cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 78. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified flexural strength and no individual test result falls below the specified flexural strength by more than 50 psi.A "test" is defined as the average of two companion beams. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the slab is considered potentially deficient.

1.4.3 Air Entrainment

Except as otherwise specified for lightweight concrete, all normal weight concrete shall be air entrained to contain between 4 and 7 percent total air, except that when the nominal maximum size coarse aggregate is 3/4 inch or smaller it shall be between 4.5 and 7.5 percent. Concrete with

specified strength over 5000 psi may have 1.0 percent less air than specified above. Specified air content shall be attained at point of placement into the forms. Air content for normal weight concrete shall be determined in accordance with ASTM C 231.

1.4.4 Slump

Slump of the concrete, as delivered to the point of placement into the forms, shall be within the following limits. Slump shall be determined in accordance with ASTM C 143.

Structural Element	Slump Minimum	Slump Maximum
Walls, columns and beams	2 in.	4 in.
Foundation walls, substructure walls, footings, slabs	1 in.	3 in.
Any structural concrete approved for placement by pumping:		
At pump	2 in.	6 in.
At discharge of line	1 in.	4 in.

When use of a plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C 494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

1.4.5 Concrete Temperature

The temperature of the concrete as delivered shall not exceed 90 degrees F. When the ambient temperature during placing is 40 degrees F or less, or is expected to be at any time within 6 hours after placing, the temperature of the concrete as delivered shall be between 55 and 75 degrees F.

1.4.6 Size of Coarse Aggregate

The largest feasible nominal maximum size aggregate (NMSA) specified in paragraph AGGREGATES shall be used in each placement. However, nominal maximum size of aggregate shall not exceed any of the following: three-fourths of the minimum cover for reinforcing bars, three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

1.4.7 Special Properties and Products

Concrete may contain admixtures other than air entraining agents, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete, if specified or approved. Any of these materials to be used on the project shall be used in the mix design studies.

1.5 MIXTURE PROPORTIONS

Concrete shall be composed of portland cement, other cementitious and

pozzolanic materials as specified, aggregates, water and admixtures as specified.

1.5.1 Proportioning Studies for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Except as specified for flexural strength concrete, mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test reports indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratios required in subparagraph Water-Cement Ratio will be the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus pozzolan, silica fume, and ground granulated blast furnace slag (GGBF slag) by the weight equivalency method as described in ACI 211.1. In the case where silica fume or GGBF slag is used, the weight of the silica fume and GGBF slag shall be included in the equations in ACI 211.1 for the term P, which is used to denote the weight of pozzolan. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent. Laboratory trial mixtures shall be designed for maximum permitted slump and air content. Separate sets of trial mixture studies shall be made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either shall be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerator or a retarder may be used without separate trial mixture study. Separate trial mixture studies shall also be made for concrete for any conveying or placing method proposed which requires special properties and for concrete to be placed in unusually difficult placing locations. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance withASTM C 192/C 192M. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, a curve shall be plotted showing the relationship between 7 day and 28 day strengths. Each mixture shall be designed to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding.

1.5.2 Proportioning Studies for Flexural Strength Concrete

Trial design batches, mixture proportioning studies, and testing requirements shall conform to the requirements specified in paragraph Proportioning Studies for Normal Weight Concrete, except that proportions shall be based on flexural strength as determined by test specimens (beams) fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 78. Procedures given in ACI 211.1 shall be modified as necessary to accommodate flexural strength.

1.5.3 Average Compressive Strength Required for Mixtures

The mixture proportions selected during mixture design studies shall produce a required average compressive strength (f'cr) exceeding the specified compressive strength (f'c) by the amount indicated below. This required average compressive strength, f'cr, will not be a required acceptance criteria during concrete production. However, whenever the daily average compressive strength at 28 days drops below f'cr during concrete production, or daily average 7-day strength drops below a strength correlated with the 28-day f'cr, the mixture shall be adjusted, as approved, to bring the daily average back up to f'cr. During production, the required f'cr shall be adjusted, as appropriate, based on the standard deviation being attained on the job.

1.5.3.1 Computations from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214.3R. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths (f'c) within 1,000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

f'cr = f'c + 1.34S where units are in psi

f'cr = f'c + 2.33S - 500 where units are in psi

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

1.5.3.2 Computations without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

a. If the specified compressive strength f'c is less than 3,000 psi,

f'cr = f'c + 1000 psi

b. If the specified compressive strength f'c is 3,000 to 5,000 psi,

f'cr = f'c + 1,200 psi

c. If the specified compressive strength f'c is over 5,000 psi,

f'cr = f'c + 1,400 psi

1.5.4 Average Flexural Strength Required for Mixtures

The mixture proportions selected during mixture design studies for flexural strength mixtures and the mixture used during concrete production shall be designed and adjusted during concrete production as approved, except that the overdesign for average flexural strength shall simply be 15 percent greater than the specified flexural strength at all times.

1.6 STORAGE OF MATERIALS

Cement and other cementitious materials shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants and keep each material completely separated. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Aggregate shall not be stored directly on ground unless a sacrificial layer is left undisturbed. Reinforcing bars and accessories shall be stored above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements. Materials shall be capable of being accurately identified after bundles or containers are opened.

1.7 GOVERNMENT QUALITY ASSURANCE INSPECTION AND TESTING

Day-to day inspection and testing shall be the responsibility of the Contractor Quality Control (CQC) staff. However, representatives of the Contracting Officer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's CQC staff. Government inspection or testing will not relieve the Contractor of any of his CQC responsibilities.

1.7.1 Materials

The Government will sample and test aggregates, cementitious materials, other materials, and concrete to determine compliance with the specifications as considered appropriate. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Other materials will be sampled from storage at the jobsite or from other locations as considered appropriate. Samples may be placed in storage for later testing when appropriate.

1.7.2 Fresh Concrete

Fresh concrete will be sampled as delivered in accordance with ASTM C 172 and tested in accordance with these specifications, as considered necessary.

1.7.3 Hardened Concrete

Tests on hardened concrete will be performed by the Government when such tests are considered necessary.

1.7.4 Inspection

Concrete operations may be tested and inspected by the Government as the project progresses. Failure to detect defective work or material will not prevent rejection later when a defect is discovered nor will it obligate the Government for final acceptance.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious Materials shall be portland cement, portland-pozzolan cement, or portland cement in combination with pozzolan or silica fume and shall conform to appropriate specifications listed below. Use of cementitious materials in concrete which will have surfaces exposed in the completed structure shall be restricted so there is no change in color, source, or type of cementitious material.

2.1.1 Portland Cement

ASTM C 150, Type I with a maximum 15 percent amount of tricalcium aluminate, or Type II. White portland cement shall meet the above requirements except that it may be Type I or Type II.

2.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III with tricalcium aluminate limited to 8 percent, low alkali. Type III cement shall be used only in isolated instances and only when approved in writing.

2.1.3 Pozzolan (Fly Ash)

ASTM C 618, Class C or F with the optional requirements for multiple factor, drying shrinkage, and uniformity from Table 2A of ASTM C 618. Requirement for maximum alkalies from Table 1A of ASTM C 618 shall apply. If pozzolan is used, it shall never be less than 15 percent nor more than 35 percent by weight of the total cementitious material.

2.2 AGGREGATES

Aggregates shall conform to the following.

2.2.1 Fine Aggregate

Fine aggregate shall conform to the quality and gradation requirements of ASTM C 33.

2.2.2 Coarse Aggregate

Coarse aggregate shall conform to ASTM C 33, Class 5S, size designation 1-1/2 inches to No. 4.

2.3 CHEMICAL ADMIXTURES

Chemical admixtures, when required or permitted, shall conform to the appropriate specification listed. Admixtures shall be furnished in liquid form and of suitable concentration for easy, accurate control of dispensing.

2.3.1 Air-Entraining Admixture

ASTM C 260 and shall consistently entrain the air content in the specified ranges under field conditions.

2.3.2 Accelerating Admixture

ASTM C 494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.3.3 Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, or D, except that the 6-month and 1-year compressive and flexural strength tests are waived.

2.3.4 High-Range Water Reducer

ASTM C 494, Type F or G, except that the 6-month and 1-year strength requirements are waived. The admixture shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.3.5 Surface Retarder

COE CRD-C 94.

2.3.6 Expanding Admixture

Aluminum powder type expanding admixture conforming to ASTM C 937.

2.3.7 Other Chemical Admixtures

Chemical admixtures for use in producing flowing concrete shall comply with ASTM C 1017, Type I or II. These admixtures shall be used only when approved in writing, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan and upon performance of separate mixture design studies.

2.4 CURING MATERIALS

2.4.1 Impervious-Sheet

Impervious-sheet materials shall conform to ASTM C 171, type optional, except, that polyethylene sheet shall not be used.

2.4.2 Membrane-Forming Compound

Membrane-Forming curing compound shall conform to ASTM C 309, Type 1-D or 2, except that only a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing, or flooring specified. Nonpigmented compound shall

contain a fugitive dye, and shall have the reflective requirements in ASTM C 309 waived.

2.4.3 Burlap and Cotton Mat

Burlap and cotton mat used for curing shall conform to AASHTO M 182.

2.5 WATER

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water may be used if it meets the requirements of COE CRD-C 400.

2.6 NONSHRINK GROUT

Nonshrink grout shall conform to ASTM C 1107, Grade A, and shall be a commercial formulation suitable for the proposed application.

2.7 NONSLIP SURFACING MATERIAL

Nonslip surfacing material shall consist of 55 percent, minimum, aluminum oxide or silicon-dioxide abrasive ceramically bonded together to form a homogeneous material sufficiently porous to provide a good bond with portland cement paste; or factory-graded emery aggregate consisting of not less than 45 percent aluminum oxide and 25 percent ferric oxide. The aggregate shall be well graded from particles retained on the No. 30 sieve to particles passing the No. 8 sieve.

2.8 LATEX BONDING AGENT

Latex agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.9 EPOXY RESIN

Epoxy resins for use in repairs shall conform to ASTM C 881, Type V, Grade 2. Class as appropriate to the existing ambient and surface temperatures.

2.10 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application. Inserts for shelf angles and bolt hangers shall be of malleable iron or cast or wrought steel.

2.11 JOINT MATERIALS

2.11.1 Joint Fillers, Sealers, and Waterstops

Expansion joint fillers shall be preformed materials conforming to ASTM D 1751 or ASTM D 1752. Materials for waterstops shall be in accordance with Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS. Materials for and sealing of joints shall conform to the requirements of Section 07900 JOINT SEALING.

2.11.2 Contraction Joints in Slabs

Sawable type contraction joint inserts shall conform to COE CRD-C 540. Nonsawable joint inserts shall have sufficient stiffness to permit placement in plastic concrete without undue deviation from a straight line

and shall conform to the physical requirements of COE CRD-C 540, with the exception of Section 3.4 "Resistance to Sawing". Plastic inserts shall be polyvinyl chloride conforming to the materials requirements of COE CRD-C 572.

2.12 FLOWABLE CEMENTITIOUS FILL

Controlled low strength and density fill shall have air content up to 35 percent and 28-day compressive strength between 60 and 200 psi.

PART 3 EXECUTION

3.1 PREPARATION FOR PLACING

Before commencing concrete placement, the following shall be performed. Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Forms shall be in place, cleaned, coated, and adequately supported, in accordance with Section 03100 STRUCTURAL CONCRETE FORMWORK. Reinforcing steel shall be in place, cleaned, tied, and adequately supported, in accordance with Section 03200 CONCRETE REINFORCEMENT. Transporting and conveying equipment shall be in-place, ready for use, clean, and free of hardened concrete and foreign material. Equipment for consolidating concrete shall be at the placing site and in proper working order. Equipment and material for curing and for protecting concrete from weather or mechanical damage shall be at the placing site, in proper working condition and in sufficient amount for the entire placement. When hot, windy conditions during concreting appear probable, equipment and material shall be at the placing site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

3.1.1 Foundations

3.1.1.1 Concrete on Earth Foundations

Earth (subgrade, base, or subbase courses) surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the foundation shall be well drained and shall be satisfactorily graded and uniformly compacted.

3.1.2 Previously Placed Concrete

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Concrete at the side of vertical construction joints shall be prepared as approved by the Contracting Officer. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface. The edges of the coarse aggregate shall not be undercut. The surface of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete. The surface shall be washed completely clean as the last operation prior to placing the next lift. For heavy duty floors and two-course floors a thin coat of grout of about the consistency of thick cream shall be thoroughly scrubbed into the

existing surface immediately ahead of the topping placing. The grout shall be a 1:1 mixture of portland cement and sand passing the No. 8 sieve. The topping concrete shall be deposited before the grout coat has had time to stiffen.

3.1.2.1 Air-Water Cutting

Air-water cutting of a fresh concrete surface shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 100 psi plus or minus, 10 psi, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Contracting Officer, a surface retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift in order to prolong the period of time during which air-water cutting is effective. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, high-pressure waterjet or sandblasting shall be used as the last operation before placing the next lift.

3.1.2.2 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 psi shall be used for cutting and cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the waterjet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.1.2.3 Wet Sandblasting

Wet sandblasting shall be used after the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. After wet sandblasting, the surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.1.2.4 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.1.3 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding shall not be performed on embedded metals within 1 feet of the surface of the concrete. Tack welding shall not be performed on or to embedded items.

3.2 CONCRETE PRODUCTION

3.2.1 Batching, Mixing, and Transporting Concrete

Concrete shall either be batched and mixed onsite or shall be furnished from a ready-mixed concrete plant. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and nonagitating transporting units shall comply with NRMCA TMMB 100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC 3. Approved batch tickets shall be furnished for each load of ready-mixed concrete. Site-mixed concrete shall conform to the following subparagraphs.

3.2.1.1 General

The batching plant shall be located off site close to the project. The batching, mixing and placing system shall have a capacity of at least 100 cubic yards per hour. The batching plant shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

3.3 TRANSPORTING CONCRETE TO PROJECT SITE

Concrete shall be transported to the placing site in truck mixers or by approved pumping equipment.

3.4 CONVEYING CONCRETE ON SITE

Concrete shall be conveyed from mixer or transporting unit to forms as rapidly as possible and within the time interval specified by methods which will prevent segregation or loss of ingredients using following equipment. Conveying equipment shall be cleaned before each placement.

3.4.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet.The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yardsshall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.4.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and shall have conical-shaped discharge features. The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.4.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM

C 94. Nonagitating equipment shall be used only for transporting plant-mixed concrete over a smooth road and when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.4.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes normally attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.4.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means, such as discharge baffle or hopper , for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. The belt speed shall be a minimum of 300 feet per minute and a maximum of 750 feet per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant truck that is long enough to extend through the reinforcing bars.

3.4.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type; pneumatic placing equipment shall not be used. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. Aluminum pipe shall not be used.

3.5 PLACING CONCRETE

Mixed concrete shall be discharged within 1-1/2 hours or before the mixer drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the transporting unit. Concrete shall be handled from mixer or transporting unit to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Sufficient placing capacity shall be provided so that concrete can be kept free of cold joints.

3.5.1 Depositing Concrete

Concrete shall be deposited as close as possible to its final position in

the forms, and there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level. Concrete shall be deposited continuously in one layer or in layers so that fresh concrete is deposited on in-place concrete that is still plastic. Fresh concrete shall not be deposited on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within the section. Concrete that has surface dried, partially hardened, or contains foreign material shall not be used. When temporary spreaders are used in the forms, the spreaders shall be removed as their service becomes unnecessary. Concrete shall not be placed in slabs over columns and walls until concrete in columns and walls has been in-place at least two hours or until the concrete begins to lose its plasticity. Concrete for beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as concrete for adjoining slabs.

3.5.2 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators, except for slabs 4 inches thick or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 10,000 vibrations per minute, an amplitude of at least 0.025 inch, and the head diameter shall be appropriate for the structural member and the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a reasonable amount. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then vertically withdrawn slowly while operating. Form vibrators shall not be used unless specifically approved and unless forms are constructed to withstand their use. Vibrators shall not be used to move concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segration or flotation of coarse aggregate shall be prevented. Frequency and amplitude of vibrators shall be determined in accordance with COE CRD-C 521. Grate tampers ("jitterbugs") shall not be used.

3.5.3 Cold Weather Requirements

Special protection measures, approved by the Contracting Officer, shall be used if freezing temperatures are anticipated before the expiration of the specified curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, an accelerating admixture conforming to ASTM C 494, Type C or E may be used, provided it contains no calcium chloride. Calcium chloride shall not

be used.

3.5.4 Hot Weather Requirements

When the ambient temperature during concrete placing is expected to exceed 85 degrees F, the concrete shall be placed and finished with procedures previously submitted and as specified herein. The concrete temperature at time of delivery to the forms shall not exceed the temperature shown in the table below when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water or aggregates or placing concrete in the cooler part of the day may be required to obtain an adequate placing temperature. A retarder may be used, as approved, to facilitate placing and finishing. Steel forms and reinforcements shall be cooled as approved prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

Maximum Allowable Concrete Placing Temperature

Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature Degrees
Greater than 60	90 F
40-60	85 F
Less than 40	80 F

3.5.5 Prevention of Plastic Shrinkage Cracking

During hot weather with low humidity, and particularly with appreciable wind, as well as interior placements when space heaters produce low humidity, the Contractor shall be alert to the tendency for plastic shrinkage cracks to develop and shall institute measures to prevent this. Particular care shall be taken if plastic shrinkage cracking is potentially imminent and especially if it has developed during a previous placement. Periods of high potential for plastic shrinkage cracking can be anticipated by use of Fig. 2.1.5 of ACI 305R. In addition the concrete placement shall be further protected by erecting shades and windbreaks and by applying fog sprays of water, sprinkling, ponding or wet covering. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin as directed, after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.6 JOINTS

Joints shall be located and constructed as indicated or approved. Joints not indicated on the drawings shall be located and constructed to minimize the impact on the strength of the structure. Joints shall be perpendicular to the main reinforcement. All reinforcement shall be continued across joints; except that reinforcement or other fixed metal items shall not be continuous through expansion joints, or through construction or contraction joints in slabs on grade. Reinforcement shall be 2 inches clear from each joint. Except where otherwise indicated, construction joints between interior slabs on grade and vertical surfaces shall consist of 30 pound asphalt-saturated felt, extending for the full depth of the slab. The perimeters of the slabs shall be free of fins, rough edges, spalling, or other unsightly appearance. Reservoir for sealant for construction and

contraction joints in slabs shall be formed to the dimensions shown on the drawings by removing snap-out joint-forming inserts, by sawing sawable inserts, or by sawing to widen the top portion of sawed joints. Joints to be sealed shall be cleaned and sealed as indicated and in accordance with Section 07900 JOINT SEALING.

3.6.1 Construction Joints

For concrete other than slabs on grade, construction joints shall be located so that the unit of operation does not exceed 50 feet. Concrete shall be placed continuously so that each unit is monolithic in construction. Fresh concrete shall not be placed against adjacent hardened concrete until it is at least 24 hours old. Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Contracting Officer. Unless otherwise indicated and except for slabs on grade, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete begins to lose its plasticity, before placing concrete for beams, girders, or slabs thereon. In walls having door or window openings, lifts shall terminate at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints in walls or columns are required, a strip of 1 inchsquare-edge lumber, bevelled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph Previously Placed Concrete.

3.6.2 Contraction Joints in Slabs on Grade

Contraction joints shall be located and detailed as shown on the drawings. Contraction Joints shall be produced by forming a weakened plane in the concrete slab by use of rigid inserts impressed in the concrete during placing operations, use of snap-out plastic joint forming inserts or sawing a continuous slot with a concrete saw. Regardless of method used to produce the weakened plane, it shall be 1/4 the depth of the slab thickness and between 1/8 and 3/16 inch wide. For saw-cut joints, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent ravelling of the edges of the saw cut. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking. Reservoir for joint sealant shall be formed as previously specified. The requirements of this paragraph shall take precedence over the requirements of Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS for slabs on grade only.

3.6.3 Expansion Joints

Installation of expansion joints and sealing of these joints shall conform to the requirements of Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

3.6.4 Waterstops

Waterstops shall be installed in conformance with the locations and details shown on the drawings using materials and procedures specified in Section 03150 EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS.

3.6.5 Dowels and Tie Bars

Dowels and tie bars shall be installed at the locations shown on the drawings and to the details shown, using materials and procedures specified in Section 03200 CONCRETE REINFORCEMENT and herein. Conventional smooth "paving" dowels shall be installed in slabs using approved methods to hold the dowel in place during concreting within a maximum alignment tolerance of 1/8 inch in 12 inches. "Structural" type deformed bar dowels, or tie bars, shall be installed to meet the specified tolerances. Care shall be taken during placing adjacent to and around dowels and tie bars to ensure there is no displacement of the dowel or tie bar and that the concrete completely embeds the dowel or tie bar and is thoroughly consolidated.

3.7 FINISHING FORMED SURFACES

Forms, form materials, and form construction are specified in Section 03100 STRUCTURAL CONCRETE FORMWORK. Finishing of formed surfaces shall be as specified herein. Unless another type of architectural or special finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired. Unless painting of surfaces is required, uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that requires a Class A or B finish. Except for major defects, as defined hereinafter, surface defects shall be repaired as specified herein within 24 hours after forms are removed. Repairs of the so-called "plaster-type" will not be permitted in any location. Tolerances of formed surfaces shall conform to the requirements of ACI 117/117R. These tolerances apply to the finished concrete surface, not to the forms themselves; forms shall be set true to line and grade. Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter shall be repaired as specified in paragraph Damp-Pack Mortar Repair. Defects whose surface diameter is greater than their depth shall be repaired as specified in paragraph Repair of Major Defects. Repairs shall be finished flush with adjacent surfaces and with the same surface texture. The cement used for all repairs shall be a blend of job cement with white cement proportioned so that the final color after curing and aging will be the same as the adjacent concrete. Concrete with excessive honeycomb, or other defects which affect the strength of the member, will be rejected. Repairs shall be demonstrated to be acceptable and free from cracks or loose or drummy areas at the completion of the contract and, for Class A and B Finishes, shall be inconspicuous. Repairs not meeting these requirements will be rejected and shall be replaced.

3.7.1 Class A Finish and Class B Finish

Class A finish is not required anywhere. Class B finish is required in the interior walls of the pumphouse superstructure and the access to the discharge chamber. Fins, ravelings, and loose material shall be removed, all surface defects over 1/2 inch in diameter or more than 1/2 inch deep, shall be repaired and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Defects more than 1/2 inch in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep. The Contractor shall prepare a sample panel for approval (as specified in

PART 1) before commencing repair, showing that the surface texture and color match will be attained. Metal tools shall not be used to finish repairs in Class A surfaces.

3.7.2 Class C and Class D Finish

Class C finish is required for the interior walls of the pumphouse substructure and discharge chamber. Class D finish is not required. Fins, ravelings, and loose material shall be removed, and, except as otherwise indicated or as specified in Section 03100 STRUCTURAL CONCRETE FORMWORK, holes left by removal of form ties shall be reamed and filled. Honeycomb and other defects more than 1/2 inch deep or more than 2 inches in diameter shall be repaired. Defects more than 2 inches in diameter shall be cut back to sound concrete, but in all cases at least 1 inch deep.

3.7.3 Architectural and Special Finishes

Special finishes shall conform to the requirements specified herein.

3.8 REPAIRS

3.8.1 Damp-Pack Mortar Repair

Form tie holes requiring repair and other defects whose depth is at least as great as their surface diameter but not over 4 inchesshall be repaired by the damp-pack mortar method. Form tie holes shall be reamed and other similar defects shall be cut out to sound concrete. The void shall then be thoroughly cleaned, thoroughly wetted, brush-coated with a thin coat of neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part portland cement to 2 parts fine aggregate passing the No. 16 mesh sieve, and minimum amount of water. Only sufficient water shall be used to produce a mortar which, when used, will stick together on being molded into a ball by a slight pressure of the hands and will not exude water but will leave the hands damp. Mortar shall be mixed and allowed to stand for 30 to 45 minutes before use with remixing performed immediately prior to use. Mortar shall be thoroughly tamped in place in thin layers using a hammer and hardwood block. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through to the outside face. All holes shall be packed full. Damp-pack repairs shall be moist cured for at least 48 hours.

3.8.2 Repair of Major Defects

Major defects will be considered to be those more than 1/2 inch deep or, for Class A and B finishes, more than 1/2 inch in diameter and, for Class C and D finishes, more than 2 inches in diameter. Also included are any defects of any kind whose depth is over 4 inches or whose surface diameter is greater than their depth. Major defects shall be repaired as specified below.

3.8.2.1 Surface Application of Mortar Repair

Defective concrete shall be removed, and removal shall extend into completely sound concrete. Approved equipment and procedures which will not cause cracking or microcracking of the sound concrete shall be used. If reinforcement is encountered, concrete shall be removed so as to expose the reinforcement for at least 2 inches on all sides. All such defective areas greater than 12 square inches shall be outlined by saw cuts at least 1 inch deep. Defective areas less than 12 square inches shall be outlined

by a 1 inch deep cut with a core drill in lieu of sawing. All saw cuts shall be straight lines in a rectangular pattern in line with the formwork panels. After concrete removal, the surface shall be thoroughly cleaned by high pressure washing to remove all loose material. Surfaces shall be kept continually saturated for the first 12 of the 24 hours immediately before placing mortar and shall be damp but not wet at the time of commencing mortar placement. The Contractor, at his option, may use either hand-placed mortar or mortar placed with a mortar gun. If hand-placed mortar is used, the edges of the cut shall be perpendicular to the surface of the concrete. The prepared area shall be brush-coated with a thin coat of neat cement grout. The repair shall then be made using a stiff mortar, preshrunk by allowing the mixed mortar to stand for 30 to 45 minutes and then remixed, thoroughly tamped into place in thin layers. If hand-placed mortar is used, the Contractor shall test each repair area for drumminess by firm tapping with a hammer and shall inspect for cracks, both in the presence of the Contracting Officer's representative, immediately before completion of the contract, and shall replace any showing drumminess or cracking. If mortar placed with a mortar gun is used, the gun shall be a small compressed air-operated gun to which the mortar is slowly hand fed and which applies the mortar to the surface as a high-pressure stream, as approved. Repairs made using shotcrete equipment will not be accepted. The mortar used shall be the same mortar as specified for damp-pack mortar repair. If gun-placed mortar is used, the edges of the cut shall be beveled toward the center at a slope of 1:1. All surface applied mortar repairs shall be continuously moist cured for at least 7 days. Moist curing shall consist of several layers of saturated burlap applied to the surface immediately after placement is complete and covered with polyethylene sheeting, all held closely in place by a sheet of plywood or similar material rigidly braced against it. Burlap shall be kept continually wet.

3.8.2.2 Repair of Deep and Large Defects

Deep and large defects will be those that are more than 6 inches deep and also have an average diameter at the surface more than 18 inches or that are otherwise so identified by the Project Office. Such defects shall be repaired as specified herein or directed, except that defects which affect the strength of the structure shall not be repaired and that portion of the structure shall be completely removed and replaced. Deep and large defects shall be repaired by procedures approved in advance including forming and placing special concrete using applied pressure during hardening. Preparation of the repair area shall be as specified for surface application of mortar. In addition, the top edge (surface) of the repair area shall be sloped at approximately 20 degrees from the horizontal, upward toward the side from which concrete will be placed. The special concrete shall be a concrete mixture with low water content and low slump, and shall be allowed to age 30 to 60 minutes before use. Concrete containing a specified expanding admixture may be used in lieu of the above mixture; the paste portion of such concrete mixture shall be designed to have an expansion between 2.0 and 4.0 percent when tested in accordance with ASTM C 940. A full width "chimney" shall be provided at the top of the form on the placing side to ensure filling to the top of the opening. A pressure cap shall be used on the concrete in the chimney with simultaneous tightening and revibrating the form during hardening to ensure a tight fit for the repair. The form shall be removed after 24 hours and immediately the chimney shall be carefully chipped away to avoid breaking concrete out of the repair; the surface of the repair concrete shall be dressed as required.

3.9 FINISHING UNFORMED SURFACES

The finish of all unformed surfaces shall meet the requirements of paragraph Tolerances in PART 1, when tested as specified herein.

3.9.1 General

The ambient temperature of spaces adjacent to unformed surfaces being finished and of the base on which concrete will be placed shall be not less than 50 degrees F. In hot weather all requirements of paragraphs Hot Weather Requirements and Prevention of Plastic Shrinkage Cracking shall be met. Unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, with additional finishing as specified below, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings, properly consolidated, and left true and regular. Unless otherwise shown on the drawings, exterior surfaces shall be sloped for drainage, as directed. Where drains are provided, interior floors shall be evenly sloped to the drains. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or "jitterbugs" shall not be used for any surfaces. The dusting of surfaces with dry cement or other materials or the addition of any water during finishing shall not be permitted. If bleedwater is present prior to finishing, the excess water shall be carefully dragged off or removed by absorption with porous materials such as burlap. During finishing operations, extreme care shall be taken to prevent over finishing or working water into the surface; this can cause "crazing" (surface shrinkage cracks which appear after hardening) of the surface. Any slabs with surfaces which exhibit significant crazing shall be removed and replaced. During finishing operations, surfaces shall be checked with a 10 foot straightedge, applied in both directions at regular intervals while the concrete is still plastic, to detect high or low areas.

3.9.2 Rough Slab Finish

As a first finishing operation for unformed surfaces and as final finish for slabs to receive mortar setting beds, the surface shall receive a rough slab finish prepared as follows. Unless specified otherwise, unformed surfaces shall receive only a rough slab finish. The concrete shall be uniformly placed across the slab area, consolidated as previously specified, and then screeded with straightedge strikeoffs immediately after consolidation to bring the surface to the required finish level with no coarse aggregate visible. Side forms and screed rails shall be provided, rigidly supported, and set to exact line and grade. Allowable tolerances for finished surfaces apply only to the hardened concrete, not to forms or screed rails. Forms and screed rails shall be set true to line and grade. "Wet screeds" shall not be used.

3.9.3 Troweled Finish

The pumphouse superstructure floor shall be given a trowel finish. After floating is complete and after the surface moisture has disappeared, unformed surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks. In lieu of hand finishing, an approved power finishing machine may be used in accordance with the directions of the machine manufacturer. Additional trowelings shall be performed, either by hand or machine until the surface has been troweled 2 3 4 times, with waiting period between each. Care shall be taken to

prevent blistering and if such occurs, troweling shall immediately be stopped and operations and surfaces corrected. A final hard steel troweling shall be done by hand, with the trowel tipped, and using hard pressure, when the surface is at a point that the trowel will produce a ringing sound. The finished surface shall be thoroughly consolidated and shall be essentially free of trowel marks and be uniform in texture and appearance. The concrete mixture used for troweled finished areas shall be adjusted, if necessary, in order to provide sufficient fines (cementitious material and fine sand) to finish properly.

3.9.4 Non-Slip Finish

Non-slip floors shall be constructed in accordance with the following subparagraphs.

3.9.4.1 Broomed

Exposed floor areas around the trash rack access and the pumphouse foundation slab shall be given a broomed finish. After floating, the surface shall be lightly steel troweled, and then carefully scored by pulling a coarse fiber push-type broom across the surface. Brooming shall be transverse to traffic or at right angles to the slope of the slab. After the end of the curing period, the surface shall be vigorously broomed with a coarse fiber broom to remove all loose or semi-detached particles.

3.10 CURING AND PROTECTION

3.10.1 General

Concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
All other concrete	7 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and damage from rain and flowing water for the duration of the curing period. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure, and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. Materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat, including welding, shall be permitted near or in direct contact with the concrete at any time. Except as otherwise permitted by paragraph Membrane Forming Curing Compounds, moist curing shall be provided for any areas to receive floor hardener, any paint or other applied coating, or to which other concrete is to be bonded. Concrete containing silica fume shall be initially cured by fog misting during finishing, followed immediately by continuous moist curing. Except for plastic coated burlap, impervious sheeting alone shall not be used for curing.

3.10.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the

entire curing period, commencing immediately after finishing. If water or curing materials used stain or discolor concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned as approved. When wooden forms are left in place during curing, they shall be kept wet at all times. If steel forms are used in hot weather, nonsupporting vertical forms shall be broken loose from the concrete soon after the concrete hardens and curing water continually applied in this void. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Burlap and mats shall be clean and free from any contamination and shall be completely saturated before being placed on the concrete. The Contractor shall have an approved work system to ensure that moist curing is continuous 24 hours per day.

3.10.3 Membrane Forming Curing Compounds

Membrane forming curing compounds shall not be used on surfaces in the pumphouse operating floor. Otherwise, concrete may be cured with a pigmented curing compound in lieu of moist curing. Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete, including surfaces to which a smooth finish is to be applied or other concrete to be bonded. However, a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements, may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. All surfaces shall be thoroughly moistened with water. Curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 psi, at a uniform coverage of not more than 400 square feet per gallon for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. Surfaces on which clear compound is used shall be shaded from direct rays of the sun for the first 3 days. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.10.4 Impervious Sheeting

The following concrete surfaces may be cured using impervious sheets: all horizontal surfaces except the pumphouse operating floor. However, except for plastic coated burlap, impervious sheeting alone shall not be used for curing. Impervious-sheet curing shall only be used on horizontal or nearly horizontal surfaces. Surfaces shall be thoroughly wetted and be completely covered with the sheeting. Sheeting shall be at least 18 inches wider than the concrete surface to be covered. Covering shall be laid with

light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3.10.5 Cold Weather Curing and Protection

When the daily ambient low temperature is less than 32 degrees F the temperature of the concrete shall be maintained above 40 degrees F for the first seven days after placing. During the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by suitable temperature measuring devices furnished by the Governmentthe Contractor, as required, and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor as directed.

3.11 SETTING BASE PLATES AND BEARING PLATES

After being properly positioned, column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be set to the proper line and elevation with damp-pack bedding mortar, except where nonshrink grout is indicated. The thickness of the mortar or grout shall be approximately 1/24 the width of the plate, but not less than 3/4 inch. Concrete and metal surfaces in contact with grout shall be clean and free of oil and grease, and concrete surfaces in contact with grout shall be damp and free of laitance when grout is placed. Nonshrink grout shall be used for pumps and generator equipment.

3.11.1 Damp-Pack Bedding Mortar

Damp-pack bedding mortar shall consist of 1 part cement and 2-1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed. The space between the top of the concrete and bottom of the bearing plate or base shall be packed with the bedding mortar by tamping or ramming with a bar or rod until it is completely filled.

3.11.2 Nonshrink Grout

Nonshrink grout shall be a ready-mixed material requiring only the addition of water. Water content shall be the minimum that will provide a flowable mixture and completely fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.11.2.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified therein. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, the batch shall be mixed for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. The space between the top of the concrete or machinery-bearing surface and the plate shall be filled solid with the

grout. Forms shall be of wood or other equally suitable material for completely retaining the grout on all sides and on top and shall be removed after the grout has set. The placed grout shall be carefully worked by rodding or other means to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout, and of surfaces receiving the grout, shall be maintained at 65 to 85 degrees F until after setting.

3.11.2.2 Treatment of Exposed Surfaces

For metal-oxidizing nonshrink grout, exposed surfaces shall be cut back 1 inch and immediately covered with a parge coat of mortar consisting of 1 part portland cement and 2-1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. The parge coat shall have a smooth finish. For other mortars or grouts, exposed surfaces shall have a smooth-dense finish and be left untreated. Curing shall comply with paragraph CURING AND PROTECTION.

3.12 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL

The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and shall submit specified reports. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease and the operation shall be corrected. The laboratory performing the tests shall be onsite and shall conform with ASTM C 1077. Materials may be subjected to check testing by the Government from samples obtained at the manufacturer, at transfer points, or at the project site. The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and as it deems necessary thereafter for conformance with ASTM C 1077.

3.12.1 Grading and Corrective Action

3.12.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

3.12.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of

aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

3.12.2 Quality of Aggregates

Thirty days prior to the start of concrete placement, the Contractor shall perform all tests for aggregate quality required by ASTM C 33. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality at least every three months, and when the source of aggregate or aggregate quality changes. Samples tested after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

3.12.3 Scales, Batching and Recording

The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every three months. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. At the same time, the Contractor shall test and ensure that the devices for dispensing admixtures are operating properly and accurately. When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.12.4 Batch-Plant Control

The measurement of concrete materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic yard for each class of concrete batched during each day's plant operation.

3.12.5 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete

production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Tests shall be made in accordance with ASTM C 231 for normal weight concrete and ASTM C 173 for lightweight concrete. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single test result reaches either the upper or lower action limit, a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the air content and the control chart for range, and for determining need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate control chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph Air Entrainment. An upper warning limit and a lower warning limit line shall be set 1.0 percentage point above and below the average line, respectively. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a secondary control chart for range where an upper warning limit is set at 2.0 percentage points and an upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the air content at the mixer controlled as directed.

b. Air Content Corrective Action. Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the secondary control chart for range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted.

c. Slump Testing. In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143 for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Test results shall be plotted on control charts which shall at all times be readily available to the Government and shall be submitted weekly. Copies of the current control charts shall be kept in the field by testing crews and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit,

a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control charts for slump and the chart for range, and for determining need for any remedial action. Limits shall be set on separate control charts for slump for each type of mixture. The upper warning limit shall be set at 1/2 inch below the maximum allowable slump specified in paragraph Slump in PART 1 for each type of concrete and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 2 inches. Samples for slump shall be taken at the mixer. However, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer, and the slump at the mixer controlled as directed.

d. Slump Corrective Action. Whenever points on the control charts for slump reach the upper warning limit, an adjustment shall immediately be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum w/c ratio specified, based on aggregates which are in a saturated surface dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive individual slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted, and the Contractor shall take appropriate steps to bring the slump under control. Additional slump tests shall be made as directed.

e. Temperature. The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.

f. Strength Specimens. At least one set of test specimens shall be made, for compressive or flexural strength as appropriate, on each different concrete mixture placed during the day for each 500 cubic yards or portion thereof of that concrete mixture placed each day. Additional sets of test specimens shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A truly random (not haphazard) sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph Strength Requirements in PART 1 shall consist of four specimens, two to be tested at 7 days and two at 28 days. A set of test specimens for concrete with a 90-day strength per the same paragraph shall

consist of six specimens, two tested at 7 days, two at 28 days, and two at 90 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39 for test cylinders and ASTM C 78 for test beams. Results of all strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength "tests", ("test" as defined in paragraph Strength Requirements in PART 1) moving average of last 3 "tests" for strength, and moving average for range for the last 3 "tests" for each mixture. The charts shall be similar to those found in ACI 214.3R.

3.12.6 Inspection Before Placing

Foundations, construction joints, forms, and embedded items shall be inspected by the Contractor in sufficient time prior to each concrete placement in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.12.7 Placing

The placing foreman shall supervise placing operations, shall determine that the correct quality of concrete or grout is placed in each location as specified and as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement. The placing foreman shall not permit batching and placing to begin until it has been verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.12.8 Vibrators

The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing. Any vibrator not meeting the requirements of paragraph Consolidation, shall be immediately removed from service and repaired or replaced.

3.12.9 Curing Inspection

a. Moist Curing Inspections. At least once each shift, and not less than twice per day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action. When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by 1 day.

c. Membrane Curing Inspection. No curing compound shall be applied until the Contractor has verified that the compound is properly mixed and ready for spraying. At the end of each operation, the Contractor shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered, shall compute the rate of coverage in square feet per gallon, and shall note whether or not coverage is uniform.

d. Membrane Curing Corrective Action. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet Curing Inspection. At least once each shift and once per day on non-work days, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet Curing Corrective Action. When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

3.12.10 Cold-Weather Protection

At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.12.11 Mixer Uniformity

a. Stationary Mixers. Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 75,000 cubic yards of concrete placed, whichever results in the shortest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94.

b. Truck Mixers. Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

c. Mixer Uniformity Corrective Action. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.12.12 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be

prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all contractor quality control records.

3.13 FLOWABLE CEMENTITIOUS FILL

The Contractor shall prepare and install fill in strict accordance with manufacturer's instructions. Water content of mix should be adjusted to obtain maximum 3 inches initial slump prior to incorporating admixture. Contractor shall perform trial mixtures as recommended by manufacturer in order to obtain final mix meeting compressive strength and air content percent required. Place fill continuously until the designated work section is filled.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 04 - MASONRY

SECTION 04200

MASONRY

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, HANDLING, AND STORAGE
1.3.1 Masonry Units
1.3.2 Reinforcement, Anchors, and Ties
1.3.3 Cementitious Materials, Sand and Aggregates

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.2 CLAY OR SHALE BRICK (Not Used)
2.3 CONCRETE MASONRY UNITS (CMU)
2.3.1 Aggregates
2.3.2 Kinds and Shapes
2.4 BURNISHED BLOCK MASONRY UNITS
2.5 PRECAST CONCRETE ITEMS
2.5.1 Lintels
2.5.2 Splash Blocks
2.6 MORTAR
2.6.1 Mortar Admixtures
2.6.2 Coloring
2.7 GROUT
2.7.1 Grout Admixtures
2.7.2 Grout Barriers
2.8 ANCHORS, TIES, AND BAR POSITIONERS
2.8.1 Wall Ties
2.8.2 Bar Positioners
2.9 JOINT REINFORCEMENT
2.10 REINFORCING STEEL BARS AND RODS
2.11 CONTROL JOINT KEYS
2.12 EXPANSION-JOINT MATERIALS
2.13 INSULATION
2.13.1 Rigid Board-Type Insulation
2.13.1.1 Insulation Thickness and Air Space
2.13.1.2 Aged R-Value
2.13.1.3 Recovered Material
2.13.2 Insulation Adhesive
2.14 MASONRY CORE FILL INSULATION
2.15 FLASHING
2.16 WEEP HOLE VENTILATORS

PART 3 EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

3.1.1 Hot Weather Installation
3.1.2 Cold Weather Installation
3.1.2.1 Preparation
3.1.2.2 Completed Masonry and Masonry Not Being Worked On
3.2 LAYING MASONRY UNITS
3.2.1 Surface Preparation
3.2.2 Forms and Shores
3.2.3 Concrete Masonry Units
3.2.4 Tolerances
3.2.5 Cutting and Fitting
3.2.6 Jointing
3.2.6.1 Flush Joints
3.2.6.2 Tooled Joints
3.2.6.3 Door and Window Frame Joints
3.2.7 Joint Widths
3.2.7.1 Concrete Masonry Units
3.2.8 Embedded Items
3.2.9 Unfinished Work
3.2.10 Masonry Wall Intersections
3.3 ANCHORED VENEER CONSTRUCTION
3.4 WEEP HOLES
3.5 COMPOSITE WALLS
3.6 MORTAR
3.7 REINFORCING STEEL
3.7.1 Positioning Bars
3.7.2 Splices
3.8 JOINT REINFORCEMENT
3.9 PLACING GROUT
3.9.1 Horizontal Grout Barriers
3.9.2 Cleanouts
3.9.2.1 Cleanouts for Hollow Unit Masonry Construction
3.9.3 Grouting Equipment
3.9.3.1 Grout Pumps
3.9.3.2 Vibrators
3.9.4 Grout Placement
3.9.4.1 Low-Lift Method
3.9.4.2 High-Lift Method
3.10 BOND BEAMS
3.11 CONTROL JOINTS
3.12 BRICK EXPANSION JOINTS AND CONCRETE MASONRY VENEER JOINTS
3.13 LINTELS
3.13.1 Masonry Lintels
3.13.2 Precast Concrete and Steel Lintels
3.14 SILLS AND COPINGS
3.15 ANCHORAGE TO CONCRETE
3.16 INSULATION
3.17 MASONRY CORE FILL INSULATION
3.18 SPLASH BLOCKS
3.19 POINTING AND CLEANING
3.19.1 Concrete Masonry Unit and Concrete Brick Surfaces
3.19.2 Clay or Shale Brick Surfaces (Not Used)
3.20 BEARING PLATES
3.21 PROTECTION

-- End of Section Table of Contents --

SECTION 04200

MASONRY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(1997a) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 153/A 153M	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 615/A 615M	(1996ael) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 67	(1998a) Sampling and Testing Brick and Structural Clay Tile
ASTM C 90	(1998) Loadbearing Concrete Masonry Units
ASTM C 91	(1998) Masonry Cement
ASTM C 216	(1998) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 270	(1997ael) Mortar for Unit Masonry
ASTM C 476	(1998) Grout for Masonry
ASTM C 494	(1999) Chemical Admixtures for Concrete
ASTM C 516	(1980) Vermiculite Loose Fill Thermal Insulation
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 641	(1982; R 1991) Staining Materials in Lightweight Concrete Aggregates
ASTM C 744	(1998) Prefaced Concrete and Calcium Silicate Masonry Units
ASTM C 780	(1996) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

ASTM C 1072	(1998) Measurement of Masonry Flexural Bond Strength
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 2000	(1999) Rubber Products in Automotive Applications
ASTM D 2240	(1997el) Rubber Property - Durometer Hardness
ASTM D 2287	(1996) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Burnished Block Masonry Units; G, CO

Manufacturer's descriptive data.

SD-04 Samples

Burnished Block Masonry Units; G, CO

Color samples of three stretcher units and one unit for each type of special shape. Units shall show the full range of color and texture.

SD-07 Certificates

Concrete Masonry Units (CMU);
Burnished Block Masonry Units;

Certificates of compliance stating that the materials meet the specified requirements.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.3.1 Masonry Units

Concrete masonry units shall be covered or protected from inclement weather and shall conform to the moisture content as specified in ASTM C 90when

delivered to the jobsite. In addition, glass block units and prefaced concrete units shall be stored with their finish surfaces covered. Prefabricated lintels shall be marked on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.3.2 Reinforcement, Anchors, and Ties

Steel reinforcing bars, coated anchors, ties, and joint reinforcement shall be stored above the ground. Steel reinforcing bars and uncoated ties shall be free of loose mill scale and rust.

1.3.3 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Sand and aggregates shall be stored in a manner to prevent contamination or segregation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval.

2.2 CLAY OR SHALE BRICK (Not Used)

2.3 CONCRETE MASONRY UNITS (CMU)

Standard, corduroy, and split-face hollow and solid concrete masonry units shall conform to ASTM C 90, Type I. Cement shall have a low alkali content and be of one brand. The minimum compressive strength (f'm) of the solid and hollow united shall be no less than 1500 psi.

2.3.1 Aggregates

Lightweight aggregates and blends of lightweight and heavier aggregates in proportions used in producing the units, shall comply with the following requirements when tested for stain-producing iron compounds in accordance with ASTM C 641: by visual classification method, the iron stain deposited on the filter paper shall not exceed the "light stain" classification.

2.3.2 Kinds and Shapes

Units shall be modular in size and shall include closer, jamb, header, lintel, and bond beam units and special shapes and sizes to complete the work as indicated. Units used in exposed masonry surfaces in any one building shall have a uniform fine to medium texture and a uniform color.

2.4 BURNISHED BLOCK MASONRY UNITS

Concrete blocks for grinding shall conform to ASTM C 90, Type 1. The ground surfaces shall have a factory-applied, heat-treated acrylic finish. Units shall conform to requirements of ASTM C 744 with respect to adhesion, abrasion, color change and resistance to crazing and ASTM C 67 with respect to freezing and thawing.

2.5 PRECAST CONCRETE ITEMS

Lintels and splashblocks shall be factory-made units from a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, concrete shall be 4,000 psi minimum conforming to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and minimum reinforcement shall be the reinforcement required for handling of the units. Clearance of 3/4 inchshall be maintained between reinforcement and faces of units. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 pounds per square inch for at least 5 hours, the items, after casting, shall be either damp-cured for 24 hours or steam-cured and shall then be aged under cover for 28 days or longer. Cast-concrete members weighing over 80 pounds shall have built-in loops of galvanized wire or other approved provisions for lifting and anchoring. Units shall have beds and joints at right angles to the face, with sharp true arises and shall be cast with drip grooves on the underside where units overhang walls. Exposed-to-view surfaces shall be free of surface voids, spalls, cracks, and chipped or broken edges. Precast units exposed-to-view shall be of uniform appearance and color. Unless otherwise specified, units shall have a smooth dense finish. Prior to use, each item shall be wetted and inspected for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected.

2.5.1 Lintels

Precast lintels, unless otherwise shown, shall be of a thickness equal to the wall and reinforced with two No. 4 bars for the full length. Top of lintels shall be labeled "TOP" or otherwise identified and each lintel shall be clearly marked to show location in the structure.

2.5.2 Splash Blocks

Splash blocks shall be as detailed. Reinforcement shall be the manufacturer's standard.

2.6 MORTAR

Mortar shall be Type N in accordance with the proportion specification of ASTM C 270 except Type N cement-lime mortar proportions shall be 1 part cement, 1 part lime and 6 parts aggregate; when masonry cement ASTM C 91 is used the maximum air content shall be limited to 12 percent and performance equal to cement-lime mortar shall be verified. Verification of masonry cement performance shall be based on ASTM C 780 and ASTM C 1072. Cement shall have a low alkali content and be of one brand. Aggregates shall be from one source.

2.6.1 Mortar Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall

contain less than 0.2 percent chlorides, and shall conform to ASTM C 494, Type C.

2.6.2 Coloring

Mortar coloring shall be added to the mortar used for exposed masonry surfaces to produce a uniform color. Mortar coloring shall not exceed 3 percent of the weight of cement for carbon black and ten percent of the weight of cement for all other pigments. Mortar coloring shall be chemically inert, of finely ground limeproof pigment, and furnished in accurately pre-measured and packaged units that can be added to a measured amount of cement.

2.7 GROUT

Grout shall conform to ASTM C 476. Cement used in grout shall have a low alkali content. Grout slump shall be between 8 and 10 inches. Grout shall be used subject to the limitations of Table III. Proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

2.7.1 Grout Admixtures

In cold weather, a non-chloride based accelerating admixture may be used subject to approval. Accelerating admixture shall be non-corrosive, shall contain less than 0.2 percent chlorides, and shall conform to ASTM C 494, Type C.

2.7.2 Grout Barriers

Grout barriers for vertical cores shall consist of fine mesh wire, fiberglass, or expanded metal.

2.8 ANCHORS, TIES, AND BAR POSITIONERS

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153/A 153M, Class B-2. Steel wire used for anchors and ties shall be fabricated from steel wire conforming to ASTM A 82. Anchors and ties shall be sized to provide a minimum of 5/8 inch mortar cover from either face.

2.8.1 Wall Ties

Wall ties shall be rectangular-shaped or Z-shaped fabricated of 3/16 inch diameter zinc-coated steel wire. Rectangular wall ties shall be no less than 4 inches wide. Wall ties may also be of a continuous type conforming to paragraph JOINT REINFORCEMENT. Adjustable type wall ties, if approved for use, shall consist of two essentially U-shaped elements fabricated of 3/16 inch diameter zinc-coated steel wire. Adjustable ties shall be of the double pintle to eye type and shall allow a maximum of 1/2 inch eccentricity between each element of the tie. Play between pintle and eye opening shall be not more than 1/16 inch. The pintle and eye elements shall be formed so that both can be in the same plane.

2.8.2 Bar Positioners

Bar positioners, used to prevent displacement of reinforcing bars during the course of construction, shall be factory fabricated from 9 gauge steel

wire or equivalent, and coated with a hot-dip galvanized finish. Not more than one wire shall cross the cell.

2.9 JOINT REINFORCEMENT

Joint reinforcement shall be factory fabricated from steel wire conforming to ASTM A 82, welded construction. Tack welding will not be acceptable in reinforcement used for wall ties. Wire shall have zinc coating conforming to ASTM A 153/A 153M, Class B-2. All diagonal wires shall be a minimum of 9 gauge. All longitudinal wires shall be a minimum of 3/16 inch. Reinforcement shall be ladder type design, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units. Joint reinforcement shall be placed a minimum of 5/8 inch cover from either face. The distance between crosswires shall not exceed 16 inches. Joint reinforcement for straight runs shall be furnished in flat sections not less than 10 feet long. Joint reinforcement shall be provided with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features.

2.10 REINFORCING STEEL BARS AND RODS

Reinforcing steel bars and rods shall conform to ASTM A 615/A 615M, Grade 60.

2.11 CONTROL JOINT KEYS

Control joint keys shall be a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D 2000or polyvinyl chloride conforming to ASTM D 2287. The material shall be resistant to oils and solvents. The control joint key shall be provided with a solid shear section not less than 5/8 inchthick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch. The control joint key shall fit neatly, but without forcing, in masonry unit jamb sash grooves. The control joint key shall be flexible at a temperature of minus 30 degrees F after five hours exposure, and shall have a durometer hardness of not less than 70 when tested in accordance with ASTM D 2240.

2.12 EXPANSION-JOINT MATERIALS

Backer rod and sealant shall be adequate to accommodate joint compression equal to 50 percent of the width of the joint. The backer rod shall be compressible rod stock of polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Sealant shall conform to Section 07900 JOINT SEALING.

2.13 INSULATION

2.13.1 Rigid Board-Type Insulation

Rigid board-type insulation shall be extruded polystyrene, polyurethane, or polyisocyanurate. Polystyrene shall conform to ASTM C 578. Polyurethane or polyisocyanurate shall conform to ASTM C 1289, Type I, Class 2, faced with aluminum foil on both sides of the foam. The insulation shall be a standard product and shall be marked with not less than the manufacturer's trademark or name, the specification number, the permeance and R-values.

2.13.1.1 Insulation Thickness and Air Space

The cavity space shall allow for a maximum insulation thickness of 1.5 inches,and a minimum air space of 1 inch.

2.13.1.2 Aged R-Value

The insulation shall provide a minimum aged R-value of 7.5 for the overall thickness. The aged R-value shall be determined at 75 degrees F in accordance with the appropriate referenced specification. The stated R-value of the insulation shall be certified by an independent testing laboratory or certified by an independent Registered Professional Engineer if tests are conducted in the manufacturer's laboratory.

2.13.1.3 Recovered Material

Insulation shall contain the highest practicable percentage of recovered material derived from solid waste (but material reused in the manufacturing process cannot be counted toward the percentage of recovered material). Where two materials have the same price and performance, the one containing the higher recovered material content shall be provided. The polyurethane or polyisocyanurate foam shall have a minimum recovered material content of 9 percent by weight of the core material.

2.13.2 Insulation Adhesive

Insulation adhesive shall be specifically prepared to adhere the insulation to the masonry and, where applicable, to the thru-wall flashing. The adhesive shall not deleteriously affect the insulation, and shall have a record of satisfactory and proven performance for the conditions under which to be used.

2.14 MASONRY CORE FILL INSULATION

Core fill insulation shall be a lightweight, free-flowing inorganic vermiculite, specially treated for water repellancy and a dry loose weight of 4.5-7.0 pcf and capable of supporting its own weight. Insulation shall meet requirements of ASTM C 516, Type II.

2.15 FLASHING

Flashing shall be as specified in Section 07600 SHEET METALWORK, GENERAL.

2.16 WEEP HOLE VENTILATORS

Weephole ventilators shall be prefabricated aluminum grill type vents designed to prevent insect entry with maximum air entry. Ventilators shall be sized to match modular construction with a standard 3/8 inch mortar joint.

PART 3 EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

3.1.1 Hot Weather Installation

The following precautions shall be taken if masonry is erected when the ambient air temperature is more than 99 degrees F in the shade and the relative humidity is less than 50 percent. All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 4 feet ahead of masonry; masonry units shall be set within one minute of

spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

3.1.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 40 degrees F, a written statement of proposed cold weather construction procedures shall be submitted for approval. The following precautions shall be taken during all cold weather erection.

3.1.2.1 Preparation

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

a. Air Temperature 40 to 32 Degrees F. Sand or mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F.

b. Air Temperature 32 to 25 Degrees F.Sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing.

c. Air Temperature 25 to 20 Degrees F. Sand and mixing water shall be heated to provide mortar temperatures between 40 degrees F and 120 degrees F. Temperature of mortar on boards shall be maintained above freezing. Sources of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 mph.

d. Air Temperature 20 Degrees F and below. Sand and mixing water shall be heated to provide mortar temperatures between 40 degrees F and 120 degrees F. Enclosure and auxiliary heat shall be provided to maintain air temperature above 32 degrees F. Temperature of units when laid shall not be less than 20 degrees F.

3.1.2.2 Completed Masonry and Masonry Not Being Worked On

a. Mean daily air temperature 40 degrees F to 32 degrees F. Masonry shall be protected from rain or snow for 24 hours by covering with weather-resistive membrane.

b. Mean daily air temperature 32 degrees F to 25 degrees F. Masonry shall be completely covered with weather-resistant membrane for 24 hours.

c. Mean Daily Air Temperature 25 Degrees F to 20 Degrees F. Masonry shall be completely covered with insulating blankets or equally protected for 24 hours.

d. Mean Daily Temperature 20 Degrees F and Below. Masonry temperature shall be maintained above 32 degrees F for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.2 LAYING MASONRY UNITS

Masonry units shall be laid in running bond pattern. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 1/2 inch. Each unit shall be adjusted to its final position while mortar is still soft and plastic. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below. In double wythe construction, the inner wythe may be brought up not more than 16 inches ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 8 inches.

3.2.1 Surface Preparation

Surfaces upon which masonry is placed shall be cleaned of laitance, dust, dirt, oil, organic matter, or other foreign materials and shall be slightly roughened to provide a surface texture with a depth of at least 1/8 inch. Sandblasting shall be used, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.2 Forms and Shores

Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.3 Concrete Masonry Units

Units in piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout shall be full bedded in mortar under both face shells and webs. Other units shall be full bedded under both face shells. Head joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell. Foundation walls below grade shall be grouted solid. Jamb units shall be of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved. Double walls shall be stiffened at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of the double wall. Walls and partitions shall be adequately reinforced for support of wall-hung plumbing fixtures when chair carriers are not specified.

3.2.4 Tolerances

Masonry shall be laid plumb, true to line, with courses level. Bond pattern shall be kept plumb throughout. Corners shall be square unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, masonry shall be laid within the following tolerances (plus or minus unless otherwise noted):

TABLE II

TOLERANCES

Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 10 feet	1/4 inch
In 40 feet or more	1/2 inch
Variations from horizontal lines	
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	1/4 inch
Plus	1/2 inch

3.2.5 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.6 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.6.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall.

3.2.6.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled slightly concave. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.6.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.2.7 Joint Widths

Joint widths shall be as follows:

3.2.7.1 Concrete Masonry Units

Concrete masonry units shall have 3/8 inch joints.

3.2.8 Embedded Items

Spaces around built-in items shall be filled with mortar. Openings around flush-mount electrical outlet boxes in wet locations shall be pointed with mortar. Anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in shall be embedded as the masonry work progresses. Anchors, ties and joint reinforcement shall be fully embedded in the mortar. Cells receiving anchor bolts and cells of the first course below bearing plates shall be filled with grout.

3.2.9 Unfinished Work

Unfinished work shall be stepped back for joining with new work. Toothing may be resorted to only when specifically approved. Loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

3.2.10 Masonry Wall Intersections

Each course shall be masonry bonded at corners and elsewhere as shown. Masonry walls shall be anchored or tied together at corners and intersections with bond beam reinforcement and prefabricated corner or tee pieces of joint reinforcement as shown.

3.3 ANCHORED VENEER CONSTRUCTION

The inner and outer wythes shall be completely separated by a continuous airspace as shown on the drawings. Both the inner and the outer wythes shall be laid up together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, through-wall flashings shall be protected from damage until they are fully enclosed in the wall. The airspace between the wythes shall be kept clear and free of mortar droppings by temporary wood strips laid on the wall ties and carefully lifted out before placing the next row of ties. A coarse gravel or drainage material shall be placed behind the weep holes in the cavity to a minimum depth of 4 inches of coarse aggregate or 10 inches of drainage material to keep mortar droppings from plugging the weep holes.

3.4 WEEP HOLES

Weep holes shall be provided not more than 24 inches on centers in mortar joints of the exterior wythe above wall flashing, over foundations, bond beams, and any other horizontal interruptions of the cavity. Weep holes shall be constructed using weep hole ventilators. Other approved methods may be used for providing weep holes. Weep holes shall be kept free of mortar and other obstructions.

3.5 COMPOSITE WALLS

Masonry wythes shall be tied together with joint reinforcement or with unit wall ties. The facing wythe shall be anchored or tied to the backup at a maximum spacing of 16 inches on center vertically and 24 inches on center horizontally. Unit ties shall be spaced not over 24 inches on centers horizontally, in courses not over 16 inches apart vertically, staggered in alternate courses. Ties shall be laid not closer than 5/8 inch to either masonry face. Ties shall not extend through control joints. Collar joints between masonry facing and masonry backup shall be filled solidly with grout.

3.6 MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measurement of ingredients for mortar shall be by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation

shall be retempered by adding water to restore the proper consistency and workability. Mortar that has reached its initial set or that has not been used within 2-1/2 hours after mixing shall be discarded.

3.7 REINFORCING STEEL

Reinforcement shall be cleaned of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond prior to placing grout. Bars with kinks or bends not shown on the drawings shall not be used. Reinforcement shall be placed prior to grouting. Unless otherwise indicated, vertical wall reinforcement shall extend to within 2 inches of tops of walls.

3.7.1 Positioning Bars

Vertical bars shall be accurately placed within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inchshall be maintained between the bars and masonry units. Minimum clearance between parallel bars shall be one diameter of the reinforcement. Vertical reinforcing may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Column and pilaster ties shall be wired in position around the vertical steel. Ties shall be in contact with the vertical reinforcement and shall not be placed in horizontal bed joints.

3.7.2 Splices

Bars shall be lapped a minimum of 48 diameters of the reinforcement. Welded or mechanical connections shall develop at least 125 percent of the specified yield strength of the reinforcement.

3.8 JOINT REINFORCEMENT

Joint reinforcement shall be installed at 8 inches on center or as indicated. Reinforcement shall be lapped not less than 6 inches. Prefabricated sections shall be installed at corners and wall intersections. The longitudinal wires of joint reinforcement shall be placed to provide not less than 5/8 inch cover to either face of the unit.

3.9 PLACING GROUT

Cells containing reinforcing bars shall be filled with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces shall be filled solid with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.9.1 Horizontal Grout Barriers

Grout barriers shall be embedded in mortar below cells of hollow units receiving grout.

3.9.2 Cleanouts

3.9.2.1 Cleanouts for Hollow Unit Masonry Construction

Cleanout holes shall be provided at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet. Where all cells are to be grouted, cleanout courses shall be constructed using bond beam units in an inverted position to permit cleaning of all cells. Cleanout holes shall be provided at a maximum spacing of 32 inches where all cells are to be filled with grout. A new series of cleanouts shall be established if grouting operations are stopped for more than 4 hours. Cleanouts shall not be less than 3 by 4 inch openings cut from one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Cleanout holes shall not be closed until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, cleanout holes shall be closed in an approved manner to match surrounding masonry.

3.9.3 Grouting Equipment

3.9.3.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Pumps shall be operated to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, waste materials and debris shall be removed from the equipment, and disposed of outside the masonry.

3.9.3.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. At least one spare vibrator shall be maintained at the site at all times. Vibrators shall be applied at uniformly spaced points not further apart than the visible effectiveness of the machine. Duration of vibration shall be limited to time necessary to produce satisfactory consolidation without causing segregation.

3.9.4 Grout Placement

Masonry shall be laid to the top of a pour before placing grout. Grout shall not be placed in two-wythe solid unit masonry cavity until mortar joints have set for at least 3 days during hot weather and 5 days during cold damp weather. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 5 feet in height. High-lift grout methods shall be used on pours exceeding 5 feet in height.

3.9.4.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. Mortar protruding more than 1/2 inch into the grout space shall be removed before beginning the

grouting operation. Grout pours 12 inches or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 12 inches in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.9.4.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 1/4 inch into the grout space shall be removed by dislodging the projections with a rod or stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 4 feet in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 12 to 18 inches into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Maximum Grout Pour Height (feet) (4)	Grout Type	Grouting Procedure	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (in.) (1,2) Multiwythe Masonry (3)	Hollow-unit Masonry
1	Fine	Low Lift	3/4	1-1/2 x 2
5	Fine	Low Lift	2	2 x 3
8	Fine	High Lift	2	2 x 3
12	Fine	High Lift	2-1/2	2-1/2 x 3
24	Fine	High Lift	3	3 x 3
1	Coarse	Low Lift	1-1/2	1-1/2 x 3
5	Coarse	Low Lift	2	2-1/2 x 3
8	Coarse	High Lift	2	3 x 3
12	Coarse	High Lift	2-1/2	3 x 3

TABLE III

POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Maximum Grout Pour Height (feet) (4)	Grout Type	Grouting Procedure	Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells (in.) (1,2) Multiwythe Masonry (3)	Hollow-unit Masonry
24	Coarse	High Lift	3	3 x 4

Notes:

(1) The actual grout space or cell dimension must be larger than the sum of the following items:
a) The required minimum dimensions of total clear areas given in the table above;
b) The width of any mortar projections within the space;
c) The horizontal projections of the diameters of the horizontal reinforcing bars within a cross section of the grout space or cell.

(2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 3/4 inch or greater in width.

(3) For grouting spaces between masonry wythes.

(4) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.10 BOND BEAMS

Bond beams shall be filled with grout and reinforced as indicated on the drawings. Grout barriers shall be installed under bond beam units to retain the grout as required. Reinforcement shall be continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated on the drawings. Where splices are required for continuity, reinforcement shall be lapped 48 bar diameters. A minimum clearance of 1/2 inch shall be maintained between reinforcement and interior faces of units.

3.11 CONTROL JOINTS

Control joints shall be provided as indicated and shall be constructed by using sash jamb units with control joint key in accordance with the details shown on the drawings. Sash jamb units shall have a 3/4 by 3/4 inch groove near the center at end of each unit. The vertical mortar joint at control joint locations shall be continuous, including through all bond beams. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. In single wythe exterior masonry walls, the exterior control joints shall be raked to a depth of 3/4 inch; backing and sealant shall be installed in accordance with Section 07900 JOINT SEALING. Exposed interior control joints shall be raked to a depth of 1/4 inch. Concealed control joints shall be flush cut.

3.12 BRICK EXPANSION JOINTS AND CONCRETE MASONRY VENEER JOINTS

Brick expansion joints and concrete masonry veneer joints shall be provided and constructed as shown on the drawings. Joints shall be kept free of mortar and other debris.

3.13 LINTELS

3.13.1 Masonry Lintels

Masonry lintels shall be constructed with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated on the drawings. Lintel reinforcement shall extend beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Reinforcing bars shall be supported in place prior to grouting and shall be located 1/2 inch above the bottom inside surface of the lintel unit.

3.13.2 Precast Concrete and Steel Lintels

Precast concrete and steel lintels shall be as shown on the drawings. Lintels shall be set in a full bed of mortar with faces plumb and true. Steel and precast lintels shall have a minimum bearing length of 8 inches unless otherwise indicated on the drawings.

3.14 SILLS AND COPINGS

Sills and copings shall be set in a full bed of mortar with faces plumb and true.

3.15 ANCHORAGE TO CONCRETE

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.16 INSULATION

Anchored veneer walls shall be insulated, where shown, by installing board-type insulation on the cavity side of the inner wythe. Board type insulation shall be applied directly to the masonry or thru-wall flashing with adhesive. Insulation shall be neatly fitted between obstructions without impaling of insulation on ties or anchors. The insulation shall be applied in parallel courses with vertical joints breaking midway over the course below and shall be applied in moderate contact with adjoining units without forcing, and shall be cut to fit neatly against adjoining surfaces.

3.17 MASONRY CORE FILL INSULATION

Insulation shall be poured from the bag or hopper directly into the concrete block core or wall cavity. Pours can be made at any interval, but not to exceed 20 feet in height, without requiring bridging. Rodding and tamping are not required.

3.18 SPLASH BLOCKS

Splash blocks shall be located as shown.

3.19 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, mortar and grout daubs or splashings shall be completely removed from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.19.1 Concrete Masonry Unit and Concrete Brick Surfaces

Exposed concrete masonry unit and concrete brick surfaces shall be dry-brushed at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.19.2 Clay or Shale Brick Surfaces (Not Used)

3.20 BEARING PLATES

Bearing plates for beams, joists, joist girders and similar structural members shall be set to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Damp-pack bedding mortar and non-shrink grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.21 PROTECTION

Facing materials shall be protected against staining. Top of walls shall be covered with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 2 feet down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05055

METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DETAIL DRAWINGS
1.4 QUALIFICATION OF WELDERS AND WELDING OPERATORS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Materials Orders
2.1.2 Materials List
2.1.3 Shipping Bill
2.2 FABRICATION
2.2.1 Structural Fabrication
2.2.1.1 Dimensional Tolerances for Structural Work
2.2.1.2 Structural Steel Fabrication
2.2.1.3 Structural Aluminum Fabrication
2.2.2 Welding
2.2.2.1 Welding of Structural Steel
2.2.2.2 Welding of Steel Castings
2.2.2.3 Welding of Aluminum
2.2.2.4 Welding of Steel Studs
2.2.3 Bolted Connections
2.2.3.1 Bolted Structural Steel Connections
2.2.3.2 Bolted Aluminum Connections
2.2.4 Riveted Connections
2.2.4.1 Riveted Structural Steel Connections
2.2.4.2 Riveted Aluminum Connections
2.2.5 Machine Work
2.2.5.1 Finished Surfaces
2.2.5.2 Unfinished Surfaces
2.2.6 Miscellaneous Provisions
2.2.6.1 Metallic Coatings
2.2.7 Shop Assembly
2.3 TESTS, INSPECTIONS, AND VERIFICATIONS
2.3.1 Nondestructive Testing
2.3.2 Tests of Machinery and Structural Units
2.3.3 Inspection of Structural Steel Welding
2.3.3.1 Visual Examination
2.3.3.2 Nondestructive Examination
2.3.3.3 Test Coupons
2.3.3.4 Supplemental Examination
2.3.4 Structural Steel Welding Repairs

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Alignment and Setting
3.1.2 Blocking and Wedges
3.2 PROTECTION OF FINISHED WORK
3.2.1 Machined Surfaces
3.2.2 Aluminum
3.3 TESTS
3.3.1 Workmanship
3.3.2 Production Welding

-- End of Section Table of Contents --

SECTION 05055

METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA SAS-30	(1986) Aluminum Structures Construction Manual Series - Section 1 Specifications for Aluminum Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 123	(2001) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(2000) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 490M	(2000) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 514/A 514M	(1994a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM D 962	(1981; R 1994) Aluminum Powder and Paste Pigments for Paints
ASTM E 165	(1995) Liquid Penetrant Examination Inspection Method
ASTM E 709	(1995) Magnetic Particle Examination

ASME INTERNATIONAL (ASME)

ASME B4.1	(1994) Preferred Limits and Fits for Cylindrical Parts

ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)
ASME BPV IX	(1998) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel
AWS D1.2	(1997) Structural Welding Code - Aluminum
AWS D1.6	(1998) Structural Welding Code - Stainless Steel

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS 3110	(1992; Rev G) Primer Zinc Chromate
SAE AMS 3132	(1994; Rev F) Varnish, Phenolic Resin Corrosion-Preventive

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G, ED

Detail drawings for metalwork and machine work shall be submitted and approved prior to fabrication.

SD-03 Product Data

Welding of Structural Steel; G, ED

Schedules of welding procedures for steel structures shall be submitted and approved prior to commencing fabrication.

Welding of Aluminum; G, ED

Schedules of welding processes for aluminum fabrications shall be submitted and approved prior to commencing fabrication.

Structural Steel Welding Repairs; G, ED

Welding repair plans for steel shall be submitted and approved prior to making repairs.

Materials Orders;

Copies of purchase orders, mill orders, shop orders and work orders for materials shall be submitted prior to the use of the materials in the work.

Materials List;

Materials list for fabricated items shall be submitted at the time of submittal of detail drawings.

Shipping Bill;

Shipping bill shall be submitted with the delivery of finished pieces to the site.

SD-06 Test Reports

Tests, Inspections, and Verifications;

Certified test reports for materials shall be submitted with all materials delivered to the site.

SD-07 Certificates

Qualification of Welders and Welding Operators;

Certifications for welders and welding operators shall be submitted prior to commencing fabrication.

Application Qualification for Steel Studs; G, ED

Certified reports for the application qualification for steel studs shall be submitted and approved prior to commencing fabrication.

Welding of Aluminum; G, ED

Certified report for aluminum welding qualification tests shall be submitted and approved prior to commencing welding.

1.3 DETAIL DRAWINGS

Detail drawings for metalwork and machine work shall include catalog cuts, templates, fabrication and assembly details and type, grade and class of material as appropriate. Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the detail drawings.

1.4 QUALIFICATION OF WELDERS AND WELDING OPERATORS

The Contractor shall certify that the qualification of welders and welding operators and tack welders who will perform structural steel welding have been qualified for the particular type of work to be done in accordance with the requirements of AWS D1.1, Section 5, prior to commencing fabrication. The certificate shall list the qualified welders by name and shall specify the code and procedures under which qualified and the date of qualification. Prior qualification will be accepted if welders have performed satisfactory work under the code for which qualified within the preceding three months. The Contractor shall require welders to repeat the

qualifying tests when their work indicates a reasonable doubt as to proficiency. Those passing the requalification tests will be recertified. Those not passing will be disqualified until passing. All expenses in connection with qualification and requalification shall be borne by the Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Materials Orders

The Contractor shall furnish 3 copies of purchase orders, mill orders, shop orders and work orders for all materials orders and items used in the work. Where mill tests are required purchase orders shall contain the test site address and the name of the testing agency.

2.1.2 Materials List

The Contractor shall furnish a materials list of the materials to be used in the fabrication of each item.

2.1.3 Shipping Bill

The Contractor shall furnish a shipping bill or memorandum of each shipment of finished pieces or members to the project site giving the designation mark and weight of each item, the number of items, the total weight, and the car initial and number if shipped by rail in carload lots.

2.2 FABRICATION

2.2.1 Structural Fabrication

Structural steel shapes and plates shall be ASTM A 36/A 36M galvanized, unless otherwise noted on the drawings. Material must be straight before being laid off or worked. If straightening is necessary it shall be done by methods that will not impair the metal. Sharp kinks or bends shall be cause for rejection of the material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Bends shall be made by approved dies, press brakes or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Proposed flame cutting of material other than structural steel shall be subject to approval and shall be indicated on detail drawings. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown. Re-entrant cuts shall be filleted to a minimum radius of 3/4 inch unless otherwise approved. Finished members shall be free of twists, bends and open joints. Bolts, nuts and screws shall be tight.

2.2.1.1 Dimensional Tolerances for Structural Work

Dimensions shall be measured by an approved calibrated steel tape of approximately the same temperature as the material being measured. The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified in the particular section of these specifications for the item of work. Where tolerances are not specified in other sections of these specifications or shown, an

allowable variation of 1/32 inch is permissible in the overall length of component members with both ends milled and component members without milled ends shall not deviate from the dimensions shown by not more than 1/16 inch for members 30 feet or less in length and by more than 1/8 inch for members over 30 feet in length.

2.2.1.2 Structural Steel Fabrication

Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Surfaces and edges to be welded shall be prepared in accordance with AWS D1.1, Subsection 3.2. Where structural steel is not to be welded, chipping or grinding will not be required except as necessary to remove slag and sharp edges of mechanically guided or hand-guided cuts not exposed to view. Hand-guided cuts which are to be exposed or visible shall be chipped, ground or machined to sound metal. Minimize the amount of field welding. Shop assemble components into largest size possible commensurate with transportation and handling limitations. Shop connections shall be bolted with high strength belts or welded. Provide a minimum of two 3/4 inch diameter ASTM A 325 high strength bolts for all connections. Provide friction-type connections for all bolted connections. One-sided or other types of eccentric connects not indicated will not be permitted without prior approval.

2.2.1.3 Structural Aluminum Fabrication

Laying out and cutting of aluminum shall be in accordance with the AA SAS-30, Section 6.

2.2.2 Welding

2.2.2.1 Welding of Structural Steel

a. Welding Procedures for Structural Steel - Welding procedures for structural steel shall be prequalified as described in AWS D1.1, Subsection 5.1 or shall be qualified by tests as prescribed in AWS D1.1, Section 5. Properly documented evidence of compliance with all requirements of these specifications for previous qualification tests shall establish a welding procedure as prequalified. For welding procedures qualified by tests, the test welding and specimen testing must be witnessed and the test report document signed by the Contracting Officer. Approval of any welding procedure will not relieve the Contractor of the responsibility for producing a finished structure meeting all requirements of these specifications. The Contractor will be directed or authorized to make any changes in previously approved welding procedures that are deemed necessary or desirable by the Contractor Officer. The Contractor shall submit a complete schedule of welding procedures for each steel structure to be welded. The schedule shall conform to the requirements specified in the provisions AWS D1.1, Sections 2, 3, 4, 7 and 9 and applicable provisions of Section 10. The schedule shall provide detailed procedure specifications and tables or diagrams showing the procedures to be used for each required joint. Welding procedures must include filler metal, preheat, interpass temperature and stress-relief heat treatment requirements. Each welding procedure shall be clearly identified as being prequalified or required to be qualified by tests. Welding procedures must show types and locations of welds designated or in the specifications to receive nondestructive examination.

b. Welding Process - Welding of structural steel shall be by an electric arc welding process using a method which excludes the atmosphere from the molten metal and shall conform to the applicable provisions of AWS D1.1, Sections 1 thru 7, 9, 10 and 11. Welding shall be such as to minimize residual stresses, distortion and shrinkage.

c. Welding Technique

(1) Filler Metal - The electrode, electrode-flux combination and grade of weld metal shall conform to the appropriate AWS specification for the base metal and welding process being used or shall be as shown where a specific choice of AWS specification allowables is required. The AWS designation of the electrodes to be used shall be included in the schedule of welding procedures. Only low hydrogen electrodes shall be used for manual shielded metal-arc welding regardless of the thickness of the steel. A controlled temperature storage oven shall be used at the job site as prescribed by AWS D1.1, Subsection 4.5 to maintain low moisture of low hydrogen electrodes.

(2) Preheat and Interpass Temperature - Preheating shall be performed as required by AWS D1.1, Subsection 4.2 and 4.3 or as otherwise specified except that the temperature of the base metal shall be at least 70 degrees F. The weldments to be preheated shall be slowly and uniformly heated by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

(3) Stress-Relief Heat Treatment - Where stress relief heat treatment is specified or shown, it shall be in accordance with the requirements of AWS D1.1, Subsection 4.4 unless otherwise authorized or directed.

d. Workmanship - Workmanship for welding shall be in accordance with AWS D1.1, Section 3 and other applicable requirements of these specifications.

(1) Preparation of Base Metal - Prior to welding the Contractor shall inspect surfaces to be welded to assure compliance with AWS D1.1, Subsection 3.2.

(2) Temporary Welds - Temporary welds required for fabrication and erection shall be made under the controlled conditions prescribed for permanent work. Temporary welds shall be made using low-hydrogen welding electrodes and by welders qualified for permanent work as specified in these specifications. Preheating for temporary welds shall be as required by AWS D1.1 for permanent welds except that the minimum temperature shall be 120 degrees F in any case. In making temporary welds arcs shall not be struck in other than weld locations. Each temporary weld shall be removed and ground flush with adjacent surfaces after serving its purpose.

(3) Tack Welds - Tacks welds that are to be incorporated into the permanent work shall be subject to the same quality requirements as the permanent welds and shall be cleaned and thoroughly fused with permanent welds. Preheating shall be performed as specified above for temporary welds. Multiple-pass tack welds shall have cascaded ends. Defective tack welds shall be removed before permanent welding.

2.2.2.2 Welding of Steel Castings

Unsound material shall be removed from the surfaces of steel castings to be incorporated into welded connections by chipping, machining, air-arc gouging or grinding. Major connections designed for transfer of stresses shall not be welded if the temperature of the casting is lower than 100 degrees F. Castings containing over 0.35 percent carbon or over 0.75 percent manganese shall be preheated to a temperature not to exceed 450 degrees F and welding shall be accomplished while the castings are maintained at a temperature above 350 degrees F. Welding will not be permitted on castings containing carbon in excess of 0.45 percent except on written authorization. Castings requiring welding repairs after the first annealing and castings involving welding fabrication shall be stress-relieved annealed prior to receiving final machining unless otherwise permitted.

2.2.2.3 Welding of Aluminum

Welding of aluminum shall conform to AA SAS-30 or AWS D1.2, Sections 1 through 7, 9 and 10. The welding process and welding operators shall be prequalified as required by AWS D1.2, Section 5 or AA SAS-30, Subsection 7.2.4 in accordance with the methods described in ASME BPV IX, Section IX. A certified report giving the results of the qualifying tests shall be furnished for approval. A complete schedule of the welding process for each aluminum fabrication to be welded shall be furnished for approval.

2.2.2.4 Welding of Steel Studs

The procedures for welding steel studs to structural steel, including mechanical, workmanship, technique, stud application qualification, production quality control and fabrication and verification inspection procedures shall conform to the requirements of AWS D1.1, Section 7, except as otherwise specified.

a. Application Qualification for Steel Studs - As a condition of approval of the stud application process, the Contractor shall furnish certified test reports and certification that the studs conform to the requirements of AWS D1.1, Subsections 7.2 and 7.3, certified results of the stud manufacturer's stud base qualification test, and certified results of the stud application qualification test as required by AWS D1.1, Subsection 7.6, except as otherwise specified.

b. Production Quality Control - Quality control for production welding of studs shall conform to the requirements of AWS D1.1, Subsection 7.7, except as otherwise specified. Studs on which pre-production testing is to be performed shall be welded in the same general position as required on production studs (flat, vertical, overhead or sloping). If the reduction of the length of studs becomes less than normal as they are welded, welding shall be stopped immediately and not resumed until the cause has been corrected.

2.2.3 Bolted Connections

2.2.3.1 Bolted Structural Steel Connections

Bolts, nuts and washers shall be of the type specified or indicated. All nuts shall be equipped with washers except for high strength bolts. Beveled washers shall be used where bearing faces have a slope of more than

1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated the materials, workmanship and installation shall conform to the applicable provisions of ASTM A 325 or ASTM A 490M.

a. Bolt Holes - Bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical.

(1) Holes for regular bolts shall be drilled or subdrilled and reamed in the shop and shall not be more than 1/16 inch larger than the diameter of the bolt.

(2) Holes for fitted bolts shall be match-reamed or drilled in the shop. Burrs resulting from reaming shall be removed. The threads of bolts shall be entirely outside of the holes. The body diameter of bolts shall have tolerances as recommended by ASME B4.1for the class of fit specified. Fitted bolts shall be fitted in reamed holes by selective assembly to provide an LN-2 fit.

(3) Holes for high strength bolts shall have diameters of not more than 1/16 inch larger than bolt diameters. If the thickness of the material is not greater than the diameter of the bolts the holes may be punched. If the thickness of the material is greater than the diameter of the bolts the holes may be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the bolts and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting occurring during assembly shall not distort the metal or enlarge the holes. Reaming to a larger diameter of the next standard size bolt will be allowed for slight mismatching.

2.2.3.2 Bolted Aluminum Connections

Punching, drilling, reaming and bolting for bolted aluminum connections shall conform to the requirements of AA SAS-30, Section 6.

2.2.4 Riveted Connections

2.2.4.1 Riveted Structural Steel Connections

a. Rivet Holes - Rivet holes shall be accurately spaced, cylindrical and perpendicular to the member. Countersinking shall be true and square with the hole. Rivet holes shall be 1/16 inch larger than the diameter of the rivet. If the thickness of the material is not greater than the diameter of the rivet the holes may be punched full size. If the thickness of the material is greater than the diameter of the rivet the holes shall be drilled full size or subpunched or subdrilled at least 1/8 inch smaller than the diameter of the rivet and then reamed to full size in accordance with the following provisions unless otherwise specified or authorized. For shop connections rivet holes may be drilled full size if the component parts to be riveted are welded, bolted or clamped together before drilling of rivet holes. For field connections the holes required to be subpunched or subdrilled shall be reamed in the shop if the work is assembled and matchmarked in the shop. For field connections not assembled in the shop the holes required to be subpunched or subdrilled shall be reamed in the field after the work has been assembled and bolted together.

(1) Punched Holes - Punching shall be accurate. The diameter of

the punch shall be not more than 1/16 inch greater than the diameter of the rivet. The diameter of the die opening shall not be more than 1/16 inch greater than the diameter of the punch. Holes shall be clean cut without torn or ragged edges.

(2) Reamed and Drilled Holes - Reaming and final drilling shall be done with the component parts of the member assembled and firmly fastened together. Drilling shall be done with twist drills. Reaming shall be done with short taper reamers having not less than four flutes. Reamed holes shall be made smooth by the reamer touching the entire circumference of the hole. Outside burrs on reamed holes shall be removed to the extent of making a 1/16 inch chamfer.

(3) Accuracy of Punched and Drilled Holes - The accuracy of holes punched or drilled full size shall be such that for assembled components with a group of contiguous holes in the same plane 75 percent of the holes shall admit a rod equal to the diameter of the cold rivet at right angles to the plane of the connection. The accuracy of holes required to be reamed or drilled after assembly shall be such that any group of contiguous holes in the same plane shall show no offset greater than 1/32 inch between adjacent thicknesses of metal. Drifting to enlarge holes will not be allowed. Poor matching of holes will be cause for rejection. Reaming to a larger diameter for the next standard size rivet will be allowed for slight mismatching.

b. Driving Rivets - Components to be riveted shall have all parts well pinned and firmly drawn together with bolts before riveting is commenced. Rivets shall be heated uniformly to a light cherry red color at a temperature not over 1950 degrees F in a gas, oil or electric furnace constructed so that it can be adjusted to the proper temperature except that an approved coal or coke furnace may be used for heating field rivets. Rivets shall not be driven after their temperature falls below 1000 degrees F. When heated and ready for driving rivets shall be free from slag, scale and adhesive materials. Rivets shall be hot driven with pressure tools. Driven rivets shall completely fill the holes. Rivet heads shall be neatly formed with dies of approved shape and shall be full size, concentric with the rivet hole and in full contact with the member. Loose, burned, badly formed or otherwise defective rivets shall be removed and replaced with care to avoid damage to adjacent metal. Recupping or caulking will not be permitted. Countersunk rivet heads shall be chipped or ground flush with the surface of the plate unless otherwise specified or authorized. Field rivets shall not be painted until they have been inspected and accepted.

2.2.4.2 Riveted Aluminum Connections

Punching, drilling, reaming and riveting for riveted aluminum connections shall conform to the requirements of AA SAS-30, Section 6.

2.2.5 Machine Work

Tolerances, allowances and gauges for metal fits between plain, non-threaded, cylindrical parts shall conform to ASME B4.1 for the class of fit shown or required unless otherwise shown on approved detail drawings. Where fits are not shown they shall be suitable as approved. Tolerances for machine-finished surfaces designated by non-decimal dimensions shall be

within 1/64 inch. Sufficient machining stock shall be allowed on placing pads to ensure true surfaces of solid material. Finished contact or bearing surfaces shall be true and exact to secure full contact. Journal surfaces shall be polished and all surfaces shall be finished with sufficient smoothness and accuracy to ensure proper operation when assembled. Parts entering any machine shall be accurately machined and all like parts shall be interchangeable except that parts assembled together for drilling or reaming of holes or machining will not be required to be interchangeable with like parts. All drilled holes bolts shall be accurately located.

2.2.5.1 Finished Surfaces

Surface finishes indicated or specified shall be in accordance with ASME B46.1. Values of required roughness heights are arithmetical average deviations expressed in microinches. These values are maximum. Lesser degrees will be satisfactory unless otherwise indicated. Compliance with surface requirements shall be determined by sense of feel and visual inspection of the work compared to Roughness Comparison Specimens in accordance with the provisions of ASME B46.1. Values of roughness width and waviness height shall be consistent with the general type of finish specified by roughness height. Where the finish is not indicated or specified it shall be that which is most suitable for the particular surface, provide the class of fit required and be indicated on the detail drawings by a symbol which conforms to ASME B46.1 when machine finishing is provided. Flaws such as scratches, ridges, holes, peaks, cracks or checks which will make the part unsuitable for the intended use will be cause for rejection.

2.2.5.2 Unfinished Surfaces

All work shall be laid out to secure proper matching of adjoining unfinished surfaces unless otherwise directed. Where there is a large discrepancy between adjoining unfinished surfaces they shall be chipped and ground smooth or machined to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts shall be filled in an approved manner.

2.2.6 Miscellaneous Provisions

2.2.6.1 Metallic Coatings

a. Zinc Coatings - Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123. Where zinc coatings are destroyed by cutting, welding or other causes the affected areas shall be regalvanized. Coatings 2 ounces or heavier shall be regalvanized with a suitable low-melting zinc base alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating. Coatings less than 2 ounces shall be repaired in accordance with ASTM A 780.

2.2.7 Shop Assembly

Each machinery and structural unit furnished shall be assembled in the shop to determine the correctness of the fabrication and matching of the component parts unless otherwise specified. Tolerances shall not exceed

those shown. Each unit assembled shall be closely checked to ensure that all necessary clearances have been provided and that binding does not occur in any moving part. Assembly in the shop shall be in the same position as final installation in the field unless otherwise specified. Assembly and disassembly work shall be performed in the presence of the Contracting Officer unless waived in writing. Errors or defects disclosed shall be immediately remedied by the Contractor without cost to the Government. Before disassembly for shipment each piece of a machinery or structural unit shall be match-marked to facilitate erection in the field. The location of match-marks shall be indicated by circling with a ring of white paint after the shop coat of paint has been applied or as otherwise directed.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

The Contractor shall have required material tests and analyses performed and certified by an approved laboratory to demonstrate that materials are in conformity with the specifications. These tests and analyses shall be performed and certified at the Contractor's expense. Tests, inspections, and verifications shall conform to the requirements of the particular sections of these specifications for the respective items of work unless otherwise specified or authorized. Tests shall be conducted in the presence of the Contracting Officer if so required. The Contractor shall furnish specimens and samples for additional independent tests and analyses upon request by the Contracting Officer. Specimens and samples shall be properly labeled and prepared for shipment.

2.3.1 Nondestructive Testing

When doubt exists as to the soundness of any material part such part may be subjected to any form of nondestructive testing determined by the Contracting Officer. This may include ultrasonic, magnaflux, dye penetrant, x-ray, gamma ray or any other test that will thoroughly investigate the part in question. The cost of such investigation will be borne by the Government. Any defects will be cause for rejection and rejected parts shall be replaced and retested at the Contractor's expense.

2.3.2 Tests of Machinery and Structural Units

The details for tests of machinery and structural units shall conform to the requirements of the particular sections of these specifications covering these items. Each complete machinery and structural unit shall be assembled and tested in the shop in the presence of the Contracting Officer unless otherwise directed. Waiving of tests will not relieve the Contractor of responsibility for any fault in operation, workmanship or material that occurs before the completion of the contract or guarantee. After being installed at the site each complete machinery or structural unit shall be operated through a sufficient number of complete cycles to demonstrate to the satisfaction of the Contracting Officer that it meets the specified operational requirements in all respects.

2.3.3 Inspection of Structural Steel Welding

The Contractor shall maintain an approved inspection system and perform required inspections in accordance with Contract Clause CONTRACTOR INSPECTION SYSTEM. Welding shall be subject to inspection to determine conformance with the requirements of AWS D1.1, the approved welding procedures and provisions stated in other sections of these specifications. Nondestructive examination of designated welds will be required.

Supplemental examination of any joint or coupon cut from any location in any joint may be required.

2.3.3.1 Visual Examination

All visual examination of completed welds shall be cleaned and carefully examined for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.1, Section 3 and Section 9, Part D.

2.3.3.2 Nondestructive Examination

The nondestructive examination of shop and field welds shall be performed as designated or described in the sections of these specifications covering the particular items of work.

a. Testing Agency - The nondestructive examination of welds and the evaluation of examination tests as to the acceptability of the welds shall be performed by a testing agency adequately equipped and competent to perform such services or by the Contractor using suitable equipment and qualified personnel. In either case written approval of the examination procedures is required and the examination tests shall be made in the presence of the Contracting Officer. The evaluation of examination tests shall be subject to the approval and all records shall become the property of the Government.

b. Examination Procedures - Examination procedures shall conform to the following requirements.

(1) Ultrasonic Testing - Making, evaluating and reporting ultrasonic testing of welds shall conform to the requirements of AWS D1.1, Section 6, Part C. The ultrasonic equipment shall be capable of making a permanent record of the test indications. A record shall be made of each weld tested.

(2) Radiographic Testing - Making, evaluating and reporting radiographic testing of welds shall conform to the requirements of AWS D1.1, Section 6, Part B.

(3) Magnetic Particle Inspection - Magnetic particle inspection of welds shall conform to the applicable provisions of ASTM E 709.

(4) Dye Penetrant Inspection - Dye penetrant inspection of welds shall conform to the applicable provisions of ASTM E 165.

c. Acceptability of Welds - Welds shall be unacceptable if shown to have defects prohibited by AWS D1.1, Subsection 9.25 or possess any degree of incomplete fusion, inadequate penetration or undercutting.

2.3.3.3 Test Coupons

The Government reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive examination. Should tests of any two coupons cut from the work of any welder show strengths less than that specified for the base metal it will be considered evidence of negligence or incompetence and such welder shall be removed from the work. When coupons are removed from any part of a structure the members cut shall be repaired in a neat manner with

joints of the proper type to develop the full strength of the members. Repaired joints shall be peened as approved or directed to relieve residual stress. The expense for removing and testing coupons, repairing cut members and the nondestructive examination of repairs shall be borne by the Government or the Contractor in accordance with the Contract Clauses INSPECTION AND ACCEPTANCE.

2.3.3.4 Supplemental Examination

When the soundness of any weld is suspected of being deficient due to faulty welding or stresses that might occur during shipment or erection the Government reserves the right to perform nondestructive supplemental examinations before final acceptance. The cost of such inspection will be borne by the Government.

2.3.4 Structural Steel Welding Repairs

Defective welds in the structural steel welding repairs shall be repaired in accordance with AWS D1.1, Subsection 3.7. Defective weld metal shall be removed to sound metal by use of air carbon-arc or oxygen gouging. Oxygen gouging shall not be used on ASTM A 514/A 514M steel. The surfaces shall be thoroughly cleaned before welding. Welds that have been repaired shall be retested by the same methods used in the original inspection. Except for the repair of members cut to remove test coupons and found to have acceptable welds costs of repairs and retesting shall be borne by the Contractor.

PART 3 EXECUTION

3.1 INSTALLATION

All parts to be installed shall be thoroughly cleaned. Packing compounds, rust, dirt, grit and other foreign matter shall be removed. Holes and grooves for lubrication shall be cleaned. Enclosed chambers or passages shall be examined to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Disassembly, cleaning and lubrication will not be required except where necessary to place the assembly in a clean and properly lubricated condition. Pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts shall not be used for assembling and tightening parts. Bolts and screws shall be tightened firmly and uniformly but care shall be taken not to overstress the threads. When a half nut is used for locking a full nut the half nut shall be placed first and followed by the full nut. Threads of all bolts except high strength bolts, nuts and screws shall be lubricated with an approved lubricant before assembly. Threads of corrosion-resisting steel bolts and nuts shall be coated with an approved antigalling compound. Driving and drifting bolts or keys will not be permitted.

3.1.1 Alignment and Setting

Each machinery or structural unit shall be accurately aligned by the use of steel shims or other approved methods so that no binding in any moving parts or distortion of any member occurs before it is fastened in place. The alignment of all parts with respect to each other shall be true within the respective tolerances required. Machines shall be set true to the elevations shown.

3.1.2 Blocking and Wedges

All blocking and wedges used during installation for the support of parts to be grouted in foundations shall be removed before final grouting unless otherwise directed. Blocking and wedges left in the foundations with approval shall be of steel or iron.

3.2 PROTECTION OF FINISHED WORK

3.2.1 Machined Surfaces

Machined surfaces shall be thoroughly cleaned of foreign matter. All finished surfaces shall be protected by suitable means. Unassembled pins and bolts shall be oiled and wrapped with moisture resistant paper or protected by other approved means. Finished surfaces of ferrous metals to be in bolted contact shall be washed with an approved rust inhibitor and coated with an approved rust resisting compound for temporary protection during fabrication, shipping and storage periods. Finished surfaces of metals which shall be exposed after installation except corrosion resisting steel or nonferrous metals shall be painted.

3.2.2 Aluminum

Aluminum that shall be in contact with grout or concrete shall be protected from galvanic or corrosive action by being given a coat of zinc-chromate primer and a coat of aluminum paint. Aluminum in contact with structural steel shall be protected against galvanic or corrosive action by being given a coat of zinc-chromate primer and a coat of aluminum paint. The zinc-chromate primer shall conform to SAE AMS 3110. The aluminum paint shall consist of a aluminum paste conforming to ASTM D 962, spar varnish conforming to SAE AMS 3132 and thinner compatible with the varnish. The aluminum paint shall be field mixed in proportion of 2 pounds of paste, not more than one gallon of spar varnish and not more than one pint of thinner.

3.3 TESTS

3.3.1 Workmanship

Workmanship shall be of the highest grade and in accordance with the best modern practices to conform with the specifications for the item of work being furnished.

3.3.2 Production Welding

Production welding shall conform to the requirements of AWS D1.1 or AWS D1.2 as applicable. Studs on which pre-production testing is to be performed shall be welded in the same general position as required on production items (flat, vertical, overhead or sloping). Test and production stud welding will be subjected to visual examination or inspection. If the reduction of the length of studs becomes less than normal as they are welded, welding shall be stopped immediately and not resumed until the cause has been corrected.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS
1.4 STORAGE
1.5 WELDING INSPECTOR

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL
2.1.1 Carbon Grade Steel
2.1.2 Structural Shapes for Use in Building Framing
2.2 STEEL PIPE
2.3 HIGH STRENGTH BOLTS AND NUTS
2.4 CARBON STEEL BOLTS AND NUTS
2.5 NUTS DIMENSIONAL STYLE
2.6 WASHERS
2.7 EXPANSION BOLTS AND ADHESIVE BOLTS
2.8 PAINT

PART 3 EXECUTION

3.1 FABRICATION
3.2 ERECTION
3.2.1 Structural Connections
3.2.2 Base Plates and Bearing Plates
3.2.3 Field Priming
3.2.4 Expansion Bolts and Adhesive Bolts
3.3 WELDING

-- End of Section Table of Contents --

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program
AISC ASD Manual	(1989) Manual of Steel Construction Allowable Stress Design
AISC ASD/LRFD Vol II	(1992) Manual of Steel Construction Vol II: Connections
AISC Design Guide No. 10	(1989) Erection Bracing of Low-Rise Structural Steel Frames
AISC LRFD Vol II	(1995) Manual of Steel Construction Load & Resistance Factor Design, Vol II: Structural Members, Specifications & Codes
AISC Pub No. S303	(2000) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 6/A 6M	(2000) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 53	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325M	(2000) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 490M	(2000) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 563M	(1997) Carbon and Alloy Steel Nuts (Metric)

ASTM A 572/A 572M	(2000) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 992/A 992M	(1998e1) Steel for Structural Shapes For Use in Building Framing
ASTM F 593	(1998) Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 844	(1998) Washers, Steel, Plain (Flat), Unhardened for General Use

ASME INTERNATIONAL (ASME)

ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1	(2000) Structural Welding Code - Steel

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)

1.2 GENERAL REQUIREMENTS

Structural steel fabrication and erection shall be performed by an organization experienced in structural steel work of equivalent magnitude. The Contractor shall be responsible for correctness of detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the contract drawings, shall be considered simple shear connections and shall be designed and detailed in accordance with pertinent provisions of AISC ASD Manual or AISC LRFD Vol II. Substitution of sections or modification of connection details will not be accepted unless approved by the Contracting Officer. AISC ASD Manual or AISC ASD/LRFD Vol II shall govern the work. Welding shall be in accordance with AWS D1.1. High-strength bolting shall be in accordance with AISC ASD Manual.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Structural Steel System; G, ED
Structural Connections; G, ED

Shop and erection details including members with their connections not shown on the contract drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4.

SD-03 Product Data

Erection; G, ED

Prior to erection, erection plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

Welding Procedure Specifications (WPS); G, ED

Prequalified WPS for information only.

SD-04 Samples

High Strength Bolts and Nuts; G, CO
Carbon Steel Bolts and Nuts; G, CO
Nuts Dimensional Style; G, CO
Washers; G, CO
Expansion Bolts and Adhesive Bolts; G, CO

Random samples of bolts, nuts, washers, and anchor bolts as delivered to the job site if requested, taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

SD-07 Certificates

Mill Test Reports; G, CO

Certified copies of mill test reports for structural steel, structural bolts, nuts, washers and other related structural steel items, including attesting that the structural steel furnished contains no less than 25 percent recycled scrap steel and meets the requirements specified, prior to the installation.

Welder Qualifications; G, CO

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.1.

Welding Inspector; G, ED

Welding Inspector qualifications.

Fabrication; G, ED

A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category.

1.4 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

1.5 WELDING INSPECTOR

Welding Inspector qualifications shall be in accordance with AWS D1.1

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

2.1.1 Carbon Grade Steel

Carbon grade steel shall conform to ASTM A 36/A 36M, unless otherwise noted on drawings. All carbon grade steel shall be galvanized unless noted on drawings. Where Grade 50 steel is used, carbon grade steel shall conform to ASTM A 572/A 572M.

2.1.2 Structural Shapes for Use in Building Framing

Wide flange shapes in accordance with ASTM A 992/A 992M shall be used where indicated on the drawings.

2.2 STEEL PIPE

Steel pipe shall conform to ASTM A 53, Grade B.

2.3 HIGH STRENGTH BOLTS AND NUTS

High strength bolts shall conform to ASTM A 325M, Type 1 with carbon steel nuts conforming to ASTM A 563M, Grade C or ASTM A 325M, Type 3 with carbon steel nuts conforming to ASTM A 563M, Grade C3.

2.4 CARBON STEEL BOLTS AND NUTS

Carbon steel bolts shall conform to ASTM A 307, Grade A with carbon steel nuts conforming to ASTM A 563M, Grade A.

2.5 NUTS DIMENSIONAL STYLE

Carbon steel nuts shall be Heavy Hex style when used with ASTM A 307 bolts or Heavy Hex style when used with ASTM A 325M or ASTM A 490M bolts.

2.6 WASHERS

Plain washers shall conform to ASTM F 844.

2.7 EXPANSION BOLTS AND ADHESIVE BOLTS

Material: ASTM F 593 stainless steel, Type 304 or 316. Provide Type 316 unless noted otherwise. Provide minimum edge distance cover and spacing as recommended by manufacturer, or as indicated on drawings whichever is larger. Depth of embedment: minimum embedment as recommended by manufacturer or 9 diameters of bolt, whichever is larger. Notify Contracting Officer if required depth of embedment cannot be achieved at a particular bolt location. Follow manufacturer's recommendations for installation and torque.

Submit manufacturer's load test data to verify at least the bolt capacities at the following embedment depths: (Data must be based on actual tests performed in unreinforced mass concrete of not more than 4000

psi compressive strength. Capacity must be at a concrete temperature of at least 130 degrees F.)

BOLT DIAMETER (IN)	MINIMUM EMBEDMENT (IN)	MINIMUM ULTIMATE TENSION CAPACITY (KIP)
1/2	4-1/2	8.1
5/8	5-5/8	11.4
3/4	6-3/4	15.4
7/8	7-7/8	20.1
1	9	24.7
1-1/4	11-1/4	34.3

2.8 PAINT

Paint shall conform to SSPC Paint 25.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC ASD Manual. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with endorsement "P" of AISC FCD and primed with the specified paint.

3.2 ERECTION

a: Erection of structural steel, except as indicated in item b. below, shall be in accordance with the applicable provisions of AISC ASD Manual. Erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the state in which the project is located.

b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), the erection plan shall conform to AISC Pub No. S303 and the structure shall be erected in accordance withAISC Design Guide No. 10.

3.2.1 Structural Connections

Bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work. Field welded structural connections shall be completed before load is applied.

3.2.2 Base Plates and Bearing Plates

Column base plates for columns and bearing plates for beams, girders, and similar members shall be provided. Base plates and bearing plates shall be provided with full bearing after the supported members have been plumbed and properly positioned, but prior to placing superimposed loads. Separate setting plates under column base plates will not be permitted. The area

under the plate shall be packed solidly with damp-pack bedding mortar, except where nonshrink grout is indicated on the drawings. Damp-pack bedding mortar and grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.2.3 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

3.2.4 Expansion Bolts and Adhesive Bolts

Install in strict accordance with manufacturer's instructions for hole size, hole cleaning, installation, torque requirements substrate temperature and curing. Use only carbide-tipped drilling equipment.

3.3 WELDING

The Contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05210A

STEEL JOISTS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DESCRIPTION
1.4 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 OPEN WEB STEEL JOISTS (NOT USED)
2.2 LONGSPAN STEEL JOISTS
2.3 JOIST GIRDERS (NOT USED)
2.4 ACCESSORIES AND FITTINGS
2.5 SHOP PAINTING

PART 3 EXECUTION

3.1 ERECTION
3.2 BEARING PLATES

-- End of Section Table of Contents --

SECTION 05210A

STEEL JOISTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

STEEL JOIST INSTITUTE (SJI)

SJI Specs & Tables	(1994) Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Steel Joists; G, ED

Detail drawings shall include fabrication and erection details, specifications for shop painting, and identification markings of joists.

SD-07 Certificates

Steel Joists

Certificates stating that the steel joists have been designed and manufactured in accordance with SJI Specs & Tables. Complete engineering design computations may be submitted in lieu of the certification.

1.3 DESCRIPTION

Steel joists are designated on the drawings in accordance with the standard designations of the Steel Joist Institute. Joists of other standard designations or joists with properties other than those shown may be substituted for the joists designated provided the structural properties are equal to or greater than those of the joists shown and provided all other specified requirements are met.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition and stored off the ground in a well drained location, protected from damage, and easily accessible for inspection and handling.

PART 2 PRODUCTS

2.1 OPEN WEB STEEL JOISTS (NOT USED)

2.2 LONGSPAN STEEL JOISTS

Longspan steel joists shall conform to SJI Specs & Tables, LH-Series. Joists designated LH shall be designed to support the loads given in the applicable standard load tables of SJI Specs & Tables.

2.3 JOIST GIRDERS (NOT USED)

2.4 ACCESSORIES AND FITTINGS

Accessories and fittings, including end supports and bridging, shall be in accordance with the standard specifications under which the members were designed.

2.5 SHOP PAINTING

Joists and accessories shall be shop painted with a rust-inhibiting primer paint.

PART 3 EXECUTION

3.1 ERECTION

Installation of joists shall be in accordance with the standard specification under which the member was produced. Joists shall be handled in a manner to avoid damage. Damaged joists shall be removed from the site, except when field repair is approved and such repairs are satisfactorily made in accordance with the manufacturer's recommendations. Joists shall be accurately set, and end anchorage shall be in accordance with the standard specification under which the joists were produced. Joist bridging and anchoring shall be secured in place prior to the application of any construction loads. Any temporary loads shall be distributed so that the carrying capacity of any joist is not exceeded. Loads shall not be applied to bridging during construction or in the completed work. Abraded, corroded, and field welded areas shall be cleaned and touched up with the same type of paint used in the shop painting.

3.2 BEARING PLATES

Bearing plates shall be provided with full bearing after the supporting members have been plumbed and properly positioned, but prior to placing superimposed loads. The area under the plate shall be damp-packed solidly with bedding mortar, except where non-shrink grout is indicated on the drawings. Bedding mortar and non-shrink grout shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05300

STEEL DECKING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 DECK UNITS
2.1.1 Roof Deck
2.1.2 Shear Connectors
2.2 TOUCH-UP PAINT
2.3 ADJUSTING PLATES
2.4 CLOSURE PLATES
2.4.1 Closure Plates for Roof Deck
2.4.1.1 Sheet Metal
2.5 ACCESSORIES

PART 3 EXECUTION

3.1 ERECTION
3.2 ATTACHMENTS
3.3 HOLES AND OPENINGS
3.4 PREPARATION OF FIRE-PROOFED SURFACES

-- End of Section Table of Contents --

SECTION 05300

STEEL DECKING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC ASD Spec	(1989) Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 108	(1999) Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 611	(1997) Structural Steel (SS), Sheet, Carbon, Cold-Rolled
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel
AWS D1.3	(1998) Structural Welding Code - Sheet Steel

STEEL DECK INSTITUTE (SDI)

SDI Diaphram Mnl	(1987; Amended 1991) Diaphragm Design Manual
SDI Pub No 29	(1995) Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the

Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Deck Units; G, ED
Accessories; G, ED
Attachments; G, ED
Holes and Openings; G, ED

Drawings shall include type, configuration, structural properties, location, and necessary details of deck units, accessories, and supporting members; size and location of holes to be cut and reinforcement to be provided; location and sequence of welded or fastener connections; and the manufacturer's erection instructions.

SD-03 Product Data

Deck Units; G, ED

Design computations for the structural properties of the deck units or SDI certification that the units are designed in accordance with SDI specifications.

Attachments; G, ED

Prior to welding operations, copies of qualified procedures and lists of names and identification symbols of qualified welders and welding operators.

SD-04 Samples

Deck Units; G, ED
Accessories; G, ED

A 2 sq. ft. sample of the decking material to be used, along with a sample of each of the accessories used. A sample of acoustical material to be used shall be included.

SD-07 Certificates

Deck Units; G, ED
Attachments; G, ED

Manufacturer's certificates attesting that the decking material meets the specified requirements. Manufacturer's certificate attesting that the operators are authorized to use the low-velocity piston tool.

1.3 DELIVERY, STORAGE, AND HANDLING

Deck units shall be delivered to the site in a dry and undamaged condition, stored off the ground with one end elevated, and stored under a weathertight covering permitting good air circulation. Finish of deck units shall be maintained at all times by using touch-up paint whenever necessary to prevent the formation of rust.

PART 2 PRODUCTS

2.1 DECK UNITS

Deck units shall conform to SDI Pub No 29. Panels of maximum possible lengths shall be used to minimize end laps. Deck units shall be fabricated in lengths to span 3 or more supports with flush, telescoped, or nested 2 inchlaps at ends, and interlocking, or nested side laps, unless otherwise indicated. Deck with cross-sectional configuration differing from the units indicated may be used, provided that the properties of the proposed units, determined in accordance with AISI Cold-Formed Mnl, are equal to or greater than the properties of the units indicated and that the material will fit the space provided without requiring revisions to adjacent materials or systems.

2.1.1 Roof Deck

Deck to receive concrete as a filler shall conform to ASTM A 653/A 653M or ASTM A 611. Deck shall be fabricated of 0.034 inch design thickness or thicker steel and shall be galvanized.

2.1.2 Shear Connectors

Shear connectors shall be headed stud type, ASTM A 108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC ASD Spec.

2.2 TOUCH-UP PAINT

Touch-up paint for galvanized units shall be an approved galvanizing repair paint. Finish of deck units and accessories shall be maintained by using touch-up paint whenever necessary to prevent the formation of rust.

2.3 ADJUSTING PLATES

Adjusting plates or segments of deck units shall be provided in locations too narrow to accommodate full-size units. As far as practical, the plates shall be the same thickness and configuration as the deck units.

2.4 CLOSURE PLATES

2.4.1 Closure Plates for Roof Deck

The concrete shall be supported and retained at each level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Metal closures shall be provided for all openings in steel deck 1/4 inch and over.

2.4.1.1 Sheet Metal

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.5 ACCESSORIES

The manufacturer's standard accessories shall be furnished as necessary to complete the deck installation. Metal accessories shall be of the same material as the deck and have minimum design thickness as follows: saddles, 0.0474 inch; cant strip, 0.0295 inch; other metal accessories, 0.0358 inch; unless otherwise indicated. Accessories shall include but not be limited

to saddles, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

PART 3 EXECUTION

3.1 ERECTION

Erection of deck and accessories shall be in accordance with SDI Pub No 29 or SDI Diaphram Mnl and the approved detail drawings. Damaged deck and accessories including material which is permanently stained or contaminated, with burned holes or deformed shall not be installed. The deck units shall be placed on secure supports, properly adjusted, and aligned at right angles to supports before being permanently secured in place. The deck shall not be filled with concrete, used for storage or as a working platform until the units have been secured in position. Loads shall be distributed by appropriate means to prevent damage during construction and to the completed assembly. The maximum uniform distributed storage load shall not exceed the design live load. There shall be no loads suspended directly from the steel deck. Acoustical material shall be neatly fitted into the rib voids.

3.2 ATTACHMENTS

All fasteners shall be installed in accordance with the manufacturer's recommended procedure, except as otherwise specified. The deck units shall be welded with nominal 5/8 inch diameter puddle welds or fastened with screws, powder-actuated fasteners or pneumatically driven fasteners to supports as indicated on the design drawings and in accordance with requirements of SDI Pub No 29. All welding of steel deck shall be in accordance with AWS D1.3 using methods and electrodes as recommended by the manufacturer of the steel deck being used. Welds shall be made only by operators previously qualified by tests prescribed in AWS D1.3 to perform the type of work required. Welding washers shall not be used at the connections of the deck to supports. Welding washers shall not be used at sidelaps. Holes and similar defects will not be acceptable. Deck ends shall be lapped 2 inches. All partial or segments of deck units shall be attached to structural supports in accordance with Section 2.5 of SDI Diaphram Mnl. Powder-actuated fasteners shall be driven with a low-velocity piston tool by an operator authorized by the manufacturer of the piston tool. Pneumatically driven fasteners shall be driven with a low-velocity fastening tool and shall comply with the manufacturer's recommendations. Shear connectors shall be attached as shown and shall be welded as per AWS D1.1 through the steel deck to the steel member.

3.3 HOLES AND OPENINGS

All holes and openings required shall be coordinated with the drawings, specifications, and other trades. Holes and openings shall be drilled or cut, reinforced and framed as indicated on the drawings or described in the specifications and as required for rigidity and load capacity. Holes and openings less than 6 inches across require no reinforcement. Holes and openings 6 to 12 inches across shall be reinforced by 0.0474 inch thick steel sheet at least 12 inches wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inches on center. Holes and openings larger than 12 inches shall be reinforced by steel angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Steel angles shall be installed perpendicular to the deck ribs and shall be fastened to the angles perpendicular to the steel joists.

3.4 PREPARATION OF FIRE-PROOFED SURFACES

Deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, shall be galvanized and shall be free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Any required cleaning shall be done prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 GENERAL REQUIREMENTS
1.4 DISSIMILAR MATERIALS
1.5 WORKMANSHIP
1.6 ANCHORAGE
1.7 ALUMINUM FINISHES
1.8 SHOP PAINTING

PART 2 PRODUCTS

2.1 PIPE GUARDS
2.2 STUDS
2.3 GRATING
2.4 STEEL BARS AND RODS FOR TRASH RACKS, LADDERS AND GRAB BARS
2.5 STRUCTURAL STEEL
2.6 BOLTS, NUTS, WASHERS AND OTHER FASTENERS
2.6.1 High Strength bolts, nuts, and washers
2.6.2 Bolts, Nut and Washers (other than high-strength)
2.6.2.1 Bolts and Nuts
2.6.2.2 Stainless Steel Nuts
2.6.2.3 Stainless Steel Bolts
2.6.2.4 Stainless Steel Anchor Bolts
2.6.2.5 Washers
2.7 GRATING HINGES
2.8 HANDRAILS
2.8.1 Steel Handrails, Including Carbon Steel Inserts
2.9 MANHOLE STEPS AND COVERS
2.10 ALUMINUM
2.11 MISCELLANEOUS
2.12 STOPLOG GROOVES AND SILLS
2.13 FALL RESTRAINT SYSTEM
2.14 STEEL LADDERS
2.15 GATE STEM COVER PIPE AND CAP
2.16 ALUMINUM HATCH
2.17 STOPLOG HOOKS

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS
3.2 INSTALLATION OF GRATING
3.3 INSTALLATION OF PIPE GUARDS
3.4 ATTACHMENT OF HANDRAILS
3.4.1 Installation of Steel Handrails

3.5 INSTALLATION OF MANHOLE STEPS AND COVERS
3.6 ANCHOR BOLTS AND EXPANSION ANCHORS
3.7 INSTALLATION OF FALL RESTRAINT SYSTEM
3.8 INSTALLATION OF ALUMINUM HATCH
3.9 FABRICATION AND WELDING
3.10 ZINC COATINGS

-- End of Section Table of Contents --

SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI MBG 531	(1993) Metal Bar Grating Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 48	(2000) Gray Iron Castings
ASTM A 53	(2001) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 108	(1999) Steel Bars, Carbon, Cold-Finished, Standard Quality
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 385	(1980) Providing High-Quality Zinc Coatings (Hot Dip)
ASTM A 536	(1984; R 99) Ductile Iron Castings
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 786	(2000) Rolled Steel Floor Plates
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

ASTM B 209	(1992; R A) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 211	(1992; R A) Aluminum and Aluminum-Alloy Bar, Rod and Wire
ASTM B 241	(1992; R A) Aluminum and Aluminum Alloy-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM F 593	(1995) Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	(1991) Stainless Steel Nuts

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-344	(Rev B) Lacquer, Clear Gloss, Exterior, Interior

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531	(1994) Metal Bar Grating Manual
NAAMM MBG 532	(1994) Heavy Duty Metal Bar Grating Manual

US DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 20 CFR1910	OSHA Safety and Health Standard for General Industry

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Miscellaneous Metal Items; G, ED

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates.

SD-04 Samples

Miscellaneous Metal Items;

Samples shall be full size, taken from manufacturer's stock, and shall be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.4 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.5 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.6 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.7 ALUMINUM FINISHES

Unless otherwise specified, aluminum items shall have standard mill finish.

The thickness of the coating shall be not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF-45. Items to be anodized shall receive a polished satin finish. Aluminum surfaces to be in contact with plaster or concrete during construction shall be protected with a field coat conforming to CID A-A-344.

1.8 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

PART 2 PRODUCTS

2.1 PIPE GUARDS

Pipe guards shall be heavy duty steel pipe conforming to ASTM A 53, Type E or S, weight STD, black finish.

2.2 STUDS

Studs shall be of the length and diameter shown. Steel studs shall be in accordance with ASTM A 325. Stainless steel studs shall be in accordance with ASTM F 593.

2.3 GRATING

Aluminum grating shall be designed in accordance with ANSI MBG 531 for bar type floor gratings. Grating bars shall be of the size shown. The top surface of the bearing bars shall be serrated. Clips and bolts shall be stainless steel or galvanized. Ends and perimeter edges shall be banded. Openings through grating shall be reinforced to provide required load carrying capacity and banded.

Minimize the amount of field welding. Shop-assemble components into largest size possible commensurate with transportation and handling limitations. One-sided or other types of eccentric connections not indicated will not be permitted without prior approval.

2.4 STEEL BARS AND RODS FOR TRASH RACKS, LADDERS AND GRAB BARS

Steel bars and rods for trash racks, ladders and grab bars shall conform to ASTM A 108, Grades 1010 through 1020, unless indicated otherwise. Steel items shall be galvanized after fabrication in accordance with PARAGRAPH: ZINC COATINGS.

2.5 STRUCTURAL STEEL

Structural steel plates, channels, beams and columns, and angles shall be in accordance with ASTM A 36. Steel tubes shall conform to ASTM A 500 Grade B. Structural steel items shall be galvanized after fabrication in accordance with PARAGRAPH: ZINC COATINGS.

2.6 BOLTS, NUTS, WASHERS AND OTHER FASTENERS

Bolts, nuts, washers and other fasteners shall be of the material, grade, type, class, style and finish indicated; or best suited for the intended use as determined by the Contracting Officer.

2.6.1 High Strength bolts, nuts, and washers

Shall conform to ASTM A 325.

2.6.2 Bolts, Nut and Washers (other than high-strength)

2.6.2.1 Bolts and Nuts

Shall conform to ASTM A 307, Grade A.

2.6.2.2 Stainless Steel Nuts

Shall conform to ASTM F 594.

2.6.2.3 Stainless Steel Bolts

Shall conform to ASTM F 593.

2.6.2.4 Stainless Steel Anchor Bolts

Shall conform to ASTM F 593.

2.6.2.5 Washers

Plain washers shall conform to ANSI B18.22.1, Type B.
Lock washers shall conform to ANSI B18.21.1.

2.7 GRATING HINGES

Grating hinges shall be of the size as shown and shall be full surface, not swaged, with fixed pin. Hinges and pins shall be constructed of ASTM A 276, Type 316 stainless steel.

2.8 HANDRAILS

Handrails shall be fabricated as shown. Pipe sleeve anchors shall have a drain hole on 2 sides. Care shall be taken to ensure that the drain holes remain open after surface coatings have been applied.

2.8.1 Steel Handrails, Including Carbon Steel Inserts

Steel handrails, including inserts in concrete, shall be steel pipe conforming to ASTM A 53, Type E or S, Grade A or B. Steel railings shall be as shown. Railings shall be hot-dip galvanized after fabrication in accordance with ASTM A 123 and ASTM A 385. Pipe collars shall be galvanized steel. All fastening hardware shall be galvanized in accordance with ASTM A 123 and ASTM A 385.

a. Joint posts, rail, and corners shall be fabricated by one of the following methods:

(1) Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal recessed-head setscrews.

(2) Mitered and welded joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

b. Removable sections, toe-boards, and brackets shall be provided as indicated.

2.9 MANHOLE STEPS AND COVERS

Manhole steps shall conform to ASTM C 478 and be made of polypropylene-coated steel. Manhole covers shall conform to ASTM A 48, Class 35. The type used shall be grey cast iron, slab type, with single lid, double-hinges and lifting handle. The installed cover shall be capable of withstanding 1 ton concentrated load. The cover shall come complete with frame, lid, required accessories, have manufacturer's shop finish and have shop-coated assembly.

2.10 ALUMINUM

Aluminum tubes and pipes shall conform to ASTM B 241, Alloy 6061, Temper T6.

Aluminum plates shall conform to ASTM B 209, Alloy 6061, Temper T6.

Aluminum bars and rods shall conform to ASTM B 211, Alloy 6061, Temper T6.

2.11 MISCELLANEOUS

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

2.12 STOPLOG GROOVES AND SILLS

Stoplog grooves and sills shall be fabricated to the shape and size indicated on the drawings, and in accordance with SECTION 05615 STOPLOGS.

2.13 FALL RESTRAINT SYSTEM

The fall restraint system shall contain 1 construction vest-style full body harness with tongue buckle leg straps. The system shall contain 1 Ultra-Lok self-retracting life line. The restraint system shall be provided with 1 self-locking snap hook for connection of self-retracting life line to a tie off adapter. Connectors (hooks, carabiniers, D rings, etc) must support a minimum load of 5,000 pounds. Ensure connecting hooks and anchorage are compatible. Anchorages selected for personal restraint system shall be capable of sustaining static loads applied in the directions permitted by personal fall restraint system of at least 5,000 pounds. When more than 1 personal fall restraint system is attached to an anchorage, the anchorage strengths set forth must be multiplied by the number of personal fall restraint systems attached to the anchorage. The fall restraint system shall conform with OSHA 20 CFR1910 and all applicable OSHA requirements.

2.14 STEEL LADDERS

Steel ladders shall be fixed-rail metal ladders as shown. Ladders, grab bars and accessories shall be fabricated with steel, and galvanized after fabrication in accordance with PARAGRAPH: ZINC COATINGS. Fabrication of ladders shall be as indicated on the drawings. Splices in side bars shall be made using full penetration welds and shall have a smooth transition between connecting ends without sharp or extensive projections. All welds shall be ground smooth. Ladders and grab bars shall be anchored to supporting structure as shown.

2.15 GATE STEM COVER PIPE AND CAP

Gate stem cover pipe and cap shall be schedule 40 galvanized pipe in accordance with ASTM A 53. Gate stem cover pipe and cap shall be fabricated and installed complete as shown and as specified herein, and as required for proper installation as per the gate manufacturer's recommendations.

2.16 ALUMINUM HATCH

Aluminum hatch doors shall have 1/4 inch diamond plate, reinforced with aluminum stiffeners as needed. The hatch door shall open to 90 degrees and lock automatically in position. The hatch shall withstand 150 psf and be equipped with lock and removable handles. The frame shall be made of 1/4 inch extruded aluminum with built-in neoprene cushion and strap anchors. The finish shall be a mill finish, with bituminous coating applied to portions of exterior of frame in contact with concrete.

2.17 STOPLOG HOOKS

Stoplog hooks shall be fabricated to the dimensions shown and shall be made of aluminum.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified.

3.2 INSTALLATION OF GRATING

Attach grating to end and intermediate supports with grating saddle clips and bolts as shown. Maximum spacing shall be at 2 feet on center with a minimum of 2 per side. Attach individual units of grating together with clips at 2 feet on center maximum with a minimum of 2 clips per side.

3.3 INSTALLATION OF PIPE GUARDS

Pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete specified in SECTION 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.4 ATTACHMENT OF HANDRAILS

Toeboards and brackets shall be installed where indicated. Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.4.1 Installation of Steel Handrails

Installation shall be by means of pipe sleeves secured to base plates bolted to stringers or structural steel framework. Pipe sleeves shall be provided with drainage holes to prevent collection of water inside the sleeve. The Contractor shall ensure that drainage holes are not plugged by galvanizing or debris. Handrail shall be installed with all posts vertical.

3.5 INSTALLATION OF MANHOLE STEPS AND COVERS

Install manhole steps and cover in strict accordance to manufacturer's specifications. The unit shall be operable upon completion of installation. Locate manhole steps and covers as shown on drawings.

3.6 ANCHOR BOLTS AND EXPANSION ANCHORS

Anchor bolts and expansion anchors shall be installed in locations shown in accordance with the manufacturer's written recommendations and as approved by the Contracting Officer.

3.7 INSTALLATION OF FALL RESTRAINT SYSTEM

Installation shall be in accordance with manufacturer's recommendations. Where applicable, install in a workmanship manner, plumb and level as required. Install supports and fastening mechanism as needed to provide secure and sturdy system. All welds and bolted connections shall be clear and all sharp and rough areas removed. Field welding of galvanized materials shall be recoated with approved galvanized materials.

3.8 INSTALLATION OF ALUMINUM HATCH

Fasten hatch securely in place. Completely assemble hatch with inside-outside operable handles, lifting and hold-open mechanism, hinges, and necessary hardware for complete operation. The unit shall be operable upon completion of installation. Locate hatch where shown on drawings.

3.9 FABRICATION AND WELDING

Fabrication and welding shall be in accordance with SECTION 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS

3.10 ZINC COATINGS

Zinc coatings shall be applied in a manner and of thickness and quality in accordance with ASTM A 123. Galvanizing shall be after fabrication to the maximum extent practicable. Where zinc coating is damaged by cutting, welding, transporting, assembling, installing, or other cause, the affected areas shall be regalvanized with suitable low-melting zinc based alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05615

STOPLOGS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALIFICATION OF WELDERS AND WELDING OPERATORS
1.4 DELIVERY, STORAGE AND HANDLING
1.4.1 Rubber Seals

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Metals
2.1.2 Rubber Seals
2.2 Manufactured Units
2.3 CLOSURE STRUCTURE STOPLOGS
2.3.1 Stoplogs
2.3.2 Stoplog Grooves and Sill
2.3.3 Materials
2.3.3.1 Seal Pads
2.3.3.2 Structural Steel
2.3.3.3 Structural Aluminum
2.3.3.4 Stainless Steel
2.3.3.5 Steel Threaded Rod
2.3.3.6 Stainless Steel Threaded Rod
2.3.3.7 Stop Tie-down Straps
2.3.3.8 Welded Shear Studs
2.3.3.9 Bolts
2.3.3.10 Nuts
2.3.3.11 Welds
2.4 FABRICATION
2.4.1 Detail Drawings
2.4.1.1 Fabrication Drawings
2.4.1.2 Shop Assembly Drawings
2.4.1.3 Delivery Drawings
2.4.1.4 Field Installation Drawings
2.4.2 Structural Fabrication
2.4.3 Welding
2.4.4 Bolted Connections
2.4.5 Machine Work
2.4.6 Miscellaneous Provisions
2.4.7 Fabrications
2.4.7.1 Stoplogs
2.4.7.2 Stoplog Guides, Grooves, and Sills
2.4.7.3 Miscellaneous Embedded Metals
2.4.8 Seal Assemblies
2.5 TESTS, INSPECTIONS, AND VERIFICATIONS

2.5.1 Testing of Rubber Seals

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Embedded Metals
3.2 PROTECTION OF FINISHED WORK
3.3 ACCEPTANCE TRIAL OPERATION

-- End of Section Table of Contents --

SECTION 05615

STOPLOGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	(2001) Carbon Structural Steel
ASTM A 276	(2000) Stainless Steel Bars and Shapes
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 449	(1993) Quenched and Tempered Steel Bolts and Studs
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 572	(1992b) High-Strength Low-Alloy Columbian-Vanadium Steel of Structural Quality
ASTM B 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 308	(1995a) Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM D 395	(1989; R 1994) Rubber Property - Compression Set
ASTM D 412	(1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 471	(1995) Rubber Property - Effect of Liquids
ASTM D 572	(1988; R 1994) Rubber - Deterioration by Heat and Oxygen
ASTM D 2240	(1997el) Rubber Property - Durometer Hardness
ASTM F 593	(1995) Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	(2002) Standard Specification for Stainless

Steel Nuts

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G, ED

Detail drawings shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-03 Product Data

Materials;

Materials orders, materials lists and materials shipping bills shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

Materials Disposition Records;

A system of identification which shows the disposition of specific lots of approved materials and fabricated items in the work shall be established and submitted before completion of the contract.

SD-06 Test Reports

Tests, Inspections, and Verifications;

Certified test reports for material tests shall be submitted with all materials delivered to the site.

SD-07 Certificates

Welding;

Schedules of welding procedures for structural steel and welding processes for aluminum shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals;

Submit O&M Manuals for stoplogs before completion of the contract.

1.3 QUALIFICATION OF WELDERS AND WELDING OPERATORS

Qualification of welders and welding operators shall conform to the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.4 DELIVERY, STORAGE AND HANDLING

Delivery, handling and storage of materials and fabricated items shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.4.1 Rubber Seals

Rubber seals shall be stored in a place which permits free circulation of air, maintains a temperature of 70 degrees F or less, and prevents the rubber from being exposed to the direct rays of the sun. Rubber seals shall be kept free of oils, grease, and other materials which would deteriorate the rubber. Rubber seals shall not be distorted during handling.

PART 2 PRODUCTS

2.1 MATERIALS

Materials orders, materials lists and materials shipping bills shall conform to the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.1.1 Metals

Structural steel, structural aluminum, stainless steel and other metal materials sections and standard articles shall be as shown and as specified herein and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.1.2 Rubber Seals

Rubber seals shall be fluorocarbon (Teflon) clad rubber seals of the mold type only, shall be compounded of natural rubber, synthetic polyisoprene, or a blend of both, and shall contain reinforcing carbon black, zinc oxide, accelerators, antioxidants, vulcanizing agents, and plasticizers. Physical characteristics of the seals shall meet the following requirements:

PHYSICAL TEST	TEST VALUE	TEST METHOD SPECIFICATION
Tensile Strength	2,500 psi (min.)	ASTM D 412
Elongation at Break	450% (min.)	ASTM D 412
300% Modulus	900 psi (min.)	ASTM D 412
Durometer Hardness (Shore Type A)	60 to 70	ASTM D 2240
*Water Absorption	5% by weight (max.)	ASTM D 471
Compression Set	30% (max.)	ASTM D 395
Tensile Strength (after aging 48 hrs)	803500f tensile strength (min.)	ASTM D 572

* The "Water Absorption" test shall be performed with distilled water. The

washed specimen shall be blotted dry with filter paper or other absorbent material and suspended by means of small glass rods in the oven at a temperature of 70 degrees plus/minus 2 degrees C for 22 plus/minus 1/4 hour. The specimen shall be removed, allowed to cool to room temperature in air, and weighed. The weight shall be recorded to the nearest 1 mg as W1 (W1 is defined in ASTM D 471). The immersion temperature shall be 70 degrees plus/minus 1 degree C and the duration of immersion shall be 166 hours.

a. Fabrication: Rubber seals shall have a fluorocarbon film vulcanized and bonded to the sealing surface of the bulb. The film shall be 0.060 inch thick Huntington Abrasion Resistant Fluorocarbon Film No. 4508, or equal, and shall have the following physical properties:

Tensile strength ..... 2,000 psi (min.)

Elongation ..... 250 percent (min.)

The outside surface of the bonded film shall be flush with the surface of the rubber seal and shall be free of adhering or bonded rubber. Strips and corner seals shall be molded in lengths suitable for obtaining the finish lengths shown and with sufficient excess length to provide test specimens for testing the adequacy of the adhesion bond between the film and bulb of the seal. At one end of each strip or corner seal to be tested, the fluorocarbon film shall be masked during bonding to prevent a bond for a length sufficient to hold the film securely during testing.

2.2 Manufactured Units

Bolts, nuts, and washers shall conform to the requirements specified.

Manufactured units shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3 CLOSURE STRUCTURE STOPLOGS

2.3.1 Stoplogs

Stoplogs shall be fabricated from aluminum tubes to the dimensions indicated on the drawings. Seal pads shall be bonded to the stoplogs as indicated on the drawings with an adhesive recommended by the manufacturer of the seal pad material and as approved and suited to the intended use. The pads shall also be attached with screws to the stoplogs as indicated on the drawings.

2.3.2 Stoplog Grooves and Sill

Extra care shall be taken in the fabrication and installation of the stoplog grooves and sills to ensure that leakage is kept to a minimum. If leakage is excessive and misalignment of the grooves and/or sills, or their componet parts, is a contributing factor to the leakage, the Contractor shall propose corrective measures and shall implement corrective measures at no additional cost to the Government. Stoplog Groove and end sill surfaces in contact with concrete shall be coated with a bonding agent equal to Sika Armatec 110.

2.3.3 Materials

Materials orders, materials lists and materials shipping bills shall conform to the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.3.1 Seal Pads

Seal pad material shall be fabricated from material having the same characteristics and material properties as one of the following products. The adhesive used to bond the material to the stoplog shall be recommended by the manufacturer and as submitted and approved. The following manufacturers are acceptable:

a. Custom Urethane Elasomers, Inc.: Compound PO-655.

b. Seals Unlimited, Inc.: Product 75A.

c. Wendt Productions, Inc.: Keelshield (smooth surface).

2.3.3.2 Structural Steel

All structural steel shall conform to ASTM A 572, Grade 50. All structural steel shall be galvanized after fabrication except stainless steel.

2.3.3.3 Structural Aluminum

Structural aluminum shall conform to ASTM B 221 and ASTM B 308,Alloy 6061, Temper T6.

2.3.3.4 Stainless Steel

Stainless steel stoplog frames and sills shall conform to ASTM A 276, Type 304 with a minimum yield strength equal to 45 ksi and a minimum ultimate strength equal to 90 ksi.

2.3.3.5 Steel Threaded Rod

All steel threaded rod shall conform to ASTM A 449 and galvanized after fabrication.

2.3.3.6 Stainless Steel Threaded Rod

All stainless steel threaded rod shall conform to ASTM A 276. The threaded rod shall be strain hardened Type 316 with a minimum yield strength equal to 75 ksi and a minimum ultimate strength equal to 95 ksi.

2.3.3.7 Stop Tie-down Straps

Stop tie-down straps shall be 2-piece, 2 inch wide polyester webbed, with straps with flat hook on each end. A rachet buckle shall be used for tightening. The minimum working load shall be 1000 pounds. The minimum length shall be 20 feet.

2.3.3.8 Welded Shear Studs

Welded shear studs shall be Type 304 Stainless Steel. Studs shall confrom to the requirements of ASTM F 593 and shall have a minimum yield strength equal to 45 ksi and a minimum ultimate strength equal to 90 ksi.

2.3.3.9 Bolts

All bolts shall conform to ASTM F 593.

2.3.3.10 Nuts

All nuts shall conform to ASTM F 594.

2.3.3.11 Welds

All welds shall have E70 electrodes. Refer to Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS for additional information.

2.4 FABRICATION

2.4.1 Detail Drawings

Detail drawings of stoplogs and appurtenant shop fabricated items, including fabrication drawings, shop assembly drawings, delivery drawings, and field installation drawings, shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.1.1 Fabrication Drawings

Fabrication drawings shall show complete details of materials, tolerances, connections, and proposed welding sequences which clearly differentiate shop welds and field welds.

2.4.1.2 Shop Assembly Drawings

Shop assembly drawings shall provide details for connecting the adjoining fabricated components in the shop to assure satisfactory field installation.

2.4.1.3 Delivery Drawings

Delivery drawings shall provide descriptions of methods of delivering components to the site, including details for supporting fabricated components during shipping to prevent distortion or other damages.

2.4.1.4 Field Installation Drawings

Field installation drawings shall provide a detailed description of the field installation procedures. The description shall include the location and method of support of installation and handling equipment; provisions to be taken to protect concrete and other work during installation; method of maintaining components in correct alignment; and methods for installing appurtenant items.

2.4.2 Structural Fabrication

Structural fabrication shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.3 Welding

Welding shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.4 Bolted Connections

Bolted connections shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.5 Machine Work

Machine work shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.6 Miscellaneous Provisions

Miscellaneous provisions for fabrication shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.7 Fabrications

2.4.7.1 Stoplogs

Stoplogs shall be fabricated of aluminum 37,000 psi tensile yield strength minimum Alloy 6061, Temper T6.

2.4.7.2 Stoplog Guides, Grooves, and Sills

Stoplog guides, grooves, and sills shall be fabricated of stainless steel conforming to ASTM A 276, Type 304, as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS. Stainless steel studs for stoplog guides, grooves and sills shall be in accordance with ASTM F 593.

2.4.7.3 Miscellaneous Embedded Metals

Corner protection angles, frames, base plates, and other embedded metal items required for complete installation shall conform to the details shown.

2.4.8 Seal Assemblies

Seal assemblies shall consist of rubber seals, spacer bars, and fasteners. Rubber seals shall be continuous over the full length. Seals shall be accurately fitted and drilled for proper installation. Bolt holes shall be drilled in the rubber seals by using prepared templates or the retainer bars as templates. Splices in seals shall be fully molded, develop a minimum tensile strength of 50 percent of the unspliced seal, and occur only at locations shown on fabrication drawings. All vulcanizing of splices shall be done in the shop. The vulcanized splices between molded corners and straight lengths shall be located as close to the corners as practicable. Splices shall be on a 45 degree bevel related to the "thickness" of the seal. The surfaces of finished splices shall be smooth and free of irregularities. Stainless steel retainer bars shall be field-spliced only where shown and machine-finished after splicing.

2.5 TESTS, INSPECTIONS, AND VERIFICATIONS

Tests, inspections, and verifications for materials shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.5.1 Testing of Rubber Seals

The fluorocarbon film of rubber seals shall be tested for adhesion bond in accordance with ASTM D 413 using either the machine method or the deadweight method. A 1 inch long piece of seal shall be cut from the end of the seal which has been masked and subjected to tension at an angle approximately 90 degrees to the rubber surface. There shall be no separation between the fluorocarbon film and the rubber when subjected to a load of 30 pounds per inch width.

Failure of any specimen to meet the requirements of the test used will be cause for rejection of the piece from which the test specimen was taken.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall conform to the requirements specified and in SECTION 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

3.1.1 Embedded Metals

Corner protection angles, frames, base plates, and other embedded metal items required for complete installation shall be accurately installed to the alignment and grade required to ensure accurate fitting and matching of components. Anchors for embedded metals shall be installed as shown. Items requiring two concrete pours for installation shall be attached to the embedded anchors after the initial pour, adjusted to the proper alignment, and concreted in place with the second pour.

3.2 PROTECTION OF FINISHED WORK

Protection of finished work shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

3.3 ACCEPTANCE TRIAL OPERATION

After completion of installation, the Contracting Officer will examine the stoplog installation for final acceptance. The individual components of the stoplog installation will be examined first to determine whether or not the workmanship conforms to the specification requirements. The Contractor will be required to place the stoplogs in the guides a sufficient number of times to demonstrate that the stoplogs fit properly and seat uniformly. Required repairs or replacements to correct defects, shall be made at no cost to the Government. The trial operation shall be repeated after defects are corrected.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 06 - WOODS & PLASTICS

SECTION 06100A

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 LUMBER AND SHEATHING
2.1.1 Grading and Marking
2.1.1.1 Lumber Products
2.1.1.2 Plywood and Other Products
2.1.2 Sizes
2.1.3 Treatment
2.1.3.1 Lumber and Timbers
2.1.3.2 Plywood
2.1.4 Moisture Content
2.1.5 Miscellaneous Wood Members
2.1.5.1 Nonstress Graded Members
2.1.5.2 Wood Bumpers (Not Used)
2.1.5.3 Sill Plates (Not Used)
2.1.5.4 Blocking and Nailers
2.2 ACCESSORIES AND NAILS
2.2.1 Anchor Bolts
2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws
2.2.3 Clip Angles
2.2.4 Expansion Shields
2.2.5 Joist Hangers (Not Used)
2.2.6 Metal Bridging
2.2.7 Nails and Staples
2.3 VAPOR RETARDER
2.4 AIR INFILTRATION BARRIER

PART 3 EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS
3.1.1 General
3.1.2 Blocking
3.1.3 Nailers and Nailing Strips

-- End of Section Table of Contents --

SECTION 06100A

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

AF&PA T01	(1991; Supple 1993; Addenda Apr 1997; Supple T02) National Design Specification for Wood Construction
AF&PA T11	(1988) Manual for Wood Frame Construction

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard
AHA A194.1	(1985) Cellulosic Fiber Board

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC TC Manual	(1994) Timber Construction Manual
AITC 109	(1990) Standard for Preservative Treatment of Structural Glued Laminated Timber
AITC 111	(1979) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection
AITC 190.1	(1992) Wood Products - Structural Glued Laminated Timber

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A208.1	(1999) Particleboard Mat Formed Woods

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	(2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM C 1136	(1995) Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C 1177/C 1177M	(1999) Glass Mat Gypsum Substrate for Use as Sheathing

ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM E 84	(2001) Surface Burning Characteristics of Building Materials
ASTM E 96	(2000) Water Vapor Transmission of Materials
ASTM E 154	(1988; R 1999) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM F 547	(1977; R 1995) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(2000) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA C9	(1997) Plywood - Preservative Treatment by Pressure Processes
AWPA C20	(1999) Structural Lumber Fire-Retardant Pressure Treatment
AWPA C27	(1999) Plywood - Fire-Retardant Pressure Treatment
AWPA M4	(1999) Standard for the Care of Preservative-Treated Wood Products
AWPA P5	(2000) Standards for Waterborne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA EWS R540C	(1996) Builder Tips Proper Storage and Handling of Glulam Beams
APA EWS T300C	(1997) Technical Note Glulam Connection Details
APA PRP-108	(1980; Rev Jan 1996) Performance Standards and Policies for Structural-Use Panels

CALIFORNIA REDWOOD ASSOCIATION (CRA)

CRA RIS-01-SS	(1997) Standard Specifications for Grades of California Redwood Lumber

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1209	Interim Safety Standard for Cellulose Insulation

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood
DOC PS 2	(1992) Performance Standards for Wood-Based Structural-Use Panels

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM LPD 1-49	(1995) Loss Prevention Data Sheet - Perimeter Flashing

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(1994) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(1997) Standard Grading Rules for Northeastern Lumber

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Specs	(1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB Rules	(1994; Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber

TRUSS PLATE INSTITUTE (TPI)

TPI 1	(1995; Errata) National Design Standard for Metal Plate-Connected Wood Truss Construction and Commentary; and Apendix 1
TPI Bklet HIB	(1991) Handling, Installing & Bracing Metal Plate Connected Wood Trusses

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17	(1996; Supples VII(A-E), VIII(A-C)) Grading Rules for West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules	(1999) Western Lumber Grading Rules 95

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Nailers and Nailing Strips

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-07 Certificates

Grading and Marking

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C.

PART 2 PRODUCTS

2.1 LUMBER AND SHEATHING

2.1.1 Grading and Marking

2.1.1.1 Lumber Products

Solid sawn and finger-jointed lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

2.1.1.2 Plywood and Other Products

Materials shall bear the grademark or other identifying marks indicating grades of material and rules or standards under which produced, including requirements for qualifications and authority of the inspection organization. Except for plywood and wood structural panels, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are

nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil. Except as specified for all-heart material of the previously mentioned species, the following items shall be treated:

a. Wood members in contact with or within 18 inches of soil.

b. Wood members in contact with water.

c. Wood members exposed to the weather including those used in builtup roofing systems or as nailing strips or nailers over fiberboard or gypsum-board wall sheathing as a base for wood siding.

d. Wood members set into concrete regardless of location, including flush-with-deck wood nailers for roofs.

e. Wood members in contact with concrete that is in contact with soil or water or that is exposed to weather.

2.1.3.1 Lumber and Timbers

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use.

2.1.3.2 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use.

2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

a. Treated and Untreated Lumber: 4 inches or less, nominal thickness, 19 percent maximum. 5 inches or more, nominal thickness, 23 percent maximum in a 3 inch perimeter of the timber cross-section.

b. Materials Other Than Lumber: In accordance with standard under which product is produced.

2.1.5 Miscellaneous Wood Members

2.1.5.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size (inch)
Blocking	2 x 4 or such larger size as required; smaller sizes when approved for a specific use.
Nailing strips and backs	2 inch stock.

2.1.5.2 Wood Bumpers (Not Used)

2.1.5.3 Sill Plates (Not Used)

2.1.5.4 Blocking and Nailers

Blocking and nailers shall be standard or number 2 grade.

2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

2.2.1 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options include zinc compounds, cadmium, and aluminum paint impregnated finishes.

2.2.3 Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.2.4 Expansion Shields

Type and size best suited for intended use.

2.2.5 Joist Hangers (Not Used)

2.2.6 Metal Bridging

Optional to wood bridging; zinc-coated steel, size and design to provide rigidity equivalent to specified wood bridging.

2.2.7 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as

recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T11. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T01. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.3 VAPOR RETARDER

Vapor retarder shall be polyethylene sheeting conforming to ASTM E 154 or other equivalent material. Vapor retarder shall have a maximum vapor permeance rating of 0.5 perms as determined in accordance with ASTM E 96, unless otherwise specified.

2.4 AIR INFILTRATION BARRIER

Air infiltration barrier shall be building paper meeting the requirements of ASTM C 1136, Type IV, style optional or a tear and puncture resistant olefin building wrap (polyethylene or polypropylene) with a moisture vapor transmission rate of 125 g per square meter per 24 hours in accordance with ASTM E 96, Desiccant Method at 23 degrees C or with a moisture vapor transmission rate of 670 g per square meter per 24 hours in accordance with ASTM E 96, Water Method at 23 degrees C.

PART 3 EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS

3.1.1 General

Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place. Nailing shall be in accordance with the Recommended Nailing Schedule as contained in NFPA Manual for House Framing. Where detailed mailing requirements are not specified, nail isze and nail spacing shall be sufficient to develope an adequate strength for the connection without splitting the members.

3.1.2 Blocking

Blocking shall be provided as necessary for application of roofing, siding, and other materials or building items. Blocking shall be cut to fit tight and rigidly nailed.

3.1.3 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Nailers used in conjunction with roof deck installation shall be installed flush with the roof deck system. Stacked nailers shall be assembled with spikes or nails spaced not more than 18 inches on center and staggered. Beginning and ending nails shall not be more than 6 inches for nailer end. Ends of stacked nailers shall be

offset approximately 12 inches in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place. Nailers and nailer installation for Factory Mutual wind uplift rated roof systems specified in other Sections of these specifications shall conform to the recommendations contained in FM LPD 1-49.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07412A

NON-STRUCTURAL METAL ROOFING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 GENERAL REQUIREMENTS
1.3.1 Non-Structural Metal Roof System
1.3.2 Manufacturer
1.3.3 Installer
1.4 DESIGN LOADS
1.5 PERFORMANCE REQUIREMENTS
1.6 DELIVERY AND STORAGE
1.7 WARRANTIES
1.7.1 Contractor's Weathertightness Warranty
1.7.2 Manufacturer's Material Warranties
1.8 COORDINATION MEETING

PART 2 PRODUCTS

2.1 ROOF PANELS
2.1.1 Steel Panels
2.1.2 Aluminum Panels (Not Used)
2.2 ACCESSORIES
2.3 FASTENERS
2.4 FACTORY COLOR FINISH
2.4.1 Cyclic Salt Fog/UV Test
2.4.2 Formability Test
2.4.3 Accelerated Weathering, Chalking Resistance and Color Change
2.4.4 Humidity Test
2.4.5 Impact Resistance
2.4.6 Abrasion Resistance Test
2.4.7 Specular Gloss (Not Used)
2.4.8 Pollution Resistance
2.5 UNDERLAYMENTS
2.5.1 Felt Underlayment
2.5.2 Rubberized Underlayment
2.5.3 Slip Sheet
2.6 INSULATION
2.6.1 Rigid Board Insulation for Use Above a Roof Deck
2.6.1.1 Polyisocyanurate
2.6.1.2 Expanded-Perlite Insulation Board
2.6.1.3 Glass Mat Gypsum Roof Board
2.6.2 Blanket Insulation
2.6.3 Loose Fill or Granular Fill
2.6.3.1 Perlite
2.7 INSULATION RETAINERS
2.8 SEALANT

2.9 GASKETS AND INSULATING COMPOUNDS
2.10 VAPOR RETARDER
2.10.1 Vapor Retarders as Integral Facing
2.10.2 Vapor Retarders Separate from Insulation
2.10.3 Slip Sheet for Use With Vapor Retarder
2.11 WOOD NAILERS

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Roofing
3.1.2 Field Forming of Roof Panels for Unique Areas
3.1.3 Underlayment
3.2 INSULATION INSTALLATION
3.2.1 Board Insulation in Warm Climates (Not Used)
3.2.2 Board Insulation in Cool Climates
3.3 PROTECTION OF VAPOR RETARDER FROM ROOF DECK
3.4 VAPOR RETARDER INSTALLATION
3.4.1 Integral Facing on Blanket Insulation
3.4.2 Polyethylene Vapor Retarder
3.5 INSTALLATION OF WOOD NAILERS
3.6 SLIP SHEET INSTALLATION

-- End of Section Table of Contents --

SECTION 07412A

NON-STRUCTURAL METAL ROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 463/A 463M	(2000) Steel Sheet, Aluminum-Coated by the Hot-Dip Process
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 792/A 792M	(1999) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 209M	(2001) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 549	(1981; R 1995e1) Perlite Loose Fill Insulation
ASTM C 612	(2000) Mineral Fiber Block and Board Thermal Insulation
ASTM C 728	(1997) Standard Specification For Perlite Thermal Insulation Board
ASTM C 991	(1998) Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
ASTM C 1177/C 1177M	(1999) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 226	(1997a) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

ASTM D 522	(1993a; R 01) Mandrel Bend Test of Attached Organic Coatings
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 00) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1999) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993; R 1999el) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 4587	(1991) Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light- and Water- Exposure Apparatus
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E 84	(2001) Surface Burning Characteristics of Building Materials
ASTM E 96	(2000) Water Vapor Transmission of Materials

UNDERWRITERS LABORATORIES (UL)

UL 580 (1994; Rev thru Feb 1998) Tests for Uplift Resistance of Roof Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Metal Roofing; G, ED

a. Drawings consisting of catalog cuts, flashing details, erection drawings, shop coating and finishing specifications, and other data as necessary to clearly describe materials, sizes, layouts, construction details, fasteners, and erection. Drawings shall be provided by the metal roofing manufacturer.

b. Drawings showing the UL 580, Class 90 tested roof system assembly.

SD-04 Samples

Accessories

One sample of each type of flashing, trim, fascia, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Roof Panels; G, CO

One piece of each type and finish to be used, 9 inches long, full width.

Fasteners; G, CO

Two samples of each type to be used with statement regarding intended use. If so requested, random samples of screws, bolts, nuts, and washers as delivered to the jobsite shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Gaskets and Insulating Compounds; G, CO

Two samples of each type to be used and descriptive data.

Sealant; G, CO

One sample, approximately 1 pound, and descriptive data.

SD-07 Certificates

Roof Panels
Installation
Accessories

Certificates attesting that the panels and accessories conform to the specified requirements. Certificate for the roof assembly shall certify that the assembly complies with the material and fabrication requirements specified and is suitable for the installation at the indicated design slope. Certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that at least 3 representative samples of similar material to that which will be provided on this project have been previously tested and have met the quality standards specified for factory color finish.

Insulation

Certificate attesting that the polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

Installer; G, CO

Certification of installer.

Warranties; G, CO

At the completion of the project, signed copies of the 5-year Warranty for Non-Structural Metal Roofing System, a sample copy of which is attached to this section, and the 20-year Manufacturer's Material [and Weathertightness] Warranties.

1.3 GENERAL REQUIREMENTS

The Contractor shall furnish a commercially available roofing system which satisfies the specified design and additional requirements contained herein. The roofing system shall be provided by the Contractor as a complete system, as tested and approved in accordance with UL 580. Roof panels, components, transitions, accessories, and assemblies shall be supplied by the same roofing system manufacturer.

1.3.1 Non-Structural Metal Roof System

The Non-Structural Metal Roof System covered under this specification shall include the entire roofing system; the metal roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with UL 580. The system shall be installed on a substrate as shown and as specified in this section and in Section 05300 STEEL DECKING. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, skylights; interior or exterior gutters and downspouts, eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system; and items specified in other sections of the specifications that are part of the system.

1.3.2 Manufacturer

The non-structural metal roofing system shall be the product of a manufacturer who has been in the practice of manufacturing metal roofs for a period of not less than 3 years and has been involved in at least five

projects similar in size and complexity to this project.

1.3.3 Installer

The installer shall be certified by the metal roof manufacturer to have experience in installing at least three projects that are of comparable size, scope and complexity as this project for the particular roof system furnished. The installer may be either employed by the manufacturer or be an independent installer.

1.4 DESIGN LOADS

Non-structural Metal Roof System assemblies shall be tested as defined in UL 580 and shall be capable of resisting the wind uplift pressures shown on the contract drawings or, as a minimum, shall be approved to resist wind uplift pressures of UL 580, Class 90.

1.5 PERFORMANCE REQUIREMENTS

The metal roofing system supplied shall conform to the roof slope, the underlayment, and uplift pressures shown on the contract drawings. The Contractor shall furnish a commercially available roofing system which satisfies all the specified requirements.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weather tight coverings and kept dry. Material shall not be covered with plastic where such covering will allow sweating and condensation. Plastic may be used as tenting with air circulation allowed. Storage conditions shall provide good air circulation and protection from surface staining.

1.7 WARRANTIES

The Non-Structural Metal Roofing System shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.7.1 Contractor's Weathertightness Warranty

The Non-Structural Metal Roofing System shall be warranted by the Contractor on a no penal sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The roofing covered under this warranty shall include the entire roofing system, including but not limited to, the roof panels, fasteners, connectors, roof securement components, and assemblies tested and approved in accordance with UL 580. In addition, the system shall consist of panel finishes, slip sheet, insulation, vapor retarder, all accessories, components, and trim and all connections with roof panels. This includes roof penetration items such as vents, curbs, skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed and any other components specified within this contract to provide a weathertight roof system; and items specified in other sections of the specifications that are part of the roof system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to service design

loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's required warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and system manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in attached WARRANTY FOR NON-STRUCTURAL METAL ROOF SYSTEM, and shall start upon final acceptance of the facility. It is required that the Contractor provide a separate bond in an amount equal to the installed total roofing system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the 5 year Contractor's warranty period for the entire roofing system as outlined above.

1.7.2 Manufacturer's Material Warranties

The Contractor shall furnish, in writing, the following manufacturer's material warranties which cover all Non-Structural Metal Roofing System components such as roof panels, flashing, accessories, and trim, fabricated from coil material:

a. A manufacturer's 20 year material warranty warranting that the aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel as specified herein will not rupture, fail structurally, or perforate under normal atmospheric conditions at the site. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.

b. A manufacturer's 20 year exterior material finish warranty warranting that the factory color finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of 8 when measured in accordance with ASTM D 4214; or fade or change colors in excess of 5 NBS units as measured in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing or replacing the defective coated coil material.

c. A roofing system manufacturer's 20 year system weathertightness warranty.

1.8 COORDINATION MEETING

A coordination meeting shall be held within 45 days after contract award for mutual understanding of the metal roofing system contract requirements. This meeting shall take place at the building site and shall include representatives from the Contractor, the roofing system manufacturer, the roofing supplier, the erector, the designer, and the Contracting Officer. All items required by paragraph SUBMITTALS shall be discussed, including applicable standard manufacturer shop drawings, and the approval process. The Contractor shall coordinate time and arrangements for the meeting.

PART 2 PRODUCTS

2.1 ROOF PANELS

Panels shall be steel and shall have a factory color finish. Length of sheets shall be sufficient to cover the entire length of any unbroken roof

slope for slope lengths that do not exceed 30 feet. Sheets longer than 30 feet may be furnished if approved by the Contracting Officer. Width of sheets shall provide nominal 12 inches of coverage in place. Design provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. All sheets shall be either square-cut or miter-cut. The ridge cap shall be installed as recommended by the metal roofing manufacturer. Height of corrugations, ribs, or seams, at overlap of adjacent roof sheets shall be the building manufacturer's standard for the indicated roof slope.

2.1.1 Steel Panels

Zinc-coated steel conforming to ASTM A 653/A 653M; aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 50 coating; or aluminum-coated steel conforming to ASTM A 463/A 463M, Type 2, coating designation T2 65. Uncoated roof panels shall be 0.024 inch thick minimum. Panels shall be within 95 percent of the nominal thickness. Prior to shipment, mill finish panels shall be treated with a passivating chemical and oiled to inhibit the formation of oxide corrosion products. Panels that have become wet during shipment and have started to oxidize shall be rejected.

2.1.2 Aluminum Panels (Not Used)

2.2 ACCESSORIES

Accessories shall be compatible with the roofing furnished. Flashing, trim, metal closure strips, caps, and similar metal accessories shall be not less than the minimum thicknesses specified for roof panels. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the panels and shall not absorb or retain water.

2.3 FASTENERS

Fasteners for roof panels shall be zinc-coated steel, stainless steel, aluminum, or nylon capped steel, type and size as recommended by the manufacturer to meet the performance requirements. Fasteners for accessories shall be the manufacturer's standard. Exposed roof fasteners shall be gasketed or have gasketed washers on the exterior side of the roofing to waterproof the fastener penetration. Washer material shall be compatible with the panels; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8 inch thick.

2.4 FACTORY COLOR FINISH

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall be as selected by the Contracting Officer from the manufacturer's standard colors. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.2 mil thickness. The exterior color finish shall meet the test requirements specified below.

2.4.1 Cyclic Salt Fog/UV Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, over 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.4.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of fracturing to the naked eye.

2.4.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested in accordance with ASTM D 4587, test condition B for 1000 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.4.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.4.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no cracking.

2.4.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.4.7 Specular Gloss (Not Used)

2.4.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10

percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.5 UNDERLAYMENTS

2.5.1 Felt Underlayment

Felt underlayment shall be No. 30 felt in accordance with ASTM D 226, Type II.

2.5.2 Rubberized Underlayment

Rubberized underlayment shall be equal to "Ice and Water Shield" as manufactured by Grace Construction Products, "Winterguard" as manufactured by CertainTeed Corporation, or "Weather Watch Ice and Water Barrier" as manufactured by GAF Building Materials Corporation.

2.5.3 Slip Sheet

Slip Sheet shall be 5 pounds per 100 sf rosin sized unsaturated building paper.

2.6 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages.

2.6.1 Rigid Board Insulation for Use Above a Roof Deck

2.6.1.1 Polyisocyanurate

Polyisocyanurate insulation shall conform to ASTM C 1289, Type I, Class 2 (having a minimum recovered material content of 9 percent by weight of core material in the polyisocyanurate portion). For impermeable faced polyisocyanurate (Ex: aluminum foil) the maximum design R-value per 1 inch of insulation used shall be 7.2.

2.6.1.2 Expanded-Perlite Insulation Board

Expanded-perlite insulation board shall conform to ASTM C 728.

2.6.1.3 Glass Mat Gypsum Roof Board

Glass mat gypsum roof board for underlayment/overlayment, thermal protection, or insulation protection shall be in accordance with ASTM C 1177/C 1177M.

2.6.2 Blanket Insulation

Blanket insulation shall conform to ASTM C 991.

2.6.3 Loose Fill or Granular Fill

2.6.3.1 Perlite

Perlite shall conform to ASTM C 549, Type II with minimum recovered material content of 23 percent by weight of core material.

2.7 INSULATION RETAINERS

Insulation retainers shall be type, size, and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

2.8 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color or clear and shall cure to a rubberlike consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

2.9 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.10 VAPOR RETARDER

2.10.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white reinforced plypropylene kraft laminate (PSK). Facings and finishes shall be factory applied.

2.10.2 Vapor Retarders Separate from Insulation

Vapor retarder material shall be polyethylene sheeting conforming to ASTM D 4397. A single ply of 10 mil polyethylene sheet; or, at the Contractor's option, a double ply of 6 mil polyethylene sheet shall be used. A fully compatible polyethylene tape which has equal or better water vapor control characteristics than the vapor retarder material shall be provided. A cloth industrial duct tape in a utility grade shall also be provided to use as needed to protect the vapor retarder from puncturing.

2.10.3 Slip Sheet for Use With Vapor Retarder

Slip sheet for use with vapor retarder shall be a 5 per 100 square foot rosin-sized, unsaturated building paper.

2.11 WOOD NAILERS

Wood nailers shall conform to Section 06100a ROUGH CARPENTRY, including preservative treatment. Edge nailers shall be not less than nominal 4 inches wide and of thickness to finish flush with the top surface of the insulation. Surface mounted nailers shall be a nominal 3 inches wide by the full thickness of the insulation.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated by means of gaskets or insulating compounds. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, sheets with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Roofing

Side laps shall be laid away from the prevailing winds. Side and end lap distances, joint sealing, and fastening and spacing of fasteners shall be in accordance with manufacturer's standard practice. Spacing of exposed fasteners shall present an orderly appearance. Side laps and end laps of roof panels and joints at accessories shall be sealed. Fasteners shall be driven normal to the surface. Method of applying joint sealant shall conform to the manufacturer's recommendation to achieve a complete weathertight installation. Accessories shall be fastened into substrate, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction.

3.1.2 Field Forming of Roof Panels for Unique Areas

When roofing panels are formed from factory-color-finished steel coils at the project site, the same care and quality control measures that are taken in shop forming of roofing panels shall be observed. Rollformer shall be operated by the metal roofing manufacturer's approved installer. In cold weather conditions, preheating of the steel coils to be field formed shall be performed as necessary just prior to the rolling operations.

3.1.3 Underlayment

Underlayment types shall be installed where shown on the drawings; they shall be installed directly over the substrate. If a roof panel rests directly on the underlayments, a slip sheet shall be installed as a top layer, beneath the metal roofing panels, to prevent adhesion. All underlayments shall be installed so that successive strips overlap the next lower strip in shingle fashion. Underlayments shall be installed in accordance with the manufacturer's written instructions. The underlayments shall ensure that any water that penetrates below the metal roofing panels will drain outside of the building envelope.

3.2 INSULATION INSTALLATION

Insulation shall be installed as indicated and in accordance with manufacturer's instructions. Insulation shall be continuous over entire roof surface. Where expansion joints, terminations, and other connections are made, the cavity shall be filled with batt insulation and vapor retarder providing equivalent R-Value and perm rating as remaining insulation.

3.2.1 Board Insulation in Warm Climates (Not Used)

3.2.2 Board Insulation in Cool Climates

A layer of unfaced blanket insulation shall be placed over the board insulation and held tight against the metal roofing.

3.3 PROTECTION OF VAPOR RETARDER FROM ROOF DECK

A cloth industrial duct tape shall be adhered over all the seams of metal roof decking, at any penetration edges, and at all surface areas exhibiting sharp burrs or similar protrusions. For other types of roof decking, cloth industrial duct tape shall be adhered over all irregularities which could potentially puncture polyethylene membrane.

3.4 VAPOR RETARDER INSTALLATION

3.4.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and sealed with a compatible tape to provide a vapor tight membrane.

3.4.2 Polyethylene Vapor Retarder

The polyethylene vapor retarder membrane shall be installed over the entire surface. A fully compatible polyethylene tape shall be used to seal the edges of the sheets to provide a vapor tight membrane. Sheet edges shall be lapped not less than 6 inches. Sufficient material shall be provided to avoid inducing stresses in the sheets due to stretching or binding. All tears or punctures that are visible in the finished surface at any time during the construction process shall be sealed with polyethylene tape.

3.5 INSTALLATION OF WOOD NAILERS

Nailers shall be secured to cast-in-place deck materials by not less than 3/8 inch diameter anchors not over 47 inches on centers. Nailers shall be secured to deck materials as indicated. Bolt anchors shall have nuts and washers countersunk, and bolts shall be cut flush with top of nailer. Powder-actuated fasteners, sized and spaced for nailer anchorage equivalent to that specified and indicated, may be used when approved. Surface mounted nailers shall be installed parallel with the roof slope and shall be spaced not over 47 inches face-to-face, except that where the insulation units are less than 47 inches in length the nailers shall be spaced to minimize cutting of the insulation.

3.6 SLIP SHEET INSTALLATION

A slip sheet shall be laid over the blanket insulation facing to prevent the vinyl facing from adhering to the metal roofing.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM

FACILITY DESCRIPTION_____

BUILDING NUMBER:_____

CORPS OF ENGINEERS CONTRACT NUMBER:_____

CONTRACTOR

CONTRACTOR:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION AGENT:_____

ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM
(continued)

THE NON-STRUCTURAL METAL ROOF SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY _____ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. THE NON-STRUCTURAL METAL ROOFING SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH UL 580. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHINGS INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE NON-STRUCTURAL METAL ROOFING SYSTEM.

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE NON-STRUCTURAL METAL ROOF SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOFING SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE NON-STRUCTURAL METAL ROOFING SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE NON-STRUCTURAL METAL ROOF DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. CONTRACTOR'S DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW PONDING WATER.

6. THIS WARRANTY APPLIES TO THE NON-STRUCTURAL METAL ROOFING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

**

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
NON-STRUCTURAL METAL ROOF SYSTEM
(continued)

**REPORTS OF LEAKS AND ROOF SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS ROOF SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE NON-STRUCTURAL METAL ROOF SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, THE PARTIES SHALL, WITHIN TEN (10) DAYS, JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07600

SHEET METALWORK, GENERAL

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL REQUIREMENTS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Metal Drip Edge, Fascia, Miscellaneous Flashings, and Snow Guards
2.1.2 Scupper and Conductor Head
2.1.3 Gutters and Downspouts
2.1.4 Miscellaneous Flashing
2.1.5 Soffit Panels
2.1.6 Fabrication
2.1.7 Accessories
2.1.8 Aluminum Extrusions
2.1.9 Bituminous Cement
2.1.10 Sealant
2.1.11 Fasteners
2.1.12 Felt
2.1.13 Polyvinyl Chloride (PVC) Reglets
2.1.14 Aluminum Alloy Sheet and Plate
2.1.15 Copper
2.1.16 Stainless Steel
2.1.17 Solder
2.1.18 Through-Wall Flashing
2.2 COLOR

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS
3.2 PROTECTION OF ALUMINUM
3.2.1 Paint
3.2.2 Nonabsorptive Tape or Gasket
3.3 CONNECTIONS AND JOINTING
3.3.1 Soldering
3.3.2 Riveting
3.3.3 Seaming
3.4 CLEATS
3.5 FLASHINGS
3.5.1 Counter Flashings
3.5.2 Stepped Flashing
3.5.3 Through-Wall Flashing
3.5.3.1 Lintel Flashing

3.5.4 Valley Flashing
3.6 CONTRACTOR QUALITY CONTROL

-- End of Section Table of Contents --

SECTION 07600

SHEET METALWORK, GENERAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 167	(1999) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 32	(1996) Solder Metal
ASTM B 209M	(2001) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B 370	(1998) Copper Sheet and Strip for Building Construction
ASTM D 226	(1997a) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2822	(1991; R 1997el) Asphalt Roof Cement
ASTM D 4022	(1994) Coal Tar Roof Cement, Asbestos Containing
ASTM D 4586	(1993) Asphalt Roof Cement, Asbestos Free

SHEET METAL & AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual

1.2 GENERAL REQUIREMENTS

Sheet metalwork shall be accomplished to form weathertight construction without waves, warps, buckles, fastening stresses or distortion, and shall

allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed by sheet metal mechanics. Installation of sheet metal items used in conjunction with roofing shall be coordinated with roofing work to permit continuous roofing operations. Sheet metalwork pertaining to heating, ventilating, and air conditioning is specified in Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM.

1.3 DELIVERY, STORAGE, AND HANDLING

Materials shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness, and wet-storage stains upon delivery to the jobsite. Materials shall be clearly labeled as to type and manufacturer. Sheet metal items shall be carefully handled to avoid damage. Materials shall be stored in dry, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Lead, lead-coated metal, and galvanized steel shall not be used. Any metal listed by SMACNA Arch. Manual for a particular item may be used, unless otherwise specified or indicated. Materials shall conform to the requirements specified below and to the thicknesses and configurations established in SMACNA Arch. Manual. Different items need not be of the same metal, except that if copper is selected for any exposed item, all exposed items shall be copper.

2.1.1 Metal Drip Edge, Fascia, Miscellaneous Flashings, and Snow Guards

Material shall be 0.040 inch aluminum or 16 ounce copper where noted. Aluminum finish shall be factory-applied "Kynar 500" PVF coating, or equal. Continuous concealed clip shall be same material as fascia. Provide fasteners of correct length and type. Fabricate to profiles shown or required.

2.1.2 Scupper and Conductor Head

Type shall be similar to "Scupper Design and Installation," Figure 1-26, page 1.59, SMACNA Arch. Manual and as shown on drawings. Material shall be 0.040 inch aluminum. Finish shall be factory-applied "Kynar 500" PVF coating, or equal. Provide necessary fasteners, hangers and accessories.

2.1.3 Gutters and Downspouts

Material shall be 0.032 inch prefinished aluminum or 16 ounce copper, ASTM B 370 cold rolled tempered. Ogee design. Provide necessary clips, fasteners, hangers and accessories. Aluminum finish shall be factory-applied "Kynar 500" PVF coating, or equal.

2.1.4 Miscellaneous Flashing

Base flashing, counterflashings, roof penetration flashings, and miscellaneous flashings as shown on drawings. Material shall be 0.032 inch aluminum; same finish as adjacent construction.

2.1.5 Soffit Panels

Type: prefinished aluminum vented where noted. Manufacturer's standard panel design. Furnish all clips, mouldings, and trim. Color shall be white, unless indicated otherwise in Color Schedule.

2.1.6 Fabrication

Form sections true to shape, accurate in size, square, and free from distortion or defects. Hem exposed edges on underside 1/2 inch; miter and seam corners. Weld aluminum seams.

2.1.7 Accessories

Accessories and other items essential to complete the sheet metal installation, though not specifically indicated or specified, shall be provided. Fastener shall be stainless steel, aluminum, or galvanized steel. Finish exposed fasteners same as adjacent construction.

2.1.8 Aluminum Extrusions

ASTM B 221M, Alloy 6063, Temper T5.

2.1.9 Bituminous Cement

Type I asphalt cement conforming to ASTM D 2822 or ASTM D 4586. For coal tar roofing; coal tar cement conforming to ASTM D 4022.

2.1.10 Sealant

Unless otherwise specified, sealant shall be an elastomeric weather resistant sealant as specified in Section 07900 JOINT SEALING.

2.1.11 Fasteners

Fasteners shall be compatible with the fastened material and shall be the type best suited for the application.

2.1.12 Felt

ASTM D 226, Type I.

2.1.13 Polyvinyl Chloride (PVC) Reglets

ASTM D 1784, Class 14333D, 0.075 inch minimum thickness.

2.1.14 Aluminum Alloy Sheet and Plate

ASTM B 209M, anodized clear form, alloy, and temper appropriate for use.

2.1.15 Copper

ASTM B 370, Temper H 00.

2.1.16 Stainless Steel

ASTM A 167, Type 302 or 304; fully annealed, dead soft temper.

2.1.17 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.18 Through-Wall Flashing

a. Stainless steel, Type 304, not less than 0.003 inch thick, completely encased by and permanently bonded on both sides to 50 pound high strength bituminized crepe kraft paper, using hot asphalt, heat, and pressure.

b. Three ounce copper sheet, with 2 mils of dense, clear, polyethylene sheet bonded to each side of the copper.

2.2 COLOR

Flashing colors shall match the color of adjacent metal items.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Unless otherwise specified or indicated, exposed edges shall be folded back to form a 1/2 inch hem on the concealed side, and bottom edges of exposed vertical surfaces shall be angled to form drips. Bituminous cement shall not be placed in contact with roofing membranes other than built-up roofing.

3.2 PROTECTION OF ALUMINUM

Aluminum shall not be used where it will be in contact with copper or where it will contact water which flows over copper surfaces. Aluminum that will be in contact with wet or pressure-treated wood, mortar, concrete, masonry, or ferrous metals shall be protected against galvanic or corrosive action by one of the following methods:

3.2.1 Paint

Aluminum surfaces shall be solvent cleaned and given one coat of zinc-molybdate primer and one coat of aluminum paint as specified in Section 09900 PAINTING, GENERAL.

3.2.2 Nonabsorptive Tape or Gasket

Nonabsorptive tape or gasket shall be placed between the adjoining surfaces and cemented to the aluminum surface using a cement compatible with aluminum.

3.3 CONNECTIONS AND JOINTING

3.3.1 Soldering

Soldering shall apply to copper, and stainless steel items. Edges of sheet metal shall be pretinned before soldering is begun. Soldering shall be done slowly with well heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam. Edges of stainless steel to be pretinned shall be treated with soldering acid flux. Soldering shall follow immediately after application of the flux. Upon completion of soldering, the acid flux residue shall be thoroughly cleaned from the sheet metal with a water solution of washing soda and rinsed with clean water.

3.3.2 Riveting

Joints in aluminum sheets 0.040 inch or less in thickness shall be mechanically made.

3.3.3 Seaming

Flat-lock and soldered-lap seams shall finish not less than 1 inch wide. Unsoldered plain-lap seams shall lap not less than 3 inches unless otherwise specified. Flat seams shall be made in the direction of the flow.

3.4 CLEATS

A continuous cleat shall be provided where indicated or specified to secure loose edges of the sheet metalwork. Butt joints of cleats shall be spaced approximately 1/8 inch apart. The cleat shall be fastened to supporting wood construction with nails evenly spaced not over 12 inches on centers. Where the fastening is to be made to concrete or masonry, screws shall be used and shall be driven in expansion shields set in concrete or masonry.

3.5 FLASHINGS

Flashings shall be installed at locations indicated and as specified below. Sealing shall be according to the flashing manufacturer's recommendations. Flashings shall be installed at intersections of roof with vertical surfaces and at projections through roof, except that flashing for heating and plumbing, including piping, roof, and floor drains, and for electrical conduit projections through roof or walls are specified in other sections. Except as otherwise indicated, counter flashings shall be provided over base flashings. Perforations in flashings made by masonry anchors shall be covered up by an application of bituminous plastic cement at the perforation. Flashing shall be installed on top of joint reinforcement. Flashing shall be formed to direct water to the outside of the system.

3.5.1 Counter Flashings

Except as otherwise indicated, counter flashings shall be provided over base flashings. Counter flashing shall be installed as shown on the drawings. Counter flashing shall be factory formed to provide spring action against the base flashing.

3.5.2 Stepped Flashing

Stepped flashing shall be installed where sloping roofs surfaced with shingles abut vertical surfaces. Separate pieces of base flashing shall be placed in alternate shingle courses.

3.5.3 Through-Wall Flashing

Through-wall flashing includes sill, lintel, and spandrel flashing. The flashing shall be laid with a layer of mortar above and below the flashing so that the total thickness of the two layers of the mortar and flashing are the same thickness as the regular mortar joints. Flashing shall not extend further into the masonry backup wall than the first mortar joint. Joints in flashing shall be lapped and sealed. Flashing shall be one piece for lintels and sills.

3.5.3.1 Lintel Flashing

Lintel flashing shall extend the full length of lintel. Flashing shall

extend through the wall one masonry course above the lintels and shall be bent down over the vertical leg of the outer steel lintel angle not less than 2 inches, or shall be applied over top of masonry and precast concrete lintels. Bedjoints of lintels at control joints shall be underlaid with sheet metal bond breaker.

3.5.4 Valley Flashing

Valley flashing shall be installed as specified in SMACNA Arch. Manual and as indicated.

3.6 CONTRACTOR QUALITY CONTROL

The Contractor shall establish and maintain a quality control procedure for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification of compliance of materials before, during, and after installation.

c. Inspection of sheet metalwork for proper size and thickness, fastening and joining, and proper installation.

The actual quality control observations and inspections shall be documented and a copy of the documentation furnished to the Contracting Officer at the end of each day.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07720

ROOF VENTILATORS

PART 1 GENERAL

1.1 REFERENCES
1.2 DESIGN REQUIREMENTS
1.3 QUALIFICATION
1.4 DELIVERY, STORAGE AND HANDLING
1.5 PROJECT/SITE CONDITIONS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Aluminum Extrusions
2.1.2 Aluminum Sheets
2.2 STATIONARY VENTILATORS
2.3 RIDGE VENT
2.4 FABRICATION
2.5 SCREENS

PART 3 EXECUTION

3.1 PREPARATION
3.2 INSTALLATION
3.3 PROTECTION

-- End of Section Table of Contents --

SECTION 07720

ROOF VENTILATORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 209M	(2001) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221M	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual

1.2 DESIGN REQUIREMENTS

Ventilators shall be designed for use with the specific type of project roofing system, and shall provide uniform and continuous air flow. Ventilator design shall provide protection against rain and snow, and shall be provided with a continuous weep along the bottom of both sides of wind band. Units shall be self-cleaning by the action of the elements, and shall have provisions for carrying water and normal wind-transported soil matter to the outside. Units shall be designed for windspeeds of not less than 80 mph in accordance with ASCE 7. Ventilators shall be free of internal obstructions or moving parts which will require maintenance, and shall be complete with type of mounting indicated on drawings.

1.3 QUALIFICATION

Manufacturer shall specialize in design and manufacture of the type of roof ventilators specified in this section, and shall have a minimum of 3 years of documented successful experience. Ventilator installer shall be experienced in the installation of ventilator types specified.

1.4 DELIVERY, STORAGE AND HANDLING

Roof ventilators shall be cartoned or crated prior to shipment. Ventilators shall be protected from moisture and damage. Damaged items shall be removed from site.

1.5 PROJECT/SITE CONDITIONS

Rough openings shall be field-measured and recorded on shop drawings prior to fabrication of roof ventilators. Fabrication shall be scheduled with construction schedule.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aluminum Extrusions

Aluminum extrusions shall be alloy 6063, temper T5 in compliance with ASTM B 221M.

2.1.2 Aluminum Sheets

Aluminum sheets shall be alloy 5005, temper H15 or alloy 3003, temper H14 in compliance with ASTM B 209M.

2.2 STATIONARY VENTILATORS

Stationary roof ventilators shall be fabricated of aluminum with seamless spun conical-shaped weathercap, and shall have straight-through drainage for eliminating the possibility of air-borne debris collecting in the ventilator openings. Insect screens shall be provided.

2.3 RIDGE VENT

Fabricate of 0.019 inch thick sheet aluminum with baffles to prevent snow and rain entering and weepholes to allow water to drain to roof. Vent shall have minimum net free area of 16 square inches per linear feet. Provide splice plates and end caps as required.

2.4 FABRICATION

Welds, soldered seams, rivets and fasteners shall be clean, secure, watertight, and smooth. Edges shall be wired or beaded, where necessary, to ensure rigidity. Joints between sections shall be watertight and shall allow for expansion and contraction. Galvanic action between different metals in direct contact shall be prevented by nonconductive separators.

2.5 SCREENS

Screens shall be furnished by ventilator manufacturer as part of ventilator assembly. Screen (with frames) shall be manufactured of material to match ventilators, and shall be designed to be easily removed for cleaning purposes.

PART 3 EXECUTION

3.1 PREPARATION

Rough openings and other roof conditions shall be prepared in accordance with approved shop drawings and manufacturer's recommendations. Before

starting the ventilator work, surrounding roof surfaces shall be protected from damage.

3.2 INSTALLATION

Roof ventilator installation shall be coordinated with roofing work, and shall be installed in accordance with approved shop drawings, manufacturer's published instructions, and chapter 8 of SMACNA Arch. Manual. The ventilator installation shall be watertight and shall be free of vibration noise. Aluminum surfaces shall be protected from direct contact with incompatible materials. Aluminum surfaces which will be in contact with sealant shall not be coated with a protective material. Aluminum shall not be used with copper or with water which flows over copper surfaces. Roof ventilators shall be cleaned in accordance with ventilator manufacturer's recommendations.

3.3 PROTECTION

Exposed ventilator finish surfaces shall be protected against the accumulation of paint, grime, mastic, disfigurement, discoloration and damage for duration of construction activities.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL & MOISTURE PROTECTION

SECTION 07900

JOINT SEALING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 ENVIRONMENTAL REQUIREMENTS
1.4 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 BACKING
2.1.1 Rubber
2.1.2 Synthetic Rubber
2.1.3 Neoprene
2.2 BOND-BREAKER
2.3 PRIMER
2.4 SEALANT
2.4.1 No. 1 Caulking Compound
2.4.2 No. 2 Sealant
2.5 SOLVENTS AND CLEANING AGENTS

PART 3 EXECUTION

3.1 GENERAL
3.1.1 Surface Preparation
3.1.2 Concrete and Masonry Surfaces
3.1.3 Steel Surfaces
3.1.4 Aluminum Surfaces
3.2 APPLICATION
3.2.1 Masking Tape
3.2.2 Backing
3.2.3 Bond-Breaker
3.2.4 Primer
3.2.5 Sealant
3.3 CLEANING

-- End of Section Table of Contents --

SECTION 07900

JOINT SEALING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 570	(1994) Oil and Resin Base Caulking Compound for Building Construction
ASTM C 920	(1998) Elastomeric Joint Sealants
ASTM C 1184	(1991) Structural Silicone Sealants
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealant; G, ED.

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). A copy of the Material Safety Data Sheet shall be provided for each solvent, primer or sealant material. Include color charts for color selection.

1.3 ENVIRONMENTAL REQUIREMENTS

The ambient temperature shall be within the limits of 40 to 90 degrees F when the sealants are applied.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the job in the manufacturer's original unopened containers. The container label or accompanying data sheet shall

include the following information as applicable: manufacturer, name of material, formula or specification number, lot number, color, date of manufacture, mixing instructions, shelf life, and curing time at the standard conditions for laboratory tests. Materials shall be handled and stored to prevent inclusion of foreign materials. Materials shall be stored at temperatures between40 and 90 degrees F unless otherwise specified by the manufacturer.

PART 2 PRODUCTS

2.1 BACKING

Backing shall be 25 to 33 percent oversize for closed cell and 40 to 50 percent oversize for open cell material, unless otherwise indicated.

2.1.1 Rubber

Cellular rubber sponge backing shall be ASTM D 1056, Type 2, closed cell, Class A, round cross section.

2.1.2 Synthetic Rubber

Synthetic rubber backing shall be ASTM C 509, Option I, Type I preformed rods or tubes.

2.1.3 Neoprene

Neoprene backing shall be ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.2 BOND-BREAKER

Bond-breaker shall be as recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.3 PRIMER

Primer shall be non-staining type as recommended by sealant manufacturer for the application.

2.4 SEALANT

Materials shall conform to the respective specifications and other requirements specified. Each container brought to the jobsite with a different sealant formulation shall be marked for the intended use. For each intended use, the color shall be one of the manufacturer's standard colors as selected by the Contracting Officer.

2.4.1 No. 1 Caulking Compound

No. 1 Caulking Compound shall conform to ASTM C 570, Type 1 and be used for interior joints in interior walls.

2.4.2 No. 2 Sealant

No. 2 Sealant shall be a one component, elastomeric type compound conforming to ASTM C 920, Type 2, Class A or a butyl rubber sealant conforming to ASTM C 1085, or a silicone sealant conforming to ASTM C 1184. No. 2 sealant shall be used for exterior joints and the interior side of

joints in exterior walls.

2.5 SOLVENTS AND CLEANING AGENTS

Solvents, cleaning agents, and accessory materials shall be provided as recommended by the manufacturer.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Surface Preparation

The surfaces of joints to receive sealant or caulk shall be free of all frost, condensation and moisture. Oil, grease, dirt, chalk, particles of mortar, dust, loose rust, loose mill scale, and other foreign substances shall be removed from surfaces of joints to be in contact with the sealant. Oil and grease shall be removed with solvent and surfaces shall be wiped dry with clean cloths. For surface types not listed below, the sealant manufacturer shall be contacted for specific recommendations.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, the materials shall be removed by sandblasting or wire brushing. Laitance, efflorescence and loose mortar shall be removed from the joint cavity.

3.1.3 Steel Surfaces

Steel surfaces to be in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish work, the metal shall be scraped and wire brushed to remove loose mill scale. Protective coatings on steel surfaces shall be removed by sandblasting or by a solvent that leaves no residue.

3.1.4 Aluminum Surfaces

Aluminum surfaces to be in contact with sealants shall be cleaned of temporary protective coatings. When masking tape is used for a protective cover, the tape and any residual adhesive shall be removed just prior to applying the sealant. Solvents used to remove protective coating shall be as recommended by the manufacturer of the aluminum work and shall be non-staining.

3.2 APPLICATION

3.2.1 Masking Tape

Masking tape may be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking tape shall be removed within 10 minutes after joint has been filled and tooled.

3.2.2 Backing

Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

3.2.3 Bond-Breaker

Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

3.2.4 Primer

Primer shall be used on concrete masonry units, precast concrete, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

3.2.5 Sealant

Sealant shall be used before expiration of shelf life. Multi-component sealants shall be mixed according to manufacturer's printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Sealant shall be forced into joints with sufficient pressure to expel air and fill the groove solidly. Sealant shall be installed to the indicated depth without displacing the backing. Unless otherwise indicated, specified, or recommended by the manufacturer, the installed sealant shall be dry tooled to produce a uniformly smooth surface free of wrinkles and to ensure full adhesion to the sides of the joint; the use of solvents, soapy water, etc., will not be allowed. Sealants shall be installed free of air pockets, foreign embedded matter, ridges and sags. Sealer shall be applied over the sealant when and as specified by the sealant manufacturer.

3.3 CLEANING

The surfaces adjoining the sealed joints shall be cleaned of smears and other soiling resulting from the sealant application as work progresses.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY AND STORAGE
1.4 WARRANTY

PART 2 PRODUCTS

2.1 DOORS AND FRAMES
2.2 THERMAL INSULATED DOORS
2.3 WEATHERSTRIPPING
2.4 TRANSOM AND SIDELIGHT PANELS
2.5 DOOR LOUVERS (GRILLE)
2.6 FACTORY FINISH

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Thermal Insulated Doors
3.2 FIELD PAINTED FINISH

-- End of Section Table of Contents --

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.8	(1998) Steel Doors and Frames

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 236	(1989; R 1993) Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
ASTM C 976	(1990; R 1996) Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box
ASTM D 2863	(1997) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

DOOR AND HARDWARE INSTITUTE (DHI)

DHI A115.1G	(1994) Installation Guide for Doors and Hardware

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 80A	(1996) Protection of Buildings from Exterior Fire Exposures
NFPA 101	(1997; Errata 97-1; TIA 97-1) Life Safety Code

STEEL DOOR INSTITUTE (SDOI)

SDOI SDI-106	(1996) Standard Door Type Nomenclature

SDOI SDI-107 (1997) Hardware on Steel Doors (Reinforcement - Application)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors; G, ED

Drawings using standard door type nomenclature in accordance with SDOI SDI-106 indicating the location of each door and frame, elevation of each model of door and frame, details of construction, method of assembling sections, location and extent of hardware reinforcement, hardware locations, type and location of anchors for frames, and thicknesses of metal. Drawings shall include catalog cuts or descriptive data for the doors, frames, and weatherstripping including air infiltration data and manufacturers printed instructions.

SD-02 Shop Drawings

Doors; G, ED

1.3 DELIVERY AND STORAGE

During shipment, welded unit type frames shall be strapped together in pairs with heads at opposite ends or shall be provided with temporary steel spreaders at the bottom of each frame. Materials shall be delivered to the site in undamaged condition, and stored out of contact with the ground and under a weathertight covering permitting air circulation. Doors and assembled frames shall be stored in an upright position in accordance with DHI A115.1G. Abraded, scarred, or rusty areas shall be cleaned and touched up with matching finishes.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties shall be provided.

PART 2 PRODUCTS

2.1 DOORS AND FRAMES

Doors and frames shall be factory fabricated in accordance with ANSI A250.8 and the additional requirements specified herein. Door grade shall be heavy duty (Grade II) unless otherwise indicated on the door and door frame schedules. Exterior doors and frames shall be designation G60 galvanized. Doors and frames shall be prepared to receive hardware conforming to the templates and information provided under Section 08700 BUILDERS' HARDWARE. Doors and frames shall be reinforced, drilled, and tapped to receive mortised hinges, locks, latches, and flush bolts as required. Doors and frames shall be reinforced for surface applied hardware. Frames shall be welded type. Door frames shall be furnished with a minimum of three jamb

anchors and one floor anchor per jamb. Anchors shall be not less than 18 gauge steel or 7 gauge diameter wire. For wall conditions that do not allow the use of a floor anchor, an additional jamb anchor shall be provided. Rubber silencers shall be furnished for installation into factory predrilled holes in door frames; adhesively applied silencers are not acceptable. Where frames are installed in masonry walls, plaster guards shall be provided on door frames at hinges and strikes. Reinforcing of door assemblies for closers and other required hardware shall be in accordance with ANSI A250.8. Exterior doors shall have top edges closed flush and sealed against water penetration.

2.2 THERMAL INSULATED DOORS

The interior of thermal insulated doors shall be completely filled with rigid plastic foam permanently bonded to each face panel. The thermal conductance (U-value) through the door shall not exceed 0.41 btu/hr times sq f times f when tested as an operational assembly in accordance with ASTM C 236 or ASTM C 976. Doors with cellular plastic cores shall have a minimum oxygen index rating of 22 percent when tested in accordance with ASTM D 2863.

2.3 WEATHERSTRIPPING

Unless otherwise specified in Section 08700 BUILDERS' HARDWARE, weatherstripping shall be as follows: Weatherstripping for head and jamb shall be manufacturer's standard elastomeric type of synthetic rubber, vinyl, or neoprene and shall be installed at the factory or on the jobsite in accordance with the door frame manufacturer's recommendations. Weatherstripping for bottom of doors shall be as shown. Air leakage rate of weatherstripping shall not exceed 0.20 cfm per linear foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.4 TRANSOM AND SIDELIGHT PANELS

Panels for transom and sidelight shall be constructed in accordance with ANSI A250.8. Panels shall be nonremovable from the outside.

2.5 DOOR LOUVERS (GRILLE)

Provide door louvers (grilles) of size as indicated; see drawings and schedules. Louvers shall be split-Y, security type. Face plate and frame shall be 12 gauge steel. Louvers shall be 18 gauge steel. Steel shall have prime finish. Include insect screen. Provide Air Louvers Model 1500-A, Anemostat Model PLSL, or approved equal.

2.6 FACTORY FINISH

Doors and frames shall be phosphatized and primed with standard factory primer system.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with DHI A115.1G. Preparation for surface applied hardware shall be in accordance with SDOI SDI-107. Rubber silencers shall be installed in door frames after finish painting has been completed; adhesively applied silencers are not acceptable. Weatherstripping shall be installed at exterior door openings to provide a

weathertight installation. Installation and operational characteristics of fire doors shall be in accordance with NFPA 80, NFPA 80A and NFPA 101. Hollow metal door frames shall be solid grouted.

3.1.1 Thermal Insulated Doors

Hardware and perimeter seals shall be adjusted for proper operation. Doors shall be sealed weathertight after installation of hardware.

3.2 FIELD PAINTED FINISH

Steel doors and frames shall be field painted in accordance with Section 09900 PAINTING, GENERAL. Weatherstrips shall be protected from paint. Finish shall be free of scratches or other blemishes. Color shall be as selected by the Contracting Officer.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08361

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Hard-Drawn Springwire
2.1.2 Oil-Tempered Springwire
2.1.3 Steel Sheet
2.1.4 Steel Shapes
2.1.5 Aluminum Extrusions
2.1.6 Aluminum Sheets and Strips
2.1.7 Glass (Not Used)
2.2 DOORS
2.3 DESIGN REQUIREMENTS
2.4 FABRICATION
2.4.1 Steel Overhead Doors
2.4.1.1 Insulated Sections
2.4.1.2 Aluminum Sections
2.4.2 Tracks
2.4.3 Hardware
2.4.4 Counterbalancing
2.5 MANUAL OPERATORS
2.5.1 Pushup Operators
2.5.2 Chain Hoist Operators
2.6 ELECTRIC OPERATORS
2.6.1 Operator Features
2.6.2 Motors
2.6.3 Controls
2.6.4 Safety Device
2.6.5 Control Transformers
2.6.6 Electrical Components
2.6.7 Hazardous Locations
2.7 WEATHER SEALS AND SAFETY DEVICE
2.8 FINISHES
2.8.1 Galvanized and Shop Primed
2.8.2 Aluminum

PART 3 EXECUTION

3.1 INSTALLATION
3.2 ELECTRICAL WORK
3.3 TESTING

-- End of Section Table of Contents --

SECTION 08361

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997; Rev. A) Carbon Structural Steel
ASTM A 123/A 123M	(1997; Rev. A) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 227/A 227M	(1993) Steel Wire, Cold-Drawn for Mechanical Springs
ASTM A 229/A 229M	(1993) Steel Wire, Oil-Tempered for Mechanical Springs
ASTM A 653/A 653M	(1998) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221M	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM C 236	(1989; R 1993) Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
ASTM E 330	(1997) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MFM	(1988) Metal Finishes Manual

DOOR AND ACCESS SYSTEMS MANUFACTURERS ASSOCIATION (DASMA)

ANSI/NAGDM 102	(1988) Sectional Overhead Type Doors

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(1993) Industrial Control and Systems
NEMA ICS 2	(1993) Industrial Control and Systems Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC
NEMA ICS 6	(1993) Industrial Control and Systems Enclosures
NEMA MG 1	(1993; Rev. 1-4) Motors and Generators
NEMA ST 20	(1992) Dry-Type Transformers for General Applications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electrical Code

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Doors; G

Show types, sizes, locations, metal gages including minimum metal decimal thickness, hardware provisions, installation details, and other details of construction. For electrically-operated doors, include supporting brackets for motors, location, type, and ratings of motors, switches, and safety devices.

SD-03 Product Data

Doors; G

Electric operators; G

For electrically motor-operated doors, submit manufacturer's wiring diagrams for motor and controls.

SD-08 Manufacturer's Instructions

Doors

SD-10 Operation and Maintenance Data

Doors

Submit Data Package 2 in accordance with Section 01781N, "Operation and Maintenance Data."

1.3 DELIVERY, STORAGE, AND HANDLING

Protect doors and accessories from damage during delivery, storage, and handling. Clearly mark manufacturer's brand name. Store doors in dry locations with adequate ventilation, free from dust and water. Storage shall permit easy access for inspection and handling. Remove damaged items and provide new.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Hard-Drawn Springwire

ASTM A 227/A 227M.

2.1.2 Oil-Tempered Springwire

ASTM A 229/A 229M.

2.1.3 Steel Sheet

ASTM A 653/A 653M.

2.1.4 Steel Shapes

ASTM A 36/A 36M.

2.1.5 Aluminum Extrusions

ASTM B 221, Alloy 6063-T5.

2.1.6 Aluminum Sheets and Strips

ASTM B 209, alloy and temper best suited for the purpose.

2.1.7 Glass (Not Used)

2.2 DOORS

ANSI/NAGDM 102. Commercial doors. Metal doors shall be horizontal sections hinged together which operate in a system of tracks to completely close the door opening in the closed position and make the full width and height of the door opening available for use in the open position. Provide a permanent label on the door indicating the name and address of the manufacturer. Doors shall be of the standard lift type designed to slide up and back into a horizontal overhead position and requiring a maximum of 16 inches of headroom for 2 inch tracks and 21 inches of headroom for 3 inch tracks. Doors shall be operated by electric power with auxiliary hand chain operation.

2.3 DESIGN REQUIREMENTS

ANSI/NAGDM 102 except that design wind load shall be 20 pounds per square foot. Doors shall remain operable and undamaged after conclusion of tests conducted in accordance with ASTM E 330 using the design wind load.

2.4 FABRICATION

2.4.1 Steel Overhead Doors

Form door sections of hot-dipped galvanized steel not lighter than [20 gage with longitudinal integral reinforcing ribs] [or] [24 gage with longitudinal integral reinforcing ribs and flat bottom V-grooves] to match doors on adjacent City Office Building. Sections shall be not less than 2 inches in thickness. Meeting rails shall have interlocking joints to ensure a weathertight closure and alignment for full width of the door. Sections shall be of the height indicated or the manufacturer's standard, except the height of an intermediate section shall not exceed 24 inches. Bottom sections may be varied to suit door height, but shall not exceed 30 inches in height.

2.4.1.1 Insulated Sections

Insulate door sections with fibrous glass or plastic foam to provide a "U" factor of 0.14 or less when tested in accordance with ASTM C 236. Cover interior of door sections with steel sheets of not lighter than 24 gage to completely enclose the insulating material.

2.4.1.2 Aluminum Sections

At the Contractor's option, door sections may be constructed of aluminum in lieu of steel. Aluminum sections shall, as a minimum, provide the same structural and thermal properties as specified for steel sections.

2.4.2 Tracks

Provide galvanized steel tracks not lighter than 14 gage for 2 inch tracks and not lighter than 12 gage for 3 inch tracks. Provide vertical tracks with continuous steel angle not lighter than 13 gage for installation to walls. Incline vertical track through use of adjustable brackets to obtain a weathertight closure at jambs. Reinforce horizontal track with galvanized steel angle; support from track ceiling construction with galvanized steel angle and cross bracing to provide a rigid installation.

2.4.3 Hardware

Provide hinges, brackets, rollers, locking devices, and other hardware required for complete installation. Roller brackets and hinges shall be 14 gage galvanized steel. Rollers shall have ball bearings and case-hardened races. Provide reinforcing on doors where roller hinges are connected. Provide a positive locking device and cylinder lock with two keys on manually operated doors.

2.4.4 Counterbalancing

Counterbalance doors with an oil-tempered, helical-wound torsional spring mounted on a steel shaft. Spring tension shall be adjustable; connect spring to doors with cable through cable drums. Cable safety factor shall be at least 7 to 1.

2.5 MANUAL OPERATORS

2.5.1 Pushup Operators

Provide lifting handles on both sides of door. The force required to operate the door shall not exceed 25 pounds. Provide pulldown straps or ropes at bottom of doors over 7 feet high.

2.5.2 Chain Hoist Operators

Provide a galvanized, endless chain operating over a sprocket. Extend chain to within 4 feet of the floor and mount on inside of building. Obtain reduction by use of roller chain and sprocket drive or gearing. Provide chain cleat and pin for securing operator chain. Hoist shall allow for future installation of power operators. The force required to operate the door shall not exceed 35 pounds.

2.6 ELECTRIC OPERATORS

2.6.1 Operator Features

Provide operators of the drawbar type or side mount (jack shaft) type as recommended by the manufacturer. Operators shall include electric motor, machine-cut reduction gears, steel chain and sprockets, magnetic brake, brackets, pushbutton controls, limit switches, magnetic reversing contactor, a manual chain hoist operator as specified above for emergency use, and other accessories necessary for operation. Design electric operator so motor may be removed without disturbing the limit switch timing and without affecting the manual operator. Provide the operator with slipping clutch coupling to prevent stalling the motor. The emergency manual operator shall be clutch controlled so that it may be engaged and disengaged from the floor; operation shall not affect limit switch timing. The manual operator is not required if door can be manual-pushup operated with a force not to exceed 25 pounds. Provide an electrical or mechanical device that disconnects the motor from the operating mechanism when the manual operator is engaged.

2.6.2 Motors

NEMA MG 1, high-starting torque, reversible type with sufficient horsepower and torque output to move the door in either direction from any position. Motor shall produce a door travel speed of not less than two-thirds foot or more than one foot per second without exceeding the rated capacity. Motors shall be operate on current of the characteristics indicated at not more than 3600 rpm. [Single-phase motors shall not have commutation or more than one starting contact.] [Motor enclosures shall be drip-proof type or NEMA TENV type.]

2.6.3 Controls

Each door motor shall have an enclosed, across-the-line type, magnetic reversing contactor, thermal overload and undervoltage protection, solenoid-operated brake, limit switches, and control switches. Locate control switches at least 5 feet above the floor so the operator will have complete visibility of the door at all times. Control equipment shall conform to NEMA ICS 1 and NEMA ICS 2. Control enclosures shall be NEMA ICS 6, Type 12 or Type 4, except that contactor enclosures may be Type 1. Each control switch station shall be of the three-button type with buttons marked "OPEN," "CLOSE," and "STOP." The "OPEN" and "STOP" buttons shall require only momentary pressure to operate. The "CLOSE" button shall require constant pressure to maintain the closing motion of the door. If the door is in motion and the "STOP" button is pressed or the "CLOSE" button released, the door shall stop instantly and remain in the stop position; from the stop position, the door may be operated in either direction by the "OPEN" or "CLOSE" button. Pushbuttons shall be full-guarded to prevent accidental operation. Provide limit switches to automatically stop doors at the fully open and closed positions. Limit

switch positions shall be readily adjustable.

2.6.4 Safety Device

Provide a pneumatic or electric type safety device on the bottom edge of electrically-operated doors. The device shall immediately stop and reverse the door movement during the closing travel upon contact with an obstruction in the door opening or upon failure of any component of the control system. The door-closing circuit shall be automatically locked out and the door shall be operable manually until the failure or damage has been corrected. Do not use the safety device as a limit switch.

2.6.5 Control Transformers

NEMA ST 20. Provide transformers in power circuits as necessary to reduce the voltage on the control circuits to 120 volts or less.

2.6.6 Electrical Components

NFPA 70. Furnish manual or automatic control and safety devices, including extra flexible Type SO cable and spring-loaded automatic takeup reel or equivalent device, as required for operation of the doors. Conduit, wiring, and mounting of controls are specified in Section 16402N, "Interior Distribution System."

2.6.7 Hazardous Locations

In addition to meeting other requirements specified, electrical materials, equipment, and devices for installation in hazardous locations, as defined by NFPA 70, shall be specifically approved by Underwriters Laboratories or by an independent testing agency using equivalent standards, for the particular chemical group and the class and division of hazardous location involved.

2.7 WEATHER SEALS AND SAFETY DEVICE

Provide exterior doors with weatherproof joints between sections by means of tongue-and-groove joints, rabbetted joints, shiplap joints, vinyl or rubber weatherstripping; a rubber, or vinyl, adjustable weatherstrip at the top and jambs; and a compressible neoprene, rubber, or vinyl weather seal attached to the bottom of the door. On exterior doors that are electrically operated, the bottom seal shall be combination compressible weather seal and safety device for stopping door movement.

2.8 FINISHES

Concealed ferrous metal surfaces and tracks shall be hot-dip galvanized. Other ferrous metal surfaces, except rollers and lock components, shall be hot-dip galvanized and shop primed.

2.8.1 Galvanized and Shop Primed

Surfaces specified shall have a zinc coating, a phosphate treatment, and a shop prime coat of rust-inhibitive paint. The galvanized coating shall conform to ASTM A 653/A 653M, coating designation G60, for steel sheets, and ASTM A 123/A 123M for assembled steel products. The weight of coatings for assembled products shall be as designated in Table I of ASTM A 123/A 123M for the class of material to be coated. The prime coat shall be a type especially developed for materials treated by phosphates and adapted

to application by dipping or spraying. Repair damaged zinc-coated surfaces with galvanizing repair paint and spot prime. At the Contractor's option, a two-part system including bonderizing, baked-on epoxy primer, and baked-on enamel topcoat may be applied in lieu of prime coat specified.

2.8.2 Aluminum

Exposed surfaces shall receive a pretreatment and a white baked-on enamel finish as standard with the manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70. Install doors in accordance with approved shop drawings and manufacturer's instructions. Upon completion, doors shall be weathertight and free from warp, twist, or distortion. Lubricate and adjust doors to operate freely.

3.2 ELECTRICAL WORK

NFPA 70. Conduit, wiring, and mounting of controls are specified in Section 16415, "Electrical Work, Interior."

3.3 TESTING

After installation is complete, operate doors to demonstrate installation and function of operators, safety features, and controls. Correct deficiencies.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08600

SKYLIGHTS

PART 1 GENERAL

1.1 REFERENCES (NOT USED)
1.2 GENERAL REQUIREMENTS
1.3 SUBMITTALS
1.4 QUALIFICATIONS
1.5 DELIVERY STORAGE AND HANDLING
1.6 WARRANTY

PART 2 PRODUCTS

2.1 GENERAL
2.2 DOME AND FRAME
2.2.1 Design Requirements

PART 3 EXECUTION

3.1 PREPARATION
3.2 ERECTION

-- End of Section Table of Contents --

SECTION 08600

SKYLIGHTS

PART 1 GENERAL

1.1 REFERENCES (NOT USED)

1.2 GENERAL REQUIREMENTS

The Contractor shall furnish and install commercially available domed skylights which satisfy all requirements contained in this section.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings.

Drawings showing fabrication details, materials, dimensions, installation methods, anchors, and relationship to adjacent construction.

SD-03 Product Data

Skylights.

Manufacturer's descriptive data and catalog cuts.

Warranty.

Manufacturer's 5 year complete warranty.

SD-07 Certificates

Skylights.

Manufacturer's certificate stating that products meet or exceed specified requirements. Skylight system shall be evaluated and listed (the whole skylight as a unit, not just a glazing material in the unit) by the recognized building code authorities: ICBO and SBCCI-Public Safety Testing and Evaluation Services Inc.

Qualifications.

Documentation of manufacturer's experience indicating compliance with specified requirements.

1.4 QUALIFICATIONS

The manufacturer shall be a company specializing in the manufacture of the specified products with a minimum of 5 years documented experience.

1.5 DELIVERY STORAGE AND HANDLING

System modules shall be factory assembled to the greatest extent possible. Panels shall be shipped to the jobsite in rugged shipping units and shall be ready for erection. Skylight panels shall be stored on the long edge, several inches above the ground, blocked and under cover to prevent warping. Unit skylights shall be delivered in manufacturer's original containers, dry, undamaged, with seals and labels intact. All products shall be delivered, stored and protected in accordance with manufacturer's recommendations.

1.6 WARRANTY

The Contractor shall provide to the Government the manufacturer's complete warranty for materials and workmanship. The warranty shall be for 5 years from the time of project completion and shall not be prorated.

PART 2 PRODUCTS

2.1 GENERAL

Size of the skylight unit shall be as shown, except that small variations may be allowed, subject to the approval of the Contracting Officer, so that the manufactuer's standard sized unuits may be used. Construction shall allow ready removal of the frame and domes for access to the well.

2.2 DOME AND FRAME

Dome skylights shall be factory assembled units each consisting of sealed double domes with 0.06 inch extruded aluminum frame with a polyurethane thermal break to prevent condensation on the interior portion of the frame and 0.06 inch extruded aluminum retainer cap. Interior dome shall be white. Exterior dome shall be clear.

2.2.1 Design Requirements

Uniform design load capacity of composite dome and frame shall meet or exceed 40 psf snow load. The unit shall have an insulated curb approximately 9 inches high; curb shall mount to the steel roof deck. Flashing shall be provided to seal the unit to the standing seam metal roof. The following companies manufactuer skylights which meet the requirements of these specifications:

Plastic Sales & Manufacturing Co Inc
Sunglo Skylight Products
3124 Gillham Plz
Kansas City, Missouri 64109
800/821-6656

Cadillac Plasticrafts
600 W Bayaud Ave
Denver, Colorado 80223

Model 2-MTB-Custom

Plastico, Inc
P.O. Box 24158
Houston, Texas 77229-4158
800/231-6117
Model 71-TG

PART 3 EXECUTION

3.1 PREPARATION

The Contractor shall verify when structural support is ready to receive all specified work. All submitted opening sizes, dimensions and tolerances shall be field verified; preparation of openings shall include isolating dissimilar materials from aluminum system to avoid damage by electrolysis.

3.2 ERECTION

Translucent skylight system shall be erected in accordance with the approved shop drawings supplied by the manufacturer. Fastening and sealing shall be in accordance with the manufacturer's shop drawings. All panel protection shall be removed and, after other trades have completed work on adjacent materials, panel installation shall be carefully inspected and adjusted, if necessary, to ensure proper installation and weather-tight conditions. All staging, lifts and hoists required for the complete installation and field measuring shall be provided. System shall be installed clean of dirt, debris or staining and thoroughly examined for removal of all protective material prior to final inspection of the designated work area. Snow rakes shall not be used on roof windows/skylights.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 08 - DOORS & WINDOWS

SECTION 08700

BUILDERS' HARDWARE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING
1.4 SPECIAL TOOLS
1.5 WARRANTY
1.6 OPERATION AND MAINTENANCE MANUALS

PART 2 PRODUCTS

2.1 GENERAL HARDWARE REQUIREMENTS
2.2 TEMPLATES
2.3 HINGES
2.3.1 Hinges for Reverse Bevel Doors with Locks
2.3.2 Contractor's Option
2.4 EXIT DEVICES AND EXIT DEVICE ACCESSORIES
2.4.1 Exit Devices and Auxiliary Items
2.4.2 Auxiliary Locks and Associated Products
2.4.3 Lock Cylinders (Mortise, Rim and Bored)
2.4.4 Lock Trim
2.5 KEYING
2.6 DOOR CLOSING DEVICES
2.6.1 Surface Type Closers
2.7 ARCHITECTURAL DOOR TRIM
2.7.1 Door Protection Plates
2.7.1.1 Kick Plates
2.8 MISCELLANEOUS
2.8.1 Metal Thresholds
2.8.2 Rain Drips
2.8.3 Aluminum Housed Type Weatherseals
2.9 FASTENINGS
2.10 FINISHES

PART 3 EXECUTION

3.1 APPLICATION
3.1.1 Door-Closing Devices
3.1.2 Kick Plates and Mop Plates
3.1.3 Thresholds
3.1.4 Rain Drips
3.1.5 Weatherseals
3.2 HARDWARE SETS

-- End of Section Table of Contents --

SECTION 08700

BUILDERS' HARDWARE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1	(1997) Butts and Hinges
BHMA A156.3	(1994) Exit Devices
BHMA A156.4	(1992) Door Controls - Closers
BHMA A156.5	(1992) Auxiliary Locks & Associated Products
BHMA A156.7	(1997) Template Hinge Dimensions
BHMA A156.18	(1993) Materials and Finishes
BHMA A156.21	(1996) Thresholds

DOOR AND HARDWARE INSTITUTE (DHI)

DHI Keying Systems	(1989) Keying Systems and Nomenclature
DHI Locations for CSD	(1997) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames
DHI Locations for SSD	(1990) Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames
DHI ANSI/DHI A115.1G	(1994) Installation Guide for Doors and Hardware
DHI ANSI/DHI A115-W	(Varies) Wood Door Hardware Standards (Incl All5-W1 thru A115-W9)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Hardware Schedule; G, ED

Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

Keying; G, ED

Keying schedule developed in accordance with DHI Keying Systems, after the keying meeting with the user.

1.3 DELIVERY, STORAGE, AND HANDLING

Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

1.4 SPECIAL TOOLS

Special tools, such as those supplied by the manufacturer, unique wrenches, and dogging keys, shall be provided as required to adjust hardware items.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties shall be provided.

1.6 OPERATION AND MAINTENANCE MANUALS

Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided.

PART 2 PRODUCTS

2.1 GENERAL HARDWARE REQUIREMENTS

Hardware shall conform to the requirements specified herein and the HARDWARE SETS listing at the end of this section. The following hardware shall be provided matching Owner's existing. No substitututes allowed.

a. Locks: Russwinn ML2265 with LWA handle stainless steel.

b. Cylinders: MEDCO.

c. HingesL Stanley FBB199 - stainless steel.

Hardware set numbers correspond to the set numbers shown on the drawings.

2.2 TEMPLATES

Requirements for hardware to be mounted on metal doors or metal frames shall be coordinated between hardware manufacturer and door or frame manufacturer by use of templates and other information to establish location, reinforcement required, size of holes, and similar details. Templates of hinges shall conform to BHMA A156.7.

2.3 HINGES

Hinges shall conform to BHMA A156.1. Hinges used on metal doors and frames shall also conform to BHMA A156.7. Except as otherwise specified, hinge sizes shall conform to the hinge manufacturer's printed recommendations.

2.3.1 Hinges for Reverse Bevel Doors with Locks

Hinges for reverse bevel doors with locks shall have pins that are made nonremovable by means such as a set screw in the barrel, or safety stud, when the door is in the closed position.

2.3.2 Contractor's Option

Hinges with antifriction bearings may be furnished in lieu of ball bearing hinges.

2.4 EXIT DEVICES AND EXIT DEVICE ACCESSORIES

Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1. To the maximum extent possible, exit devices and all components thereof, including cylinders, shall be the products of a single manufacturer.

2.4.1 Exit Devices and Auxiliary Items

Touch bars shall be provided in lieu of conventional crossbars and arms.

2.4.2 Auxiliary Locks and Associated Products

Bored and mortise dead locks and dead latches, narrow style dead locks and dead latches, rim latches, dead latches, and dead bolts, shall conform to BHMA A156.5. Bolt and latch retraction shall be dead bolt style. Strike boxes shall be furnished with dead bolt and latch strikes for Grade 1.

2.4.3 Lock Cylinders (Mortise, Rim and Bored)

Lock cylinders shall comply with BHMA A156.5. Lock cylinder shall have not less than six pins. A master keying system shall be provided.

2.4.4 Lock Trim

Lock trim shall be heavy wrought construction of commercial plain design. Lever handles and escutcheons shall be 0.050 inch thick, if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch except that knob shanks shall be 0.060 inch thick. Lever handles shall be of plain design with ends returned to no more than 1/2 inch from the door face. Adjustable strikes shall be provided for rim type devices. Escutcheons shall be provided not less than 7 by 2-1/4 inches. Escutcheons shall be cut to suit cylinders and operating trim.

2.5 KEYING

Locks shall be keyed in sets or subsets as scheduled. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." Keys shall be supplied as follows:

Locks:	3 change keys each lock.
Master keyed sets:	3 keys each set.

The keys shall be furnished to the Contracting Officer arranged in sets or subsets as scheduled. Review the keying system with the Contracting Officer and provide the type required (master, grandmaster or great-grandmaster). Comply with Contracting Officer's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

2.6 DOOR CLOSING DEVICES

Door closing devices shall conform to BHMA A156.4, Grade 1. Closing devices shall be products of one manufacturer for each type specified. The opening resistance of closing devices shall not exceed 15 1bf applied at the latch stile or exceed 5 1bf.

2.6.1 Surface Type Closers

Surface type closers shall be Grade 1, Series C02000 Standard Cover with options PT-4C, Size 1 or 2 through Size 6. Except as otherwise specified, sizes shall conform to the manufacturer's published recommendations. Closers for outswinging exterior doors shall have parallel arms or shall be top jamb mounted.

2.7 ARCHITECTURAL DOOR TRIM

2.7.1 Door Protection Plates

2.7.1.1 Kick Plates

Kick plates shall be Type J102 stainless steel. Width of plates shall be 2 inches less than door width for single doors and 1 inchless for pairs of doors. Height shall be 16 inches. Edges of metal plates shall be beveled.

2.8 MISCELLANEOUS

2.8.1 Metal Thresholds

Thresholds shall conform to BHMA A156.21. Thresholds for exterior doors shall be extruded aluminum of the type indicated and shall provide proper clearance and an effective seal with specified weather stripping.

Thresholds shall be beveled with slopes not exceeding 1:2 and with heights not exceeding 1/2 inch.

2.8.2 Rain Drips

Extruded aluminum, not less than 0.07 inch thick, clear anodized. Door sill rain drips shall be 1-1/2 inches to 1-3/4 inches high by 5/8 inch projection. Overhead rain drips shall be approximately 1-1/2 inches high by 2-1/2 inches projection and shall extend 2 inches on either side of the door opening width.

2.8.3 Aluminum Housed Type Weatherseals

Weatherseals of the type indicated shall consist of extruded aluminum retainers not less than 0.07 inch wall thickness with vinyl, neoprene, silicone rubber, polyurethane or vinyl brush inserts. Aluminum shall be clear (natural) anodized. Weatherseal material shall be of an industrial/commercial grade. Seals shall remain functional through all weather and temperature conditions. Air leakage rate of weatherstripping shall not exceed 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

2.9 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete or masonry. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel.

2.10 FINISHES

Unless otherwise specified, finishes shall conform to those identified in BHMA A156.18. Where painting of primed surfaces is required, painting is specified in Section 09900 PAINTING, GENERAL.

PART 3 EXECUTION

3.1 APPLICATION

Hardware shall be located in accordance with DHI Locations for CSD and DHI Locations for SSD, except that deadlocks shall be mounted 48 inches above finish floor. When approved, slight variations in locations or dimensions will be permitted. Application shall be in accordance with DHI ANSI/DHI A115.1G or DHI ANSI/DHI A115-W. Door control devices for exterior doors such as closers and holders, shall be attached to doors with thru bolts and nuts or sex bolts. Alternate fastening methods may be approved by the Contracting Officer when manufacturers' documentation is submitted to verify that the fastening devices and door reinforcements are adequate to resist wind induced stresses.

3.1.1 Door-Closing Devices

Door-closing devices shall be installed and adjusted in accordance with the templates and printed instructions supplied by the manufacturer of the devices. Doors opening to the exterior shall have the closer mounted on the interior side of the door.

3.1.2 Kick Plates and Mop Plates

Kick plates shall be installed on the push side of doors.

3.1.3 Thresholds

Thresholds shall be secured with a minimum of three fasteners per single door width and six fasteners per double door width with a maximum spacing of 12 inches. Exterior thresholds shall be installed in a bed of sealant with expansion anchors and stainless steel screws, except that bronze or anodized bronze thresholds shall be installed with expansion anchors with brass screws. Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inchthread engagement into the floor or anchoring device used.

3.1.4 Rain Drips

Door sill rain drips shall align with the bottom edge of the door. Overhead rain drips shall align with bottom edge of door frame rabbet. Drips shall be set in sealant and fastened with stainless steel screws.

3.1.5 Weatherseals

Weatherseals shall be located as indicated, snug to door face and fastened in place with color matched metal screws after door and frames have been finish painted. Screw spacing shall be as recommended by manufacturer.

3.2 HARDWARE SETS

HW-1 Pump Station Doors

1-1/2 pr.	Hinges, A2111, 626, hinge height: 4-1/2 inches
1 ea.	Exit Device, Type 1, Function 08-Grade 1, 626
1 ea.	Closer, C02021, 628
1 ea.	Kick Plate, J102, 630
1 set	Weatherseals, 628
1 ea.	Rain drip, 628
1 ea.	Threshold, J603 J32130

HW-2 Pump Station Pipe Chase and Mechanical Room Doors

1-1/2 pr.	Hinges, A2111, 626, hinge height: 4-1/2 inches
1 ea.	Mortise Lockset, Type 1, Function 04-Grade 1, 626
1 ea.	Closer, C02021, 628
1 ea.	Raindrip, 628
1 ea.	Threshold, J603 J32130

HW-3 Pre-Engineered Building (Storage Shed) Service Door

1-1/2 pr.	Hinges, A2111, 626, hinge height: 4-1/2 inches
1 ea.	Exit Device, Type 1, Function 08-Grade 1, 626
1 ea.	Closer, C02021, 628
1 ea.	Kick Plate, J102, 630
1 set	Weatherseals, 628
1 ea.	Rain drip, 628
1 ea.	Threshold, J603 J32130

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09900

PAINTING, GENERAL

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 PACKAGING, LABELING, AND STORING
1.4 APPROVAL OF MATERIALS
1.5 ENVIRONMENTAL CONDITIONS
1.6 SAFETY AND HEALTH
1.6.1 Worker Exposures
1.6.2 Toxic Compounds
1.6.3 Training
1.6.4 Coordination

PART 2 PRODUCTS

2.1 PAINT
2.1.1 Colors and Tints
2.1.2 Lead
2.1.3 Chromium
2.1.4 Volatile Organic Compound (VOC) Content

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED
3.2 SURFACE PREPARATION
3.2.1 Masonry Surfaces (Not Used)
3.2.2 Ferrous Surfaces
3.2.3 Nonferrous Metallic Surfaces
3.3 MIXING AND THINNING
3.3.1 Two-Component Systems
3.4 APPLICATION
3.4.1 Ventilation
3.4.2 Respirators
3.4.3 First Coat
3.4.4 Timing
3.5 Aluminum and Aluminum Alloys Requiring Galvanic Protection
3.6 SURFACES TO BE PAINTED
3.7 SURFACES NOT TO BE PAINTED
3.8 CLEANING
3.9 PAINTING SCHEDULES

-- End of Section Table of Contents --

SECTION 09900

PAINTING, GENERAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values	(1999) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4258	(1999) Surface Cleaning Concrete for Coating

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1788	(Canc. Notice 1)) Varnish, Oil; Interior
CID A-A-2246	(Rev B) Paint, Latex
CID A-A-2336	(Rev A) Primer Coating (Alkyd, Exterior Wood, White and Tints)
CID A-A-2867	Coating, Polyurethane, Single Component Moisture Cure, Alipathic
CID A-A-2962	(Rev A) Enamel, Alkyd (Metric)
CID A-A-2994	Primer Coating, Interior, for Walls and Wood

FEDERAL SPECIFICATIONS (FS)

FS TT-E-2784	(Rev A) Enamel (Acrylic-Emulsion, Exterior Gloss and Semigloss) (Metric)
FS TT-P-38	(Rev E) Paint, Aluminum (Ready-Mixed)
FS TT-P-645B	(1979) Primer, Paint, Zinc-Molybdate Alkyd Type
FS TT-S-708	(Rev A; Am 2; Notice 1) Stain, Oil; Semi-Transparent, Wood, Exterior
FS TT-S-001992	(Basic; Notice 1) Stain, Latex, Exterior for Wood Surfaces

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 5	(1995) Zinc Dust, Zinc Oxide and Phenolic Varnish Paint
SSPC Paint 20	(1991) Zinc-Rich Primers (Type I - "Inorganic" and Type II - "Organic")
SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 7/NACE 4	(1994) Brush-Off Blast Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Paint;

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials when the required quantity of a particular batch is 50 gallons or less.

Mixing and Thinning; Application; .

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane, and liquid glaze coatings. Detailed application instructions for textured coatings shall be provided.

SD-04 Samples

Paint;

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 quart sample of each color and batch, except for quantities of 50 gallons or less, shall be taken by random selection from the sealed containers by the Contractor in the presence of a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved.

SD-06 Test Reports

Paint;

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 50 gallons:

a. A test report showing that the proposed batch to be used meets specified requirements:

b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per gallon, viscosity, fineness of grind, drying time, color, and gloss.

SD-07 Certificates

Lead; Volatile Organic Compound (VOC) Content; .

Certificate stating that paints for interior use contain no mercurial mildewcide or insecticide. Certificate stating that paints proposed for use contain not more than 0.06 percent lead by weight of the total nonvolatile. Certificate stating that paints proposed for use meet Federal VOC regulations and those of the of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located.

1.3 PACKAGING, LABELING, AND STORING

Paints shall be in sealed containers that legibly show the designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinner shall be stored in accordance with the manufacturer's written directions and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 40 and 95 degrees F. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for testing.

1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 45 and 95 degrees F when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 50 and 90 degrees F. Epoxy, and moisture-curing polyurethane

coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent.

1.6 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

1.6.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.6.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 50 gallons or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

2.1.1 Colors and Tints

Colors shall be as selected from manufacturer's standard colors, as indicated. Manufacturer's standard color is for identification of color only. Tinting of epoxy and urethane paints shall be done by the manufacturer. Stains shall conform in shade to manufacturer's standard color. The color of the undercoats shall vary slightly from the color of the next coat.

2.1.2 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

2.1.3 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

2.1.4 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition.

3.2 SURFACE PREPARATION

Surfaces to be painted shall be clean and free of foreign matter before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primmed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Masonry Surfaces (Not Used)

3.2.2 Ferrous Surfaces

Ferrous surfaces including those that have been shop-coated, shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to SSPC SP 2, power tools according to SSPC SP 3 or by sandblasting according to SSPC SP 7/NACE 4. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.2.3 Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces to be painted shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1.

3.3 MIXING AND THINNING

When thinning is approved as necessary to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.3.1 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.4.1 Ventilation

Affected areas shall be ventilated during paint application so that workers exposure to chemical substances shall not exceed limits as established by ACGIH Limit Values, or as required by a more stringent applicable regulation. Interior work zones having a volume of 10,000 cubic feet or less shall be ventilated at a minimum of 2 air exchanges per hour. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Return air inlets in the work zone shall be temporarily sealed before start of work until the coatings have dried.

3.4.2 Respirators

Operators and personnel in the vicinity of operating paint sprayers shall wear respirators.

3.4.3 First Coat

The first coat on gypsum wallboard, and other surfaces shall include repeated touching up of suction spots or overall application of primer or sealer to produce uniform color and gloss. Excess sealer shall be wiped off after each application. Each varnish coat shall be sanded lightly prior to application of subsequent coats.

3.4.4 Timing

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit weather conditions. Oil-based or oleoresinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause the undercoat to lift or lose adhesion. Manufacturer's instructions for application, curing and drying time between coats of two-component systems shall be followed.

3.5 Aluminum and Aluminum Alloys Requiring Galvanic Protection

Aluminum surfaces to be in contact with wet or pressure-treated wood, mortar, concrete, masonry, or ferrous metals shall be protected against galvanic or corrosive action using either a nonabsorptive tape or gasket as specified in Section 07600 SHEET METALWORK, GENERAL, or by painting the aluminum in contact with the above surfaces as follows:

Aluminum surfaces shall be solvent cleaned in accordance with SSPC SP 1, given one coat of zinc-molybdate primer meeting the requirements of FS TT-P-645B and one coat of aluminum paint meeting the requirements of FS TT-P-38.

3.6 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section, other than those listed in paragraph SURFACES NOT TO BE PAINTED, shall be painted as scheduled.

3.7 SURFACES NOT TO BE PAINTED

Surfaces in the following areas shall not be painted:

a. Concrete.

b. Metals fully embedded in concrete (except aluminum).

c. Factory name plates.

d. Galvanized steel items (except doors).

e. Aluminum items.

f. Stainless Steel items.

g. Factory Finished Metal Roofing and Flashing.

h. Burnished concrete masonry units.

i. Brick.

j. Piping.

k. In addition, surfaces of hardware, fittings, and other factory finished items shall not be painted.

3.8 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint and other deposits on adjacent surfaces shall be removed and the entire job left clean and acceptable.

3.9 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by ------or------ between optional systems or coats.

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Ferrous metal unless otherwise specified	SSPC Paint 5	CID A-A-2962 Type I Grade C	CID A-A-2962 Type 1 Grade C
Galvanized metal.	FS TT-E-2784 Type III	FS TT-E-2784	FS TT-E-2784
Ferrous surfaces of mechanical and electrical equipment and builders hardware that have been factory primed	Two coats of paint as recommended by the equipment manufacturer		
Aluminum aluminum-alloy, and other non-ferrous metal (non-galvanized)	CID A-A-2867	CID A-A-2867	None
	FS TT-E-2784 Type III	FS TT-E-2784 Type II	FS TT-E-2784 Type II
Aluminum aluminum-alloy,	FS TT-P-645B	FS TT-P-38	None

EXTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
and other non-ferrous metal (non-galvanized) requiring galvanic protection			

INTERIOR PAINTING SCHEDULE

Surface	First Coat	Second Coat	Third Coat
Ferrous Metal unless otherwise specified	SSPC Paint 25	CID A-A-2962 Type I Grade C	CID A-A-2962 Type I Grade C
Galvanized metal:	FS TT-E-2784 Type III	FS TT-E-2784	None
Ferrous surfaces of mechanical and electrical equipment and builders hardware that have been factory primed	Two coats of paint as recommended by the equipment manufacturer		
Aluminum and aluminum alloy unless otherwise specified.	CID A-A-2867	CID A-A-2867	None
	FS TT-E-2784 Type III	FS TT-E-2784 Type II	FS TT-E-2784 Type II

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13120

STANDARD METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 GENERAL REQUIREMENTS
1.3.1 Building Configuration
1.3.2 Qualifications
1.3.2.1 Manufacturer
1.3.2.2 Installer
1.3.2.3 Manufacturer's Representative
1.3.3 UL Compliance
1.4 DESIGN REQUIREMENTS
1.4.1 Dead Loads
1.4.2 Collateral Loads
1.4.3 Roof Live Loads
1.4.3.1 Uniform Loads
1.4.3.2 Concentrated Loads
1.4.4 Roof Snow Loads
1.4.5 Wind Loads
1.4.6 Seismic Loads
1.4.7 Impact Loads (Not used)
1.4.8 Foundations
1.4.9 Framing and Structural Members
1.4.10 Roofing and Siding
1.4.11 Provisions for Gutters And Downspouts
1.4.12 Provisions for Louvers (Not used)
1.4.13 Ventilators
1.4.13.1 Circular Ventilators (Not used)
1.4.13.2 Continuous Ventilators
1.4.14 Drift Provisions
1.4.15 Cranes (Not used)
1.5 DESIGN ANALYSIS
1.6 DELIVERY AND STORAGE
1.7 WARRANTIES
1.7.1 Prime Contractor's Weathertightness Warranty
1.7.2 Manufacturer's Material and/or System Weathertightness Warranties
1.8 COORDINATION MEETING

PART 2 PRODUCTS

2.1 BUILDING COMPONENTS
2.2 FRAMING AND STRUCTURAL MEMBERS
2.3 ROOFING AND SIDING
2.3.1 Roofing
2.3.2 Siding

2.3.3 Steel Panels
2.3.4 Aluminum Panels (Not Used)
2.3.5 Factory Insulated Panels (Not Used)
2.3.6 Factory Color Finish
2.3.6.1 Salt Spray Test
2.3.6.2 Formability Test
2.3.6.3 Accelerated Weathering, Chalking Resistance and Color Change
2.3.6.4 Humidity Test
2.3.6.5 Impact Resistance
2.3.6.6 Abrasion Resistance Test
2.3.6.7 Specular Gloss (Not Used)
2.3.6.8 Pollution Resistance
2.3.7 Accessories
2.4 WALL LINERS
2.5 FASTENERS
2.5.1 Screws
2.5.2 End-Welded Studs
2.5.3 Explosive Actuated Fasteners
2.5.4 Blind Rivets
2.5.5 Bolts
2.6 GUTTERS AND DOWNSPOUTS
2.7 LOUVERS (Not Used)
2.8 CIRCULAR ROOF VENTILATORS (Not Used)
2.9 CONTINUOUS ROOF VENTILATORS
2.10 SKYLIGHTS (Not Used)
2.11 TRANSLUCENT PANELS (Not Used)
2.12 DOORS
2.12.1 Hinged Doors
2.12.2 Sliding Doors (Not Used)
2.12.3 Overhead Doors Rolling Doors
2.12.4 Sectional Overhead Doors (Not Used)
2.13 WINDOWS (Not used)
2.14 INSULATION
2.14.1 Rigid Board Insulation
2.14.1.1 Polyisocyanurate
2.14.1.2 Polystyrene
2.14.1.3 Mineral Fiber
2.14.1.4 Blanket Insulation
2.14.1.5 Insulation Retainers
2.15 SEALANT
2.16 GASKETS AND INSULATING COMPOUNDS
2.17 VAPOR RETARDER
2.17.1 Vapor Retarders as Integral Facing
2.17.2 Vapor Retarders Separate from Insulation
2.18 SHOP PRIMING
2.19 SHELVING
2.20 HEATING SYSTEM
2.20.1 Heater Controls
2.20.2 Heater Control Compartment
2.20.3 Heating Element
2.21 FLOOR DRAIN SYSTEM
2.21.1 Fiberglass Catch Basin
2.21.1.1 Frame and Grate
2.21.2 PIPE FOR CULVERTS AND STORM DRAINS
2.21.2.1 Cast-Iron Hub and Spigot Pipe and Fittings
2.21.2.2 Floor Cleanouts
#.1 CAST IRON TRENCH DRAIN

PART 3 EXECUTION

3.1 ERECTION
3.1.1 Framing Members and Anchor Bolts
3.1.2 Roofing and Siding Installation
3.1.3 Installation of Gutters and Downspouts
3.1.4 Louvers and Ventilators (Not Used)
3.1.5 Doors and Windows
3.1.6 Insulation Installation
3.1.6.1 Board Insulation with Blanket Insulation
3.1.6.2 Blanket Insulation
3.1.7 Vapor Retarder Installation
3.1.7.1 Integral Facing on Blanket Insulation
3.1.7.2 Polyethylene Vapor Retarder
3.1.8 Wall Liner
3.1.9 Shelving
3.2 HEATING SYSTEM INSTALLATION
3.2.1 Sand Fill
3.2.2 Heating Panels
3.2.3 Electrical Work
3.2.4 Foundation Insulation
3.2.5 Testing
3.2.5.1 Heaters
3.3 FLOOR DRAIN INSTALLATION
3.4 FIELD PAINTING

-- End of Section Table of Contents --

SECTION 13120

STANDARD METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA Design Manual	(2000) Aluminum Design Manual: Specification & Guidelines for Aluminum Structures
AA Standards & Data	(1997) Aluminum Standards and Data

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 101	(1997) Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program
AISC Pub No. S303	(2000) Code of Standard Practice for Steel Buildings and Bridges
AISC Pub No. S329	(1985; Appx A June 1994) Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts
AISC Pub No. S342 L	(1993) Load and Resistance Factor Design Specification for Structural Steel Buildings
AISC ASD Spec S335	(1989) Specification for Structural Steel Buildings - Allowable Stress Design, Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI Cold-Formed Mnl	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A 74	(1996) Cast Iron Soil Pipe and Fittings
ASTM A 252	(1998) Welded and Seamless Steel Pipe Piles
ASTM A 325	(2000) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 325M	(2000) High-Strength Bolts for Structural Steel Joints (Metric)
ASTM A 463/A 463M	(2000) Steel Sheet, Aluminum-Coated by the Hot-Dip Process
ASTM A 490	(2000) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 490M	(2000) High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1999) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 529/A 529M	(2000) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 570/A 570M	(1998) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 572/A 572M	(2000) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588/A 588M	(2000) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 606	(1998) Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A 607	(1998) Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or Both, Hot-Rolled and Cold-Rolled
ASTM A 618	(1999) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 653/A 653M	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 792/A 792M	(1999) Steel Sheet, 55% Aluminum-Zinc

	Alloy-Coated by the Hot-Dip Process
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 209M	(2001) Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B 221	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 221M	(2000) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B 241/B 241M	(2000) Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM B 308/B 308M	(2000) Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM B 429	(2000) Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 553	(1999) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 564	(1997) Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 612	(2000) Mineral Fiber Block and Board Thermal Insulation
ASTM C 991	(1998) Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 522	(1993a; R 01) Mandrel Bend Test of Attached Organic Coatings
ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 00) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1995) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1999) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993; R 1999el) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1997) Measuring Adhesion by Tape Test
ASTM D 3841	(1997) Glass-Fiber-Reinforced Polyester Plastic Panels
ASTM D 4141	(1995) Standard Practice for Conducting Accelerated Outdoor Exposure Tests of Coatings
ASTM D 4214	(1998) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E 84	(2001) Surface Burning Characteristics of Building Materials
ASTM E 96	(2000) Water Vapor Transmission of Materials

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1998) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

U.S. ARMY CORPS OF ENGINEERS (USACE)

TI 809-04	(1998) Seismic Design for Buildings

TI 809-07	(1998) Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls

MATERIAL HANDLING INDUSTRY (MHI)

MHI CMAA 70	(1994) Electric Overhead Traveling Cranes

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA Low Rise Manual	(1996) Low Rise Building Systems Manual

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(1993; Errata; Addenda Oct 1997) Architectural Sheet Metal Manual

STEEL DOOR INSTITUTE (SDOI)

SDOI SDI-100	(1991) Standard Steel Doors and Frames

STEEL WINDOW INSTITUTE (SWI)

SWI Specifier's Guide	(1995) The Specifier's Guide to Steel Windows

UNDERWRITERS LABORATORIES (UL)

UL 580	(1994; Rev thru Feb 1998) Tests for Uplift Resistance of Roof Assemblies

CAST IRON SOIL PIPE INSTITUTE (CISPI)

CISPI HSN-85	(1985) Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Building Shop Drawings; G, ED

Detail drawings consisting of catalog cuts, design and erection drawings, and an isometric view of the roof showing the design wind uplift pressure and dimensions of edge and corner zones. Shop painting and finishing specifications. Anchor bolt placement plan and column reactions.

Heating Equipment Shop Drawings; G, ED

Shop drawings shall be provided for all heating equipment and materials. Submittals shall include manufacturer's descriptive and

technical literature, performance charts, and catalog cuts. Drawings shall indicate clearances required for maintenance and operation. The following shop drawings shall be submitted:

a) Heating systems. Locations and sizes of all heating panels shall be shown.

b) Wiring diagrams for the heating system.

Floor Drain Equipment; G, ED

Detail drawings consisting of catalog cuts and other information showing all dimensions, materials, standards and all other features of the cast iron trench drain, fiberglass catch basin, cast iron frame and grate on top of the catch basin, type of pipe and pipe joints, connections of all components of the floor drain, and layout of all component parts.

SD-03 Product Data

Design Analysis; G, ED

Design analysis (building and foundations including anchor bolt plans) as one package with the drawings.

Instruction Manuals;

Manufacturer's literature for individual building component systems.

Erection;

Manufacturer's erection instruction and erection drawings describing the preparation requirements, assembly sequence, temporary bracing, shoring, and related information necessary for erection of the metal building including its structural framework and components.

Qualifications; G, CO

Qualifications of the manufacturer, the manufacturer's Representative when one is used, and qualifications and experience of the building erector. A brief list of locations where buildings of similar design have been used shall be included with the detail drawings and shall also include information regarding date of completion, name and address of owner, and how the structure is used.

Shelving;

Manufacturer's literature and installation instructions.

Heating Equipment; G, ED

Provide manufacturer's bulletins, catalogue cuts, etc. on the heating equipment supplied under this contract. Rating, control information, physical dimensions, etc. shall be given.

SD-04 Samples

Accessories;

One sample of each type of flashing, trim, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Roofing and Siding;

One piece of each type and finish (exterior and interior) to be used, 9 inches long, full width. The sample for factory color finished covering shall be accompanied by certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than 5 pieces has been tested and has met the quality standards specified for factory color finish.

Fasteners;

Two samples of each type to be used, with statement regarding intended use. If so requested, random samples of bolts, nuts, and washers as delivered to the job site shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Insulation;

One piece of each type to be used, and descriptive data covering installation.

Gaskets and Insulating Compounds;

Two samples of each type to be used and descriptive data.

Sealant;

One sample, approximately 1 pound, and descriptive data.

Wall Liners;

One piece, 9 inches long, full width.

SD-06 Test Reports

Performance Test Reports; G, ED

Upon completion and testing of the installed heating system, test reports shall be submitted in booklet form showing all field tests performed.

SD-07 Certificates

Metal Building Systems;

a. A Certificate from the metal building manufacturer stating that the metal building was designed from a complete set of the contract drawings and specifications and that the building furnished complies with the specified requirements.

b. Mill certification for structural bolts, framing steel, roofing and siding, and steel wall liner panels.

c. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Metal Building System, a sample copy of which is attached to this section, the 20-year Manufacturer's Material Warranties, and the Manufacturer's 20-year System Weathertightness Warranty when one is required.

Insulation;

Certificate attesting that the polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

1.3 GENERAL REQUIREMENTS

The metal building system covered under this specification shall be provided by a single manufacturer and shall include all components and assemblies that form a building. Structural Standing Seam Metal Roofing System, when specified, shall be furnished as part of a single manufacturer's system.

1.3.1 Building Configuration

Buildings shall have structural steel main building frames, and secondary framing including purlins and girts, engineered and fabricated by the building systems supplier. Buildings shall have vertical steel walls and gable roof system. Roof slope shall be 1 vertical to 12 horizontal or steeper. Buildings shall be single-span structures with one of the following framing systems: rigid frame, column with single-span or continuous trusses, continuous beam frames, or column with rigid frame. Exterior doors, overhead doors and stack shelving shall be included in the metal building system. Building dimensions shall be not less than 60 feet deep by 75 feet wide, with the 75 foot dimension being on the gable ends. Two overhead doors shall be located on the gable end closest to the road and one service door shall be located on the west side at the end of the wall closest to the overhead doors. The building shall have the following properties:

16' High sidewalls
26 Gauge wall panels
24 Gauge standing seam metal roof
29 Gauge white liner panel on walls and ceiling
Full insulation in walls and ceilings
(2) 14' x 14' Overhead doors with commercial openers
(4) 6" Guard posts at each overhead door (8 total)
(1) 3' x 7' Service door
Full foundation with frost footings (reinforced concrete)
Heated with under floor radiant heat system (earth storage type)
6" Thick concrete floor with #4 rebar @ 16" o.c. ea. way, see drawings for foundation plan
Floor drain with sand and oil separator
10' x 60' x 6" Concrete apron with #4 rebar @ 16" o.c. ea. way
60 lf of stack shelving
Electrical:
(6) Hanging lights
(4) 110v Outlets

(1) Light switch
200-amp Service, see Section 01140 for power company
(2) Exterior wall pac lights

1.3.2 Qualifications

1.3.2.1 Manufacturer

Metal building shall be the product of a recognized steel building systems manufacturer who has been in the practice of manufacturing steel building systems for a period of not less than 5 years. The manufacturer shall be chiefly engaged in the practice of designing and fabricating steel building systems. The manufacturer shall be certified under the Metal Building Systems (MB) Certification Program, AISC FCD. Structural framing and covering shall be designed by a licensed Professional Engineer experienced in design of this work.

1.3.2.2 Installer

Erector shall have specialized experience in the erection of steel building systems for a period of at least 3 years. Framing shall be erected in accordance with MBMA Low Rise Manual, common industry practices and erection instructions describing the basic sequence of assembly, temporary bracing, shoring, and related information necessary for erection of the metal building including its structural framework and components. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads acting on the exposed framing, such as wind loads and seismic forces, as well as loads due to erection equipment and erection operation. Bracing furnished by the manufacturer for the metal building system shall not be assumed to be adequate during erection. Structural members shall not be field cut or altered without approval of the metal building manufacturer. Welds, abrasions, and surfaces not shop primed or galvanized shall be primed after erection.

1.3.2.3 Manufacturer's Representative

A representative designated by the building manufacturer, who is familiar with the design of the building supplied and experienced in the erection of metal buildings similar in size to the one required under this contract, shall be present at the job site during construction, from the start of the structural framing erection until completion of the installation of the exterior covering, to assure that the building is erected properly.

1.3.3 UL Compliance

Electrical appliances and equipment supplied shall meet the Underwriters Laboratory requirements regarding fire and casualty hazards. The label or listing by the Underwriters Laboratory will be accepted as proof of conforming with this requirement.

1.4 DESIGN REQUIREMENTS

Criteria and definitions shall be in accordance with MBMA Low Rise Manual, except criteria for seismic loads which shall be in accordance with TI 809-04 and all other loads and load combinations in accordance with ASCE 7.

1.4.1 Dead Loads

The dead load shall consist of the weight of all permanent construction such as roof, framing, covering members and all other materials of the building system.

1.4.2 Collateral Loads

Collateral load of 3 pounds per square foot shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings. This allowance does not include the weight of hung equipment weighing 50 pounds or more. Equipment loads of 50 pounds or more shall be shown on the shop (detail) drawings and the structure (frame, purlins, girts) shall be strengthened as required. The Contractor is responsible for providing the building manufacturer the magnitude and approximate location of all concentrated loads greater than 50 pounds before design of the building commences.

1.4.3 Roof Live Loads

1.4.3.1 Uniform Loads

Uniform roof live loads, including maintenance traffic and construction loads, shall be determined and applied in accordance with ASCE 7.

1.4.3.2 Concentrated Loads

In addition to ASCE 7 roof live loads, a minimum design concentrated load of 300 pounds shall be used to simulate a construction load on roof panels. The concentrated load shall be applied at the panel midspan and shall be resisted by a single standing seam metal roof panel, or a 24 inches wide corrugated metal panel, assumed to be acting as a beam. The undeformed shape of the panel shall be used to determine the section properties.

1.4.4 Roof Snow Loads

The design roof snow loads, including effects of drifting, shall be determined and applied in accordance with ASCE 7.

1.4.5 Wind Loads

Wind pressures shall be computed and applied in accordance with ASCE 7.

1.4.6 Seismic Loads

Seismic loads shall be computed in accordance with TI 809-04.

1.4.7 Impact Loads (Not used)

1.4.8 Foundations

Foundations shall be constructed as shown.

1.4.9 Framing and Structural Members

Structural steel members and their connections shall be designed in accordance with AISC ASD Spec S335 or AISC Pub No. S342 L. Structural cold-formed steel framing members and their connections shall be designed in accordance with TI 809-07. Aluminum structural members and their

connections shall be designed in accordance with AA Design Manual. Maximum deflection under applied live load, snow, or wind load shall not exceed 1/180th of the span length. Members with openings in their webs shall be designed with consideration of the additional stresses which will result due to the openings. Deflections of the steel framing above and along the side of commercially framed door openings shall be limited to a maximum allowable deflection of 1/360 of the opening width to ensure proper operation of the doors. The contractor shall include the loads that the door transfers to the building frame in the design. Framed openings shall be designed to structurally replace the covering and framing displaced. The subpurlin and/or purlin spacing shall not exceed 30 inches on centers at the corner, edge and ridge zones, and 5 foot maximum on centers for the remainder of the roof.

1.4.10 Roofing and Siding

Except as otherwise specified, steel roofing and siding shall be designed in accordance with AISI Cold-Formed Mnl. Aluminum roofing and siding shall be designed in accordance with AA Standards & Data. Section modulus and moment of inertia of aluminum sheet shall be determined for actual cross section dimensions by the conventional methods for actual design stresses and by effective width concept for deflection in accordance with AA Design Manual. Maximum deflection for wall and roof panels under applied live load, snow or wind loads shall not exceed 1/180th of the span length. The design analysis shall establish that the roof, when deflected under loading combinations, shall not result in ponding. Maximum deflections shall be based on sheets continuous across two or more supports with sheets unfastened and fully free to deflect. The calculated deflection from the concentrated load shall not exceed 1/180 of the span length. The methods for resisting lateral loads shall be cross-bracing, rigid frames, or wind columns.

1.4.11 Provisions for Gutters And Downspouts

Gutters and downspouts shall be designed according to the requirements of SMACNA Arch. Manual for storms which should be exceeded only once in 5 years and with adequate provisions for thermal expansion and contraction. Supports for gutters and downspouts shall be designed for the anticipated loads. Roof drainage system to withstand rainfall intensity of 5 inches per hour, with 5 minute duration.

1.4.12 Provisions for Louvers (Not used)

1.4.13 Ventilators

1.4.13.1 Circular Ventilators (Not used)

1.4.13.2 Continuous Ventilators

Continuous roof ventilators shall be ridge mounted gravity type, with dampers, designed for a minimum capacity of 100 cubic feet of air per minute for each 10 foot section based on a wind velocity of 5 miles per hour and an exterior-interior temperature differential of 10 degrees F and without screens in place.

1.4.14 Drift Provisions

Lateral deflections, or drift, at the roof level of a structure in relation

to the floor or slab on grade, caused by deflection of horizontal force resisting elements, shall conform to MBMA Low Rise Manual.

1.4.15 Cranes (Not used)

1.5 DESIGN ANALYSIS

The design analysis shall be the design of a licensed Professional Engineer experienced in design of this work and shall include complete calculations for the building, its components, and the foundations. Foundations shown on the drawings are based on loads derived from a representative set of similar building types. The Contractor shall obtain the services of a licensed Professional Engineer to verify that the foundations shown are adequate for the building supplied using the criteria in paragraph Foundations. Formulas and references shall be identified. Assumptions and conclusions shall be explained, and cross-referencing shall be clear. Wind forces on various parts of the structure, both positive and negative pressure, shall be calculated with the controlling pressure summarized. Lateral forces due to seismic loading shall be calculated and tabulated for the various parts and portions of the building. Computer programmed designs shall be accompanied by stress values and a letter of certification, signed by a licensed Professional Engineer, stating the design criteria and procedures used and attesting to the adequacy and accuracy of the design. A narrative of the computer program delineating the basic methodology shall be included. Computer program output shall be annotated and supplemented with sketches to verify the input and output. Critical load conditions used in the final sizing of the members shall be emphasized. The design analysis shall include the name and office phone number of the designer, who shall function as a point of contact to answer questions during the detail drawing review.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for roofing and siding shall provide good air circulation and protection from surface staining.

1.7 WARRANTIES

The Metal Building System, composed of framing and structural members, roofing and siding, gutters and downspouts, accessories, fasteners, trim, and miscellaneous building closure items such as doors and windows (when furnished by the manufacturer) shall be warranted as described below against material and workmanship deficiencies, system deterioration caused by exposure to the elements and service design loads, leaks and wind uplift damage. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.7.1 Prime Contractor's Weathertightness Warranty

The Metal Building System shall be warranted by the Contractor on a no penal sum basis for a period of five years against materials and workmanship deficiencies; system deterioration caused by exposure to the

elements and/or inadequate resistance to specified service design loads, water leaks, and wind uplift damage. The Metal Building System covered under this warranty shall include but is not limited to the following: framing and structural members, roofing and siding panels and seams, interior or exterior gutters and downspouts, accessories, fasteners, trim, flashings and miscellaneous building closure items such as doors and windows (when furnished by the manufacturer), connectors, components, and fasteners, and other system components and assemblies installed to provide a weathertight system; and items specified in other sections of these specifications that become part of the metal building system. All material and workmanship deficiencies, system deterioration caused by exposure to the elements and/or inadequate resistance to specified service design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. See the attached Contractor's written warranty for issue resolution of warrantable defects. This warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor shall supplement this warranty with written warranties from the installer and/or system manufacturer, which shall be submitted along with Contractor's warranty. However, the Contractor is ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in attached **WARRANTY FOR METAL BUILDING SYSTEMS,** and start upon final acceptance of the facility. The Contractor shall provide a separate bond in an amount equal to the installed total metal building system cost in favor of the owner (Government) covering the Contractor's warranty responsibilities effective throughout the five year Contractor's warranty period for the entire metal building system as outlined above.

1.7.2 Manufacturer's Material and/or System Weathertightness Warranties

The Contractor shall furnish, in writing, the following manufacturer's material warranties to the Contracting Officer which cover all Metal Building System components:

a. A manufacturer's 20 year material warranty warranting that the specified aluminum, zinc-coated steel, aluminum-zinc alloy coated steel or aluminum-coated steel will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed securement system including fasteners and coil material.

b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214test procedures; or change colors in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to replacing the defective coated material.

1.8 COORDINATION MEETING

A coordination meeting shall be held within 45 days after contract award for mutual understanding of the metal building system contract requirements. This meeting shall take place at the building site and shall include representatives from the Contractor, the roofing/metal building system manufacturer, the roofing/metal building supplier, the erector, the

designer, and the Contracting Officer. All items required by paragraph SUBMITTALS shall be discussed, including applicable standard manufacturer shop drawings, and the approval process. The Contractor shall coordinate time and arrangements for the meeting. The building corners and all door locations shall be staked out prior to this meeting.

PART 2 PRODUCTS

2.1 BUILDING COMPONENTS

Each piece or part of the assembly shall be clearly and legibly marked to correspond with the drawings.

2.2 FRAMING AND STRUCTURAL MEMBERS

Steel 1/8 inch or more in thickness shall conform to ASTM A 36/A 36M, ASTM A 529/A 529M, ASTM A 572/A 572M, or ASTM A 588/A 588M. Uncoated steel less than 1/8 inch in thickness shall conform to ASTM A 570/A 570M, ASTM A 606, or ASTM A 607. Galvanized steel shall conform to ASTM A 653/A 653M, G 90 coating designation, 0.045 inch minimum thickness. Aluminum-zinc coated steel shall conform to ASTM A 792/A 792M, AZ 50 coating designation, 0.045 inch minimum thickness. Aluminum sheet shall conform to ASTM B 209, 0.032 inch minimum thickness. Aluminum structural shapes and tubes shall conform to ASTM B 221, or ASTM B 308/B 308M. Structural pipe shall conform to ASTM A 53/A 53M, ASTM A 252, ASTM A 500, ASTM A 501, ASTM A 618, ASTM B 221, ASTM B 241/B 241M or ASTM B 429. Holes for structural connections shall be made in the shop.

2.3 ROOFING AND SIDING

Roofing and siding shall be steel and shall have factory color finishes that generally match the adjacent city building. Color shall be as selected by the Contracting Officer.

2.3.1 Roofing

Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope unless otherwise approved. Width of sheets with interlocking ribs shall provide not less than 12 inches of coverage in place. Provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. Panel shall have configurations for overlapping sheets. Roof deck assemblies shall be Class 90 as defined in UL 580. Exposed, penetrating fastener may be used. Height of corrugation at overlap of adjacent roof sheets shall be the building manufacturer's standard for the indicated roof slope.

2.3.2 Siding

Length of sheet shall be sufficient to cover the entire height of any unbroken height of wall surface unless otherwise approved. Width of sheets with overlapping configurations shall provide not less than 24 inches of coverage in place. Width of sheets with interlocking ribs shall provide not less than 12 inches of coverage in place. Provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. Siding shall have configurations for overlapping adjacent sheets or interlocking ribs for securing adjacent sheets. Siding shall be fastened to framework using concealed fasteners or fasteners in panel reveals.

2.3.3 Steel Panels

Roofing and siding shall be zinc-coated steel conforming to ASTM A 653/A 653M, G 90 coating designation; aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 50 coating; or aluminum-coated steel conforming to ASTM A 463/A 463M, Type 2, coating designation T2 E5. Wall panels shall be 0.026 inch thick minimum.

2.3.4 Aluminum Panels (Not Used)

2.3.5 Factory Insulated Panels (Not Used)

2.3.6 Factory Color Finish

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall be as selected by the Contracting Officer from the manufacturer's standard or premium colors. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.2 mil thickness. The exterior color finish shall meet the test requirements specified below.

2.3.6.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 1000 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610 and a rating of 6, over 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.3.6.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

2.3.6.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested in a UV/Condensation Apparatus in accordance with ASTM D 4141 for 1000 total hours. Exposure conditions shall be as follows: 4 hours UV/60 degrees C followed by 4 hours CON/50 degrees C where UV = ultraviolet light (lamps) only and CON equals condensation conditions only. The coatings shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244.

2.3.6.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247

for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.3.6.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.3.6.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.3.6.7 Specular Gloss (Not Used)

2.3.6.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.3.7 Accessories

Flashing, trim, metal closure strips and curbs, fascia, caps, diverters, and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the building finish. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the roofing or siding and shall not absorb or retain water.

2.4 WALL LINERS

Wall liners shall be 0.018 inch thick minimum for steel with the same composition specified for siding, and formed or patterned to prevent waviness and distortion, and shall extend from floor to the ceiling. Matching metal trim shall be provided at base of wall liner, at top of wall liner, around openings in walls and over interior and exterior corners. Wall liners shall have the manufacturer's standard finishes. Colors shall be as selected by the Contracting Officer.

2.5 FASTENERS

Fasteners for standing seam metal roofs and steel wall panels shall be zinc-coated steel, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for aluminum wall panels shall be aluminum or corrosion resisting steel. Fasteners for attaching wall panels to supports shall provide both tensile and shear strength of not less than 750 lbs per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed wall fasteners shall be color finished or provided with plastic color caps to match the covering. Non penetrating fastener system for wall panels using concealed clips shall be manufacturer's standard for the system provided.

2.5.1 Screws

Screws shall be as recommended by the manufacturer to meet the design strength requirements.

2.5.2 End-Welded Studs

Automatic end-welded studs shall be shouldered type with a shank diameter of not less than 3/16 inch and cap or nut for holding covering against the shoulder.

2.5.3 Explosive Actuated Fasteners

Fasteners for use with explosive actuated tools shall have a shank of not less than 0.145 inch with a shank length of not less than 1/2 inch for fastening panels to steel and not less than 1 inch for fastening panels to concrete.

2.5.4 Blind Rivets

Blind rivets shall be aluminum with 3/16 inch nominal diameter shank or stainless steel with 1/8 inch nominal diameter shank. Rivets shall be threaded stem type if used for other than the fastening of trim. Rivets with hollow stems shall have closed ends.

2.5.5 Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.6 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be fabricated of aluminum, zinc-coated steel or aluminum-zinc alloy coated steel and shall have manufacturer's standard factory color finish. Minimum uncoated thickness of materials shall be 0.018 inch for steel and 0.032 inch for aluminum. All accessories necessary for the complete installation of the gutters and downspouts shall be furnished. Accessories shall include gutter straps, downspout elbows, downspout straps and fasteners fabricated from metal compatible with the gutters and downspouts.

2.7 LOUVERS (Not Used)

2.8 CIRCULAR ROOF VENTILATORS (Not Used)

2.9 CONTINUOUS ROOF VENTILATORS

Continuous roof ventilators shall be fabricated of aluminum, zinc-coated steel, or aluminum-zinc alloy coated steel, shall have manufacturer's factory color finish to match the roof, and shall be furnished with bird screens and chain or cable operated dampers. Minimum uncoated thickness of materials shall be 0.018 inch for steel and 0.032 inch for aluminum. Ventilators shall be furnished in 8 to 10 feet long sections braced at mid length.

2.10 SKYLIGHTS (Not Used)

2.11 TRANSLUCENT PANELS (Not Used)

2.12 DOORS

2.12.1 Hinged Doors

Hinged doors and frames shall receive a galvanic coating and factory primer and shall conform to the requirements of Section 08110 STEEL DOORS AND FRAMES. Exterior doors shall have top edges closed flush and sealed against water penetration. Hardware shall be as specified in Section 08700 BUILDERS HARDWARE.

2.12.2 Sliding Doors (Not Used)

2.12.3 Overhead Doors Rolling Doors

Overhead rolling doors shall conform to the requirements of Section 08330a OVERHEAD ROLLING DOORS.

2.12.4 Sectional Overhead Doors (Not Used)

2.13 WINDOWS (Not used)

2.14 INSULATION

Thermal resistance of insulation shall be not less than the R-18 in the walls and R-32 in the ceiling. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Roof and wall insulation, including facings, shall have a flame spread not in excess of 25 and a smoke developed rating not in excess of 50 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if tests are conducted in the insulation manufacturer's laboratory.

2.14.1 Rigid Board Insulation

2.14.1.1 Polyisocyanurate

Polyisocyanurate insulation shall conform to ASTM C 1289, Type I, Class 2 (having a minimum recovered material content of 9 percent by weight of core material in the polyisocyanurate portion). For impermeable faced polyisocyanurate (Ex: aluminum foil) the maximum design R-value per 1 inch of insulation used shall be 7.2 inch.

2.14.1.2 Polystyrene

Insulation shall conform to ASTM C 578, Type IV.

2.14.1.3 Mineral Fiber

Insulation shall conform to ASTM C 612.

2.14.1.4 Blanket Insulation

Blanket insulation shall conform to ASTM C 991.

2.14.1.5 Insulation Retainers

Retainers shall be type, size and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

2.15 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color or clear and shall cure to a rubber like consistency.

2.16 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be non running after drying.

2.17 VAPOR RETARDER

2.17.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white reinforced polypropylene kraft laminate (PSK). Facings and finishes shall be factory applied.

2.17.2 Vapor Retarders Separate from Insulation

Vapor retarder material shall be polyethylene sheeting conforming to the requirements of ASTM D 4397. A single ply of 10 mil polyethylene sheet; or, at the option of the Contractor, a double ply of 6 mil polyethylene sheet shall be used. A fully compatible polyethylene tape shall be provided which has equal or better water vapor control characteristics than the vapor retarder material. A cloth industrial duct tape in a utility grade shall also be provided to use as needed to protect the vapor retarder from puncturing.

2.18 SHOP PRIMING

Ferrous surfaces shall be cleaned of oil, grease, loose rust, loose mill scale, and other foreign substances and shop primed. Primer coating shall be in accordance with the manufacturer's standard system.

2.19 SHELVING

Shelving for storage building shall be from one manufacturer and shall be 48 inches wide and extend the entire width of building (approximately 60') along one wall. Shelving shall be Heavy Duty painted steel, with adjustable beams and frames and galvanized steel ribbed decking with a minimum capacity of 150 pounds per square foot. The shelving shall have

three shelves and a minimum height of 84 inches high.

2.20 HEATING SYSTEM

The heating system shall be an under floor, earth storage, radiant heat system equal to the "Smart Rooms" Thermal Comfort System manufactured by Therma-Ray. The heating system shall employ electric heat panels located beneath the concrete floor. The heating system shall be provided by a single manufacturer and shall include all components and assemblies that form a complete and fully functional heating system.

2.20.1 Heater Controls

Heat panels shall be controlled by a programmable controller manufactured by the heat panel manufacturer. The system shall be set up with a single zone for the storage building. A remote controller, wall mounted and manufactured by the heating system manufacturer, with one or more sensors installed within the concrete slab shall be integrated into the system. A high limit sensor or high temperature cut-out shall also be installed below the concrete slab and integrated into the system. The programmable controller shall be set up to take advantage of off peak electric power and shall be capable of controlling the following functions at a minimum:

Set temperature
Set start time
Set finish time
Set day of week

2.20.2 Heater Control Compartment

Controls for the heat panels shall be in an isolated compartment with a hinged cover which provides full access for servicing. All heat panel and control wiring shall terminate in the control compartment. Complete wiring diagram shall be attached to the inside of the access cover. A separate circuit breaker panel and electric meter shall be provided.

2.20.3 Heating Element

Heating element shall be Therma-Slab Heat Panels as manufactured by Therma-Ray or equal. Heat panels shall be rated at 240 V and shall be UL approved. The minimum installed heating capacity shall be 56 KW. The installed kilowatt capacity and thermal storage capacity, in combination, shall be sufficient to limit operation to the off-peak times, as provided for in the utility rate, while providing 100% of the structures heating requirements at design conditions. The system shall be designed to maintain the temperature in the building at not less than 45 degrees Fahrenheit.

2.21 FLOOR DRAIN SYSTEM

The floor drain system shall consist of a 6 inch wide cast iron trench drain with grated lid, 3 inch diameter cast iron hub and spigot pipe with vent and cleanout, 36 inch diameter fiberglass catch basin supported on a 6 inch thick concrete slab, cast iron frame and grate on the catch basin, and all other component parts necessary for a complete installation.

2.21.1 Fiberglass Catch Basin

Catch basin shall be constructed of fiberglass. Pipe shall penetrate the

wall of the catch basin and be sealed with a push grommet designed to seal around the outside of the cast iron pipe. Catch basin shall correspond to the dimensions shown.

2.21.1.1 Frame and Grate

The frame and grate for the catch basin shall be manufactured of cast iron and have machined bearing surfaces. The frame and grate shall be model R-2540 as manufactured by Neenah Foundry Co. or equal.

2.21.2 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes and schedules indicated and shall conform to the requirements specified.

2.21.2.1 Cast-Iron Hub and Spigot Pipe and Fittings

ASTM A 74 with ASTM C 564 or CISPI HSN-85 rubber compression gasket joints. Fittings inside the floor drain and separator shall be cast iron and shall be flanged joint unless otherwise approved.

2.21.2.2 Floor Cleanouts

Provide cast-iron or ductile-iron floor cleanout with anchor flange, adjustable height polished bronze, nickel bronze, stainless steel, or chromium-plated copper alloy rim and scoriated floor plate with "CO" cast in the plate, and countersunk screws for installing floor plate flush with finished floor.

#.1 CAST IRON TRENCH DRAIN

The trench drain shall be constructed of cast iron, shall have cast iron sides, ends, bottom, and grated top, shall be suitable for the intended use and shall be the dimensions as indicated on the drawings.

PART 3 EXECUTION

3.1 ERECTION

Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Improper or mislocated drill holes in panels shall be plugged with an oversize screw fastener and gasketed washer; however, panels with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces shall be kept clean and free from sealant, metal cuttings, excess material from thermal cutting, and other foreign materials. Exposed surfaces which have been thermally cut shall be finished smooth within a tolerance of 1/8 inch. Stained, discolored or damaged sheets shall be removed from the site. Welding of steel shall conform to AWS D1.1; welding of aluminum shall conform to AA Design Manual.

3.1.1 Framing Members and Anchor Bolts

Erection shall be in accordance with the approved erection instructions and drawings and with applicable provision of AISC ASD Spec S335. Framing members fabricated or modified on site shall be saw or abrasive cut; bolt holes shall be drilled. Onsite flame cutting of framing members, with the

exception of small access holes in structural beam or column webs, will not be permitted. High-strength bolting shall conform to AISC Pub No. S329 using ASTM A 325 or ASTM A 490, ASTM A 490M bolts. Improper or mislocated bolt holes in structural members or other misfits caused by improper fabrication or erection, shall be repaired in accordance with AISC Pub No. S303. Concrete work is specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. Anchor bolts shall be accurately set by template while the concrete is in a plastic state. Uniform bearing under base plates and sill members shall be provided using a nonshrinking grout. Separate leveling plates under column base plates shall not be used. Members shall be accurately spaced to assure proper fitting of panels. As erection progresses, the work shall be securely fastened to resist the dead load and wind and erection stresses. Supports for electric overhead traveling cranes shall be positioned and aligned in accordance with MHI CMAA 70.

3.1.2 Roofing and Siding Installation

Siding shall be applied with the longitudinal configurations in the vertical position. Roofing shall be applied with the longitudinal configurations in the direction of the roof slope. Accessories shall be fastened into framing members, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction. Fastener and fastener spacing shall be in accordance with manufacture design.

3.1.3 Installation of Gutters and Downspouts

Gutters and downspouts shall be rigidly attached to the building. Spacing of cleats for gutters shall be 16 inches maximum. Spacing of brackets and spacers for gutters shall be 36 inches maximum. Supports for downspouts shall be spaced according to manufacturer's recommendations.

3.1.4 Louvers and Ventilators (Not Used)

3.1.5 Doors and Windows

Doors and windows, including frames and hardware, shall be securely anchored to the supporting construction, shall be installed plumb and true, and shall be adjusted as necessary to provide proper operation. Joints at doors and windows shall be sealed according to manufacturer's recommendations to provide weathertight construction.

3.1.6 Insulation Installation

Insulation shall be installed as indicated and in accordance with manufacturer's instructions.

3.1.6.1 Board Insulation with Blanket Insulation

Rigid or semirigid board insulation shall be laid in close contact. If more than one layer of insulation is required, joints in the second layer shall be offset from joints in the first layer. A layer of blanket insulation shall be placed over the rigid or semirigid board insulation to be compressed against the underside of the metal roofing to reduce thermal bridging, dampen noise, and prevent roofing flutter. This layer of blanket insulation shall be compressed a minimum of 50 percent.

3.1.6.2 Blanket Insulation

Blanket insulation shall be installed over the purlins and held tight against the metal roofing. It shall be supported by an integral facing or other commercially available support system.

3.1.7 Vapor Retarder Installation

3.1.7.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and sealed with a compatible tape to provide a vapor tight membrane.

3.1.7.2 Polyethylene Vapor Retarder

The polyethylene vapor retarder membrane shall be installed over the entire surface. A fully compatible polyethylene tape shall be used to seal the edges of the sheets to provide a vapor tight membrane. Sheet edges shall be lapped not less than 6 inches. Sufficient material shall be provided to avoid inducing stresses in the sheets due to stretching or binding. All tears or punctures that are visible in the finished surface at any time during the construction process shall be sealed with polyethylene tape.

3.1.8 Wall Liner

Wall liner shall be securely fastened into place in accordance with the manufacturer's recommendation and in a manner to present a neat appearance.

3.1.9 Shelving

The shelving system shall be anchored to the floor and wall per the manufactures written recommendations.

3.2 HEATING SYSTEM INSTALLATION

The heat panels shall be installed per the manufacturer's written instructions. Installation shall be in such a manner that the heating panels are not damaged.

3.2.1 Sand Fill

The electric heating panels shall be installed on top of a layer of sand to protect the panels from the subbase. The initial layer of sand shall be a minimum of 2" or as recommended by the heating system manufacturer, whichever is greater. Once the heating panels are in place and all necessary wiring is completed, including all necessary sensors, the remainder of the sand fill shall be placed over the panels to the depth recommended by the heating system manufacturer, or 8", whichever is greater. The sand fill shall be free from rocks or other objects which could damage the heating panels. No equipment shall be allowed to run on top of the electric heating panels until an adequate amount of sand is placed on top of the panels to protect them. If the panels are damaged, they shall be replaced by the Contractor at no additional cost to the Government.

3.2.2 Heating Panels

Heating panels shall be arranged in such a manner to provide even heating within the building.

3.2.3 Electrical Work

Electrical work shall comply with NFPA 70 (NEC). Electric heaters specified herein shall be provided complete with sensors and controls.

3.2.4 Foundation Insulation

A minimum of 2 inches of rigid insulation (R10), or the thickness recommended by the heating system manufacturer, whichever is greater, shall be installed on the inside of the building foundation. The rigid insulation shall be installed to a depth of 4 feet, or to the depth recommended by the heating system manufacturer, whichever is greater.

3.2.5 Testing

The heating system specified under this section shall be tested and inspected after building is completed and heating heating system is installed, complete and ready for service. If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated.

3.2.5.1 Heaters

The heating system shall be operated for a period of not less than 15 minutes. Current draw shall be measured.

3.3 FLOOR DRAIN INSTALLATION

The floor drain system and all the component parts shall be installed as indicated on the drawings.

3.4 FIELD PAINTING

Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Shop-primed ferrous surfaces exposed on the outside of the building and all shop-primed surfaces of doors and windows shall be painted with two coats of an approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with the manufacturer's recommended touch-up paint.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM

FACILITY
DESCRIPTION:_____

BUILDING
NUMBER:_____

CORPS OF ENGINEERS CONTRACT
NUMBER:_____

CONTRACTOR

CONTRACTOR:_____
ADDRESS:_____

POINT OF
CONTACT:_____

TELEPHONE
NUMBER:_____

OWNER

OWNER:_____

ADDRESS:_____

POINT OF
CONTACT:_____

TELEPHONE
NUMBER:_____

CONSTRUCTION AGENT

CONSTRUCTION
AGENT:_____
ADDRESS:_____

POINT OF CONTACT:_____

TELEPHONE
NUMBER:_____

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(continued)

THE METAL BUILDING SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY [_____] FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCIES, WIND DAMAGE AND STRUCTURAL FAILURE WITHIN PROJECT SPECIFIED DESIGN LOADS, AND LEAKAGE. THE METAL BUILDING SYSTEM COVERED UNDER THIS WARRANTY SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING: FRAMING AND STRUCTURAL MEMBERS, ROOFING AND SIDING PANELS AND SEAMS, INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS, ACCESSORIES, TRIM, FLASHINGS AND MISCELLANEOUS BUILDING CLOSURE ITEMS SUCH AS DOORS AND WINDOWS (WHEN FURNISHED BY THE MANUFACTURER), CONNECTORS, COMPONENTS, AND FASTENERS, AND OTHER SYSTEM COMPONENTS AND ASSEMBLIES INSTALLED TO PROVIDE A WEATHERTIGHT SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THESE SPECIFICATIONS THAT BECOME PART OF THE METAL BUILDING SYSTEM. ALL MATERIAL AND WORKMANSHIP DEFICIENCIES, SYSTEM DETERIORATION CAUSED BY EXPOSURE TO THE ELEMENTS AND/OR INADEQUATE RESISTANCE TO SPECIFIED SERVICE DESIGN LOADS, WATER LEAKS AND WIND UPLIFT DAMAGE SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER

ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE AND LEAKAGE ASSOCIATED WITH THE METAL BUILDING SYSTEM COVERED UNDER THIS WARRANTY SHALL BE REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY SHALL COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON [_____] AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

_____

(Company President) (Date)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(continued)

THE CONTRACTOR SHALL SUPPLEMENT THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE METAL BUILDING SYSTEM, WHICH SHALL BE SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR WILL BE ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.

5. FAILURE OF ANY PART OF THE BUILDING SYSTEM DUE TO ACTIONS BY THE OWNER WHICH INHIBIT FREE DRAINAGE FROM THE ROOF, AND GUTTERS AND DOWNSPOUTS; OR CONDITIONS WHICH CREATE PONDING WATER ON THE ROOF OR AGAINST THE BUILDING SIDING.

6. THIS WARRANTY APPLIES TO THE METAL BUILDING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES. REPORTS OF LEAKS AND BUILDING SYSTEM DEFICIENCIES SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE BY TELEPHONE OR IN WRITING FROM EITHER THE OWNER, OR CONTRACTING OFFICER. EMERGENCY REPAIRS, TO PREVENT FURTHER ROOF LEAKS, SHALL BE INITIATED IMMEDIATELY; A WRITTEN PLAN SHALL BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM WITHIN SEVEN CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT SHALL BE STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
METAL BUILDING SYSTEM
(Exclusions from Coverage Continued)

IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE METAL BUILDING SYSTEM REPLACED OR REPAIRED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR. IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION, UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. THE REQUEST FOR AN ARBITRATOR MUST BE MADE WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED THE PARTIES SHALL, WITHIN 10 DAYS JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES SHALL CONFER WITHIN 10 DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE NAME REMAINS. THE REMAINING PERSON SHALL BE THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED ETC., SHALL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT SHALL PAY FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. A WRITTEN ARBITRATOR'S DECISION WILL BE REQUESTED NOT LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT. A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 14 - CONVEYING SYSTEMS

SECTION 14600

CRANES, SINGLE-GIRDER BRIDGE, MONORAIL AND JIB

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.2.1 General Requirements
1.2.1.1 Standard Products
1.2.1.2 Nameplates
1.2.1.3 Verification of Dimensions
1.2.1.4 Welding
1.2.2 Design Criteria
1.2.2.1 Hoist Characteristics
1.2.2.2 Monorail Characteristics
1.2.2.3 Capacity Plates
1.2.3 Definitions
1.2.3.1 Capacity
1.2.3.2 Hoisting Speed
1.2.3.3 Rated Lift
1.2.3.4 Headroom
1.2.3.5 Minimum Radius
1.2.3.6 Trolley Speed
1.3 SUBMITTALS
1.4 DELIVERY AND STORAGE

PART 2 PRODUCTS

2.1 ELECTRIC HOIST
2.1.1 General
2.1.2 Types of Electric Hoists
2.1.2.1 Electric Wire Rope Hoist
2.1.3 Load and Motor Brakes
2.2 HOIST MECHANICAL EQUIPMENT
2.2.1 Wire Rope Hoist
2.2.1.1 [Hoist Wire Rope
2.2.1.2 Hoist-Rope Drum
2.2.1.3 Hoist Load Block and Sheaves
2.2.2 Hoist Hook Assembly
2.2.3 Hoist Gear Assembly
2.2.3.1 Gears
2.2.3.2 Gear Shafts
2.2.3.3 Gear Train Assembly
2.2.4 Hoist Bearings
2.2.4.1 Antifriction Bearings
2.2.4.2 Factory Sealed Bearings
2.2.5 Hoist Lubrication
2.2.6 Hoist Frame and Housing
2.2.7 Hoist Paint Finish

2.3 TROLLEYS
2.3.1 Paint
2.3.2 Wheels
2.3.2.1 Load Distribution
2.3.2.2 Design and Type
2.3.2.3 Bearings
2.3.3 Side Plates, Pins, and Axles
2.3.3.1 Side Plates
2.3.3.2 Pins and Axles
2.3.4 Gearing
2.3.4.1 Gears
2.3.4.2 Drive Pinions
2.3.4.3 Clamps
2.3.5 Safety Hangers or Lugs
2.4 TROLLEY TYPE
2.4.1 Electric-Motor-Driven Trolleys
2.5 MONORAIL TRACK
2.5.1 Track Design
2.5.2 Flanges
2.5.3 Miscellaneous Track Items
2.5.3.1 Splice Plates and Fasteners
2.5.3.2 Safety End Stops
2.5.3.3 Fittings
2.5.4 Finishing
2.6 ELECTRICAL
2.6.1 Power Supply
2.6.1.1 Trolley Power Supply
2.6.2 Motor Controller
2.6.2.1 Contactor Fingers
2.6.2.2 Transformer
2.6.2.3 Enclosure for Mounting
2.6.3 Pendant Control Station
2.6.4 Mainline Disconnect Switch
2.6.5 Hoist Limit Switches
2.6.6 Trolley Travel Limit Switches
2.6.7 Hoist Motors
2.6.8 Trolley Motors
2.6.9 Motor Brake
2.6.10 Conduit and Wire
2.6.10.1 Conduit
2.6.10.2 Wire

PART 3 EXECUTION

3.1 ERECTION
3.2 INSTALLATION OF MONORAIL TRACK
3.3 ONSITE ELECTRIFICATION SYSTEM TESTS
3.4 ACCEPTANCE TESTING
3.4.1 Acceptance Test
3.4.1.1 Test Sequence
3.4.1.2 Test Data
3.4.1.3 Equipment Monitoring
3.4.1.4 Hooks
3.4.2 No-Load Testing
3.4.2.1 Hoist Operating and Limit Switch Test
3.4.2.2 Trolley Travel
3.4.2.3 Hoist Loss of Power No-Load Test
3.4.2.4 Travel Loss of Power No-Load Test
3.4.3 Load Test

3.4.3.1 Hoist
3.5 MANUFACTURER'S SERVICES
3.6 FIELD TRAINING

-- End of Section Table of Contents --

SECTION 14600

CRANES, SINGLE-GIRDER BRIDGE, MONORAIL AND JIB

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA Std 9	(1990) Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std 11	(1990) Load Ratings and Fatigue Life for Roller Bearings

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

AGMA 9005-D	(1994) Industrial Gear Lubrication

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C80.1	(1995) Rigid Steel Conduit - Zinc Coated
ANSI MH27.1	(1996) Cranes and Monorail Systems, Underhung

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM B 633	(1998) Electrodeposited Coatings of Zinc on Iron and Steel
ASTM E 10	(1998) Brinell Hardness of Metallic Materials

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

FEDERAL SPECIFICATIONS (FS)

FS RR-W-410	(Rev D; Am 1) Wire Rope and Strand

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures

NEMA KS 1	((1996) Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
NEMA WC 3	(1992; Rev 1) Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 674	(1994; Rev thru Oct 1998) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

1.2.1.1 Standard Products

Materials and equipment shall be standard products of manufacturers regularly engaged in the fabrication of cranes and hoists and shall essentially duplicate items which have been in satisfactory use for at least 2 years prior to bid opening. Any company licensed by a crane and hoist manufacturer to manufacture cranes and hoists bearing their name shall have the design and components approved by the licensor prior to submission to the Government for approval.

1.2.1.2 Nameplates

Each major component of equipment shall have the manufacturer's name, address, type or style, model or catalog number, and serial number on a metal plate secured to the equipment.

1.2.1.3 Verification of Dimensions

The Contractor shall verify all dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing any work.

1.2.1.4 Welding

Welding shall be in accordance with AWS D1.1.

1.2.2 Design Criteria

The hoist(s) shall be designed to operate in the spaces indicated.

1.2.2.1 Hoist Characteristics

Hoist shall be an electric-wire rope hoist of operating characteristics specified. Each hoist shall have the capacity, lift-height, suspension, power source, and operating characteristics indicated and as follows:

a. Each hoist shall have the capacity indicated on drawings.

b. Each hoist shall have the minimum height of lift indicated on drawings.

c. The hoist shall be the lug-suspension type mounted on an electric-motor-driven trolley.

d. Components of the hoist shall be designed and constructed for safety of operation and durability of components. Replacement parts shall be interchangeable and readily accessible.

1.2.2.2 Monorail Characteristics

The monorail shall be of the wide flange or patented beam style.

1.2.2.3 Capacity Plates

Two capacity plates shall be provided, one for each side of the bridge. Each plate shall be lettered to indicate the total rated hoisting capacity of the crane. All lettering shall be of sufficient size to be easily read from the floor.

1.2.3 Definitions

1.2.3.1 Capacity

Capacity shall mean the rated load in pounds, or tons of 2,000 pounds each, specified by the manufacturer for the hoist and marked plainly on the hoist and loadblock so as to be clearly legible. In determining the applied load, the weight of the handling devices shall be included.

1.2.3.2 Hoisting Speed

Hoisting speed shall mean the velocity in feet per minute at which the hoist will lift the rated load. Actual lifting speed shall be within plus or minus 10 percent of the manufacturer's rating.

1.2.3.3 Rated Lift

Rated lift shall mean the distance between the upper and lower elevations of travel of the load block.

1.2.3.4 Headroom

Headroom shall be measured with the load hook in the highest position with full load which is the distance between the saddle of the load hook and the following points:

a. The bottom of the beam when S-shape runways are used.

b. The top of the bottom flange for all flat, wheel-bearing flange surfaces.

1.2.3.5 Minimum Radius

Minimum radius shall mean the smallest radius to the centerline of the beam or track on which the trolley will operate properly.

1.2.3.6 Trolley Speed

Trolley speed shall mean the velocity in feet per minute at which a motor-driven trolley with hoist will travel carrying the rated load on level track; actual speed shall be within plus or minus 10 percent of the manufacturer's rating.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wiring and Schematic diagrams; G, ED

Detailed drawings shall be submitted containing complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout, anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation.

SD-03 Product Data

Hoist Hook Assembly; G, ED

Heat Treatment;

Record of hook material and any heat treatment performed shall be submitted and shall be stamped on the hook shank or documented in certification papers furnished with the hooks.

Hoist; G, ED

Manufacturer's catalog data shall be submitted showing the equipment and accessories to be provided.

SD-06 Test Reports

Electrification System Tests; G, ED

Results of electrification system tests shall be submitted.

Acceptance Testing; G, ED

Test reports in booklet form shall be submitted showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. The report shall include the information as required by paragraph ACCEPTANCE TESTING.

SD-07 Certificates

Hoist; G, ED

Track Design; G, ED

Hoist controls; G, ED

Certification shall be submitted attesting that each hoist, hoist trolley and track, and hoist control has been factory tested for rated load capacity and operation, and that each hoist complies with the requirements specified.

Electric Hoists; G, ED

Trolleys; G, ED

Wiring; G, ED

Contact Conductors; G, ED

Hoist Controls; G, ED

Overcurrent Protection; G, ED

Grounding; G, ED

Certification shall be submitted attesting that electric hoists, trolleys, wiring, contact conductors, controls, overcurrent protection, and grounding conform to NFPA 70 and to UL standards. The label or listing with reexamination by the UL will be accepted as evidence that the materials conform to this requirement and to NFPA 70.

SD-10 Operation and Maintenance Data

Operation Manuals; G, ED

Two copies of operation manuals shall be furnished for each hoist. Operation manuals shall detail the step-by-step procedures required for system startup, operation, and shutdown. Operation manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their operating features. Operation manuals shall include a copy of the acceptance test report for information and future reference.Operation manuals shall include an overall description of the system describing any unique features that may need special attention.

Maintenance Manuals; G, ED

Two copies of maintenance manuals shall be furnished for each hoist. Maintenance manuals shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Maintenance manuals shall include piping, layout diagrams, equipment layout diagrams, and wiring and control diagrams of the system as installed. Maintenance manuals shall include a spare parts list of manufacturers recommended spare parts that should be maintained onsite and any long lead time items should be clearly identified. Maintenance manuals shall contain replacement part numbers for the entire assembly.

1.4 DELIVERY AND STORAGE

Equipment delivered shall be placed in indoor storage, protected from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

PART 2 PRODUCTS

2.1 ELECTRIC HOIST

2.1.1 General

Electric hoist shall be of capacity, lift, type, suspension, headroom, and materials specified. Each unit shall be factory wired and ready for operation. Load-carrying parts of the hoist shall be designed so that the calculated static stress of the material, based on the rated capacity, will not exceed 20 percent of the average theoretical strength of the material. Each hoist shall be factory lubricated and shall be complete and ready for operation with the specified hoist controls and accessories.

2.1.2 Types of Electric Hoists

2.1.2.1 Electric Wire Rope Hoist

Electric wire rope hoists shall be equipped with the specified standard rope and hook assembly, with no corroding or sparking requirements.

2.1.3 Load and Motor Brakes

Load brake shall be a totally enclosed, automatic, mechanical-type brake with a hardened-steel, Weston-type ratchet and pawl mechanism that will hold the capacity load of the hoist at any point when the motor is stopped. Motor brakes are specified in paragraph MOTOR BRAKE.

2.2 HOIST MECHANICAL EQUIPMENT

2.2.1 Wire Rope Hoist

2.2.1.1 [Hoist Wire Rope

[Wire rope for standard applications shall be extra flexible, preformed, extra improved or improved plow steel, 6 by 37 fiber core sealed construction wire conforming to FS RR-W-410, Type I, Class 3.]

Wire rope shall be anchored to drum or dead end. Anchoring shall be of captive type, easily detached for changing and repair. Wire rope shall have a factor of safety of not less than 5, based on the minimum ultimate tensile strength of the material.]

2.2.1.2 Hoist-Rope Drum

Wire-rope drum shall be hardened steel or special grade alloy ductile iron. Minimum diameter of the drum shall be 20 times the diameter of the hoisting rope for hoists with a capacity of 2,000 pounds or less and 24 times the diameter of the hoisting rope for hoists over 2,000-pound capacity. Drum shall have accurate, machine-cut grooves, cut to full depth of wire-rope diameter, with rounded corners of dimension as required for the specified lift. In addition, the drum shall have not less than two

complete turns of rope around it when the hook is in its lowest position. Groove diameter and pitch centers shall be 1/32 inch greater than diameter of rope. Drum shall be flanged at each end and shall have enclosed tops and sides to preclude cable binding and jamming. Cable reeving shall be arranged for double reeving. Hook shall remain centered under the drum at all times.]

2.2.1.3 Hoist Load Block and Sheaves

The cable load block shall be an enclosed, safety type that will shroud the sheave and protect the operator. The sheave assembly shall be mounted on a steel axle and carried on sealed, prelubricated antifriction bearings. Wire-rope sheaves shall be machine-grooved, hardened steel, or cast iron with chilled groove surfaces. The pitch diameter for running sheaves shall be not less than 18 times the diameter of the wire rope, and the diameter of the idler and equalizer sheaves shall be not less than 16 times the diameter of the rope used.

2.2.2 Hoist Hook Assembly

Hooks and hook swivels shall be heat-treated alloy steel forgings. Yokes, crossheads, and bars shall be of suitable strength steel or cast iron.

Hook assembly for electric-operated hoists shall be carried on antifriction bearings to permit free swivel under rated capacity load without twisting load chain or wire. Each hook shall have a spring-loaded safety latch. Each hook assembly shall include a machined and threaded shaft and swivel locknut with an effective locking device to prevent nut from backing off.

2.2.3 Hoist Gear Assembly

2.2.3.1 Gears

Gears shall be spur, helical, spiral, or bevel-type, accurately machined, and conforming to AGMA standards for this type of service.

2.2.3.2 Gear Shafts

Gear shafts shall be manufactured from high-carbon steel or alloy steel, machined and ground for accurate fit, and splined for fitting to the mating gear.

2.2.3.3 Gear Train Assembly

Gear train assembly shall be totally enclosed in the hoist frame casting and shall operate in a sealed oil bath. Frame casting shall be provided with lubrication fittings and inspection ports.

2.2.4 Hoist Bearings

2.2.4.1 Antifriction Bearings

Bearings in the hoist mechanism of electric-hoists shall be antifriction bearings.

2.2.4.2 Factory Sealed Bearings

Sprocket bearings, motor bearings, and load-block bearings shall be prelubricated factory sealed bearings.

2.2.5 Hoist Lubrication

Adequate lubrication shall be provided for moving parts of the hoist and trolley and for filling, draining, and checking the level of the lubricant. Lubricant shall be designed for use in an ambient temperature of30 to 100 degrees F. Hoist reduction gearing, load brake, and trolley wheel gears with electric motor drive shall operate in an oil bath. Lubrication and mechanism housing shall prevent leaking and shall prevent lubricant from coming into contact with electric motors and equipment. Lubricant shall conform to AGMA 9005-D.

2.2.6 Hoist Frame and Housing

Operating parts of the hoist shall be mounted and enclosed in a sealed, factory-painted metal frame of malleable iron, cast steel, welded steel, or aluminum. Welded or bolted frames shall carry loads on the fabricated pieces. Welds or bolts shall be used only to hold the fabricated parts in position.

2.2.7 Hoist Paint Finish

Each hoist and accessory shall receive a factory-applied paint finish. Hooks shall not be painted.

2.3 TROLLEYS

2.3.1 Paint

Each trolley assembly shall be factory-painted, designed specifically for use with the specified hoist, and shall be furnished by the hoist manufacturer. Paint finish shall be the same type and quality specified for the hoist.

2.3.2 Wheels

2.3.2.1 Load Distribution

Each trolley assembly shall have not less than four wheels. Sufficient wheels shall be provided to properly distribute the load. The load on a wheel shall not exceed 1,200 DW pounds where D equals the diameter of the wheel in inches and W equals the width of the rail head or the nominal length of bearing on the tread.

2.3.2.2 Design and Type

Wheels shall be single-flange type manufactured from forged alloy steel with machined, hardened treads and flanges, or high-strength cast or nodular iron with machined flanges and treads, chill-hardened not less than 1/16 inch deep. Flanged wheels for motor-driven trolleys shall have treads and flanges hardened to not less than No. 320 Brinell hardness. Manually driven, trolley-wheel treads shall be hardened to not less than Brinell hardness No. 245 as defined in ASTM E 10. Wheels shall be designed to operate on sloped or flat flange I-beams.

2.3.2.3 Bearings

Trolley wheels shall be carried on sealed, permanently lubricated, antifriction bearings designed for axial and thrust loading. Bearings

shall conform to the applicable requirements of AFBMA Std 9 and AFBMA Std 11. Bearings shall have an L-10 life of 3,000 hours or more, as defined by AFBMA Std 9 or AFBMA Std 11 as applicable.

2.3.3 Side Plates, Pins, and Axles

2.3.3.1 Side Plates

Side plates shall be fabricated from structural-quality rolled-steel plate milled to the required profile with integral bosses where necessary to support equalizing pins; side plates shall be fitted with steel end bumpers.

2.3.3.2 Pins and Axles

Equalizing pins and axles shall be heat-treated alloy steel, machined and finish ground to the required size.

2.3.4 Gearing

2.3.4.1 Gears

Gears shall be cut from heat-treated alloy steel accurately machined into spur, helical, and pinion gears, conforming to AGMA requirements.

2.3.4.2 Drive Pinions

Drive pinions shall be carburized alloy steel, malleable iron, or bronze, with cut or cast teeth, conforming to AGMA requirements.

2.3.4.3 Clamps

Plain trolleys and geared, manual-drive trolleys shall have suitable, quick-acting, steel track clamps. Clamps shall be adjustable for wear and shall not injure track flanges. They shall function satisfactorily on curved and straight track and shall be capable of withstanding a pull equivalent to one-third the rated capacity of the hoist when executed parallel to the track.

2.3.5 Safety Hangers or Lugs

Safety hangers or lugs shall be steel and shall be integral with, or fastened to, each hoist frame or to trolley frame. They shall ride free above the bottom flange of the beam. Hanger shall be of sufficient capacity to hold the hoist, fully loaded, in the I-beam in case of wheel or axle failure. Safety factor of each part of trolley assembly shall be not less than 5, based on the ultimate strength of the material used.

2.4 TROLLEY TYPE

2.4.1 Electric-Motor-Driven Trolleys

Trolley shall be an electric-motor-driven geared type conforming to NFPA 70, the specified general trolley requirements, and the requirements specified.

Trolley speed shall be not more than 75 feet per minute.

2.5 MONORAIL TRACK

Monorail track, splice plates, and hangers shall be painted, hot-rolled

AISC structural steel "S" shapes or "W" shapes and plates conforming to ASTM A 36/A 36M, of size and weight as required for the specified hoist. The upper surface of the lower flange shall be free from bumps, depressions, and irregularities.

2.5.1 Track Design

The track shall be designed with a minimum safety factor of 5. Deflection of track shall not exceed 1/450 of the span, as determined by total load of trolley, track, hoist, and full-capacity load. Track curve radii shall permit smooth trolley operation without binding.

2.5.2 Flanges

Flanges shall be smoothly curved and without deformation.

2.5.3 Miscellaneous Track Items

Necessary clamps, hanger rods, hangers, track splice plates, safety end stops, fasteners, and fittings shall be provided as required for a complete system.

2.5.3.1 Splice Plates and Fasteners

Web-type splice plates or other suitable couplings shall be installed at track joints to provide flush and level connections, with maximum gap between adjacent ends at load-carrying ends not exceeding 1/16 inch; 3/16 inch at switches. Splice fasteners shall be regular hexagon or special, flat-head fasteners.

2.5.3.2 Safety End Stops

Safety stops capable of withstanding the impact of a fully loaded hoist and trolley shall be provided.

2.5.3.3 Fittings

Fittings with means for not less than 1 inch vertical adjustment of the track for level erection shall be provided, with provision for additional adjustment after the system has been in operation.

2.5.4 Finishing

The finished monorail shall be inspected after erection, and fasteners, welds, abrasions, and handling marks shall be painted in the finish color. Brackets and hangers of the monorail electrification system shall be painted in the finish color of the monorail track.

2.6 ELECTRICAL

Materials and installation, including electrical wiring, contact conductors, controls, overcurrent protection, and grounding shall meet the requirements of NFPA 70 and applicable UL and NEMA standards and specified requirements.

2.6.1 Power Supply

Electrical power for operation of the hoist will be supplied from the nominal 480 volt, 3 phase, 60-Hz alternating-current (a-c) power

distribution system.

2.6.1.1 Trolley Power Supply

Power may be brought to the trolley by a cable reel or a festoon system.

a. Festoon system shall consist of flexible power cable supported by cable trolleys running on a steel messenger cable, an I-beam rail, or a channel. The power cable shall be type G, 75-degree C, 600-volt insulation and heavy-duty neoprene or chlorosulfonated polyethylene jacket. The cable shall be sized as required by NFPA 70. The cable shall conform to the applicable requirements of NEMA WC 3, Part 7, and shall have class H or class K stranding. Cable conductors shall be terminated at both ends with terminal lugs on terminal blocks in terminal boxes. Cable ends shall have strain relief devices to protect the cable terminations.

2.6.2 Motor Controller

Motor controller shall be a reversing-type magnetic starter with thermal-overload protection, molded case circuit breaker, and control transformer operated by a pushbutton control station. Controller and control station shall be mechanically or electrically interlocked to preclude possibility of operating opposing control circuits simultaneously.

2.6.2.1 Contactor Fingers

Contactor fingers shall be adjustable and shall have renewable tips.

2.6.2.2 Transformer

Transformer shall reduce the control-circuit voltage to 120 volts AC.

2.6.2.3 Enclosure for Mounting

Motor controller shall be mounted in a gasketed sheet metal enclosure with hinged door conforming to the requirements of UL 50. Motor controller enclosures, complying with NEMA ICS 6, shall be NEMA, Type 12.

2.6.3 Pendant Control Station

Each hoist shall have a pendant-mounted conductor cable and pushbutton station with a strain-reliever chain or cable permanently attached to the hoist frame and integral with the pendant conductor cable. The control station shall be a full-guarded, momentary-contact, pushbutton type with each button clearly marked to indicate its function. A separate button or a single button providing steps for each speed of multispeed hoists or trolleys shall be provided. The pushbuttons shall return to the off (normally open contacts) position when pressure is released by operator. The pushbutton station shall be grounded to the hoist. The strain reliever chain or cable shall not be used as a grounding circuit.

2.6.4 Mainline Disconnect Switch

A mainline disconnect switch shall be provided and shall be a surface-mounted, heavy-duty, single-throw, air-break, enclosed type conforming to NEMA KS 1 as indicated. Disconnect switch shall be fused. Enclosure shall be NEMA Type 12.

2.6.5 Hoist Limit Switches

Adjustable upper-limit switch shall be provided to prevent overtravel of the hook or load block in the hoisting direction. Limit switch shall be arranged to stop the hoist motor and apply the motor brake before reaching the uppermost safe limit of travel. In case of hook overtravel, the motor shall automatically and momentarily be reversed. Adjustable lower-limit switch shall be provided to stop the hoist motor and apply the motor brake when the load hook reaches a predetermined lower limit.

2.6.6 Trolley Travel Limit Switches

Limit switches shall be mounted to the trolley, respectively, to interrupt current to the trolley controls. Adjustable limit switch actuators shall be installed on both ends to actuate the limit switches and stop the crane trolley prior to contacting the bumpers.

2.6.7 Hoist Motors

Hoist motor shall be a high-starting torque, high-slip, 30-minute time rated, reversible electric motor specifically designed for hoist duty and capable of operating at the specified duty class, capacity, and speed. The motor shall be 480-volts, 3-phase, 60-hertz and horsepower as recommended by manufacturer for capacity and lift speed of hoist. The hoist motors shall be provided with Class B insulation, and motor enclosures shall be totally enclosed, nonventilated (TENV). Enclosure shall be fitted with a UL-approved drain and breather and shall be certified and labeled in accordance with UL 674, Class 1, Groups C and D.

2.6.8 Trolley Motors

Trolley motors shall be single-speed, single-winding conforming to the requirements for hoist motors except they may be NEMA design B (high torque and slip not required).

2.6.9 Motor Brake

Motor brake shall be an externally adjustable, electrically operated single- or multiple-friction disk brake that shall apply automatically when the power is off. The brake shall be capable of holding 125 percent of the rated load from any operating speed. The brake shall hold a static load equal to 150 percent of the rated capacity of the hoist.

Trolley unit shall have an automatic, adjustable, solenoid-operated, electric brake designed for trolley application. Brake shall apply and release smoothly during starts and stops to minimize pendulum action of the load. Braking torque shall be not less than 100 percent of motor torque and shall match motor torque characteristics.

2.6.10 Conduit and Wire

2.6.10.1 Conduit

Conduit between feeder enclosure and disconnect switches and fixed control stations shall be zinc-coated rigid-steel conduit, couplings, elbows, bends, and nipples conforming to ANSI C80.1. Zinc coating shall be an electrodeposited coating conforming to ASTM B 633.

2.6.10.2 Wire

Building wire for use in conduits, raceways, and wireways in wet or dry locations shall be coordinated with requirements of Section 16120 INSULATED WIRE AND CABLE.

PART 3 EXECUTION

3.1 ERECTION

Erection shall be in accordance with the manufacturer's instructions.

3.2 INSTALLATION OF MONORAIL TRACK

Monorail tracks shall be installed in accordance with the applicable requirements of ANSI MH27.1. Tracks shall be accurately assembled to the lines and elevations indicated. Fastening of splices shall be performed after the abutting surfaces have been brought completely in contact. Connections shall be bolted or welded connections. Splices will be permitted only when indicated. Erection bolts used in welded construction may be tightened securely and left in place when they form no interference to trolley operation. If erection bolts are removed, the holes shall be plug welded and ground smooth. Monorail track shall be installed plumb and level to a tolerance of not more than 1 inch in 100 feet from the indicated elevation. The track shall be free of burrs, kinks, and deformation. Curves shall be smooth and even with no kinks or sharp bends. Track flanges shall be smooth and level. Welded joints and connections shall be ground smooth and offer no obstruction to trolley-wheel movement.

3.3 ONSITE ELECTRIFICATION SYSTEM TESTS

Electrification system shall be given continuity and insulation testsafter the installation has been completed but before equipment is energized. Contractor shall provide necessary test equipment, labor, and personnel to perform the tests as specified. Electrification system equipment shall be completely isolated from all extraneous electrical connections. Substation and switchboard feeder breakers, circuit breakers in panelboards, and other disconnecting devices shall be used to isolate the equipment under test. Insulation tests on equipment and wiring shall be conducted using a 1,000-volt, insulation-testing instrument. Readings shall be recorded every minute and until three equal and consecutive readings are obtained. The resistance between phase conductors and between phase conductors and ground shall be not less than 1 megohm. Test data shall be recorded and shall include megohm readings versus time. Final acceptance shall depend upon satisfactory performance under test. Electrification system shall not be energized until recorded test data of the electrification system tests are approved.

3.4 ACCEPTANCE TESTING

Acceptance testing shall comply with the following paragraphs.

3.4.1 Acceptance Test

The Contractor shall provide all personnel necessary to conduct the tests including but not limited to operators, riggers, rigging gear, and test weights. Testing shall be performed in the presence of Contracting Officer. The Contractor shall notify the Contracting Officer 7 days prior to testing operations.

3.4.1.1 Test Sequence

The equipment shall be tested according to the applicable paragraphs of this procedure in the sequence provided.

3.4.1.2 Test Data

Operating and startup current measurements shall be recorded for electrical equipment (motors and coils) using appropriate instrumentation. Speed measurements shall be recorded as required by the facility evaluation tests (normally at 100-percent load). Recorded values shall be compared with design specifications or manufacturer's recommended values; abnormal differences shall be explained in the remarks and submitted for approval or appropriate adjustments performed. In addition, high temperatures or abnormal operation of any equipment or machinery shall be noted, investigated, and corrected. Hoist and trolley speeds should be recorded during each test cycle.

3.4.1.3 Equipment Monitoring

During the load test, improper operation or poor condition of safety devices, electrical components, mechanical equipment, and structural assemblies shall be monitored. Observed defects critical to continued testing shall be reported immediately to the Contracting Officer and testing shall be suspended until the deficiency is corrected. During and immediately following each load test, the following inspections shall be made:

a. Inspect for evidence of bending, warping, permanent deformation, cracking, or malfunction of structural components.

b. Check for overheating in brake operation; check for proper stopping. All safety devices, including emergency stop switches and POWER OFF pushbuttons, shall be tested and inspected separately to verify proper operation of the brakes.

c. Check for abnormal noise or vibration and overheating in machinery drive components.

d. Check wire rope sheaves and drum spooling for proper operation, freedom of movement, abnormal noise, or vibration.

e. Check electrical drive components for proper operation, freedom from chatter, noise, or overheating.

f. Inspect external gears for abnormal wear patterns, damage, or inadequate lubrication.

3.4.1.4 Hooks

Hooks shall be measured for hook-throat spread before and after load test. A throat dimension base measurement shall be established by installing two tram points and measuring the distance between these tram points (to within 1/64 inch). This base dimension shall be recorded. The distance between tram points shall be measured before and after load test. An increase in the throat opening by more than 1 percent from the base measurement shall be cause for rejection.

3.4.2 No-Load Testing

3.4.2.1 Hoist Operating and Limit Switch Test

The load hook shall be raised and lowered through the full range of normal travel at rated speed and other speeds of the crane. The load hook shall be stopped below the geared limit switch upper setting. In slow speed only, proper operation of upper and lower limit switches shall be verified. The test shall be repeated a sufficient number of times (minimum of three) to demonstrate proper operation. Brake action shall be tested in each direction.

3.4.2.2 Trolley Travel

The trolley shall be operated the full distance of the monorail rails exercising all drive speed controls in each direction. Brake operation shall be verified in each direction. In slow speed, the trolley bumpers shall contact the trolley stops located on the rails.

3.4.2.3 Hoist Loss of Power No-Load Test

The hooks shall be raised to a height of approximately 6 feet or less. While slowly lowering the hook, the main power source shall be disconnected verifying that the hook will not lower and that the brake will set.

3.4.2.4 Travel Loss of Power No-Load Test

With the hook raised to clear obstructions and the trolley traveling in slow speed, the main power source shall be disconnected, verifying that the trolley will stop and that the brake will set.

3.4.3 Load Test

3.4.3.1 Hoist

Unless otherwise indicated, the following tests shall be performed using a test load of 125 percent of rated load.

a. Dynamic Load Test: The test load shall be raised and lowered through the full-range while operating in each speed. The machinery shall be completely stopped at least once in each direction to ensure proper brake operation.

b. Hoist Loss of Power Test: After raising the test load to approximately 6 feet above ground level and while slowly lowering the test load, the main power source and the control pushbutton shall be released verifying that the brake will set and that the test load will stop lowering.

c. Trolley Dynamic Load Test: While operating the trolley the full distance of the monorail rails in each direction with test load on the hook (one cycle), the proper functioning of drive speed control points and proper brake action shall be tested.

3.5 MANUFACTURER'S SERVICES

Services of a manufacturer's representative who is experienced in the installation, adjustment, erection, and operation of the equipment specified shall be provided. The representative shall supervise the installation, adjustment, and testing of the equipment.

3.6 FIELD TRAINING

A field training course shall be provided for designated operating staff members. Field training shall cover all of the items contained in the operating and maintenance instructions. The Contracting Officer shall be given at least 2 weeks advance notice of such training.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15050

SLUICE GATES AND OPERATORS

PART 1 GENERAL

1.1 SCOPE
1.2 REFERENCES
1.3 SUBMITTALS

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.1.1 General Design
2.2 MATERIALS
2.2.1 Structural Steel
2.2.2 Naval Brass
2.2.3 Manganese Bronze
2.2.4 Cold Rolled Steel
2.2.5 Stainless Steel
2.2.6 Bolting Materials
2.2.7 Asphalt Liquid
2.2.8 Sand
2.2.9 Seals
2.3 SLUICE GATES
2.3.1 General
2.3.2 Wall Thimbles
2.3.3 Frames
2.3.4 Gate Leaves
2.3.5 Stems
2.3.6 Stem Guides
2.3.7 Asphalt and Sand
2.4 OPERATING HOISTS
2.4.1 Hoists
2.4.2 Position Indicators
2.4.3 Stem Covers
2.4.4 Bolts and Nuts
2.5 PORTABLE OPERATOR
2.5.1 Electric Motor Operated Drill
2.5.1.1 Torque Limiter Coupling
2.5.1.2 Adapter Sockets

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Instructions
3.1.2 Gate Vendor's Erecting Engineer
3.1.3 Assembly
3.2 TESTS
3.2.1 Testing
3.3 PAINTING
3.3.1 Paint Schedule

3.4 TOOLS
3.5 QUALITY CONTROL

-- End of Section Table of Contents --

SECTION 15050

SLUICE GATES AND OPERATORS

PART 1 GENERAL

1.1 SCOPE

This section includes the sluice gates, portable operators, and accessories to be furnished and installed as shown on the drawings and specified herein.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 29	(1988) Fine Aggregate for Bituminous Paving Mixtures
AASHTO M 82	(1975; Rev 1996) Cut-Back Asphalt (Medium Curing Type)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	(2001) Carbon Structural Steel
ASTM A 108	(1999) Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 126	(1995el) Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 148	(1993) Steel Castings, High-Strength, for Structural Purposes
ASTM A 276	(2000) Stainless Steel Bars and Shapes
ASTM A 320	(1999) Alloy Steel Bolting Materials for Low Temperature Service
ASTM A 582	(1995b) Free-Matching Stainless Steel Bars
ASTM B 21	(1996) Naval Brass Rod, Bar, and Shapes
ASTM B 98	(1998) Copper-Silicon Alloy Rod, Bar, and Shapes
ASTM B 584	(2000) Copper Alloy Sand Castings for General Applications

ASTM C 33	(1999ael) Concrete Aggregates
ASTM D 2000	(1999) Rubber Products in Automotive Applications

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B5.10	(1994) Machine Tapers

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C 501	(1992) Standard for Sluice Gates

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code
AWS D1.6	(1998) Structural Welding Code - Stainless Steel

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Sluice Gates; G, ED

Operators; G, ED

Shop drawings shall be submitted for sluice gates and operators showing details for mounting, materials, construction and installation procedures. Catalog data, including specifications and full descriptive data, shall be submitted for all materials and equipment furnished. Other shop drawings to be submitted include the following catalogue and performance data on the portable operator.

SD-03 Product Data

Hoist Design Criteria; G, ED

Design computations and technical data showing factors of safety, calculations of stresses, and other information necessary to assure compliance with the drawings and specifications shall be submitted to the Contracting Officer.

The Contractor shall submit calculations which clearly show how the size of the operator was chosen. For the sluice gate lifts, a friction factor of 0.6 shall be used, and the gate size and the heads shall be those specified below. Alternate friction factors

may be used provided that the Contractor submit adequate backup documentation and calculations.

Gate Vendors Erecting Engineer;

Gate vendor information as specified in paragraph GATE VENDORS ERECTING ENGINEER shall be submitted.

SD-10 Operation and Maintenance Data

Sluice Gates; G, ED

Operators; G, ED

The Contractor shall submit, prior to delivery of gates to the project work site, five copies of a manual containing complete information in connection with the operation, lubrication, adjustment, routine and special maintenance, disassembly, repair, and reassembly of the gates and accessories. Each set shall be permanently bound and shall have on the cover the following: (1) The words, "OPERATING AND MAINTENANCE INSTRUCTIONS", (2) the name and location of the project, (3) the Contractor's name, and (4) the contract number. Data sheets shall be placed before instructions covering the subject. The sheets shall be approximately 8-1/2 x 11" which large sheets of drawings folded in. Each set shall include, but not be limited to, the following:

a. Operating and maintenance instructions for each piece of equipment including lubrication instructions.

b. Manufacturer's bulletins, cuts, and descriptive data.

c. Parts lists and recommended spare parts.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Sluice gates shall be the standard product of a reputable manufacturer having had at least 5 years of successful experience in the design and manufacture of sluice gates of the size and operating head specified. Gates and accessories shall be of the following design:

a. Sluice gates shall be rising stem.

b. Gates shall be flush bottom type, as indicated on the drawings. Gates shall be either stainless steel or cast iron.

c. Sluice gate frames shall be flange back type.

d. Thimbles shall be sufficiently rigid to preclude distortion during installation.

2.1.1 General Design

Component parts shall be designed for the seating and unseating heads shown in TABLE 1 using a minimum factor of safety of 5, to be increased as desired and be sized and guided so that, unless otherwise shown on the

drawings, the slenderness ratio (L/R) shall not exceed 200. The opening and closing forces for design of the stem and stem block anchorage shall include friction load based on the operating pressure shown in TABLE 1, with coefficient of friction of not less than 0.6 (or alternate friction factor) for sluice gates in addition to the weight of the gate and stem. Stem design shall include a factor of safety of 5 against failure in addition to the column buckling strength reduction effects as given by the Euler formula.

TABLE 1. GATE REQUIREMENTS

Pump Station	Gate Location	No. of Gates	Gate Size Diam.(in)	Seat Pressure (ft)	Unseated Pressure (ft)	Hoisting Method
1A	Pump Station inlet sluice gate	1	72 x 72	21	21	P
	Discharge chamber inlet closure gate	1	72 x 72	21	21	P
7	Pump Station inlet sluice gate	1	72 x 72	21	21	P
	Discharge chamber inlet closure gate	1	72 x 72	21	21	P
	Ponding area 4 outlet at MH 4F-1	1	42 x 42	21	21	P

P = Portable operator (2 electrically operated, portable, tripod-mounted operator for entire project)

2.2 MATERIALS

Materials shall meet the requirements of the following referenced publications. Use of other grades or alloys shall be requested in writing and will be subject to approval.

2.2.1 Structural Steel

ASTM A 36.

2.2.2 Naval Brass

ASTM B 21, copper alloy No. 464 or 482; temper, optional.

a. Iron castings - ASTM A 126.

b. Steel castings - ASTM A 148.

2.2.3 Manganese Bronze

ASTM B 584, high-strength yellow brass, copper alloy No. 932.

2.2.4 Cold Rolled Steel

ASTM A 108, Grades 1010 through 1020.

2.2.5 Stainless Steel

a. ASTM A 276, Type 304, Condition A (annealed) or B (cold worked, high tensile), type of finish optional.

b. ASTM A 582, Type 303, Condition A (annealed), type of finish optional.

2.2.6 Bolting Materials

a. Bolts - ASTM A 582, Type 303 or 416.

b. Nuts - ASTM B 98, Alloy 655.

2.2.7 Asphalt Liquid

AASHTO M 82, medium core liquid asphalt type, Grade MC-30 or MC-70.

2.2.8 Sand

AASHTO M 29.

2.2.9 Seals

ASTM D 2000, Grade 4AA 625A13.

2.3 SLUICE GATES

2.3.1 General

Gates shall be heavy duty type as manufactured by Whipps, Rodney Hunt, Hydro Gate, Waterman, Fontaine, or equal. The sluice gate installations shall be furnished complete with frames, leaves, stems, adjustable stem guides, and anchor bolts, complete and operable in all respects as described herein and as indicated on the drawings. The gates shall be of the pressure seating type, and shall be designed for the seated pressures and unseated pressures indicated in TABLE 1. Gates that have either a seated or unseated design pressure greater than 30 feet shall be of cast iron construction. Gates that have both seated and unseated sedign pressures less than 30 feeet may be of cast iron or stainless steel. The capacities of the operating stands shall be based upon the pressure exerted on the entire area enclosed by the gate sealing surfaces (seating faces). As used herein, operating pressure head is defined as the distance from the center of the slide, in its closed position, to the maximum water surface elevation. Sluice gates designated for power operation shall be sufficiently rugged to withstand operation by means of electric lifts or portable operators.

2.3.2 Wall Thimbles

Wall thimbles shall be of the F type. The thimbles shall be of cast iron or stainless steel with the front flange machined to a plane to provide a true seating surface for the sluice gate frame. Holes shall be drilled and tapped in the thimble to match the mounting hole pattern of the sluice gate frame. The gate frames shall be attached to the thimble by studs. The wall thimble shall be internally braced during concrete placement. Thimble shall be plumb in both planes with +1/16 inch.

2.3.3 Frames

The frames shall be cast iron or stainless steel of ample section to prevent distortion. Seat facings shall be naval brass or stainless steel and shall be machined to a smooth finish for making a tight seal meeting the requirements of AWWA C 501. The frame guides shall be of cast iron or stainless steel. The frame guides shall be equipped with adjustable side wedges, and the guides shall be of sufficient length so that not less than one-half of the gate is within the guides when the gate is wide open. The side wedges shall be faced with manganese bronze or stainless steel. Wedges shall be designed in such a manner that wedge fastening bolts may be replaced without the removal of the gate frame from the masonry or other setting, and their attachments adequate to resist tight closures of the gates. Gates shall be provided with top wedges.

2.3.4 Gate Leaves

Gate leaves shall be of cast iron or stainless steel, consisting of flat castings with horizontal and vertical ribs of ample section to withstand all of the specified conditions of operation with limited distortion to prevent leakage. The seating surfaces shall be of naval brass or stainless steel not less than 3/4 inch wide and shall be machined to a 63 micro-inch finish or better and attached by dovetail notching to make a watertight seal. The gate shall be guided in the frame with a tongue and groove construction. The tongue and grooves shall be machined full length with a 1/8 inch overall clearance in the frame guide groove. Slide wedges shall be faced with manganese bronze or stainless steel and mounted and secured to prevent rotation that would interfere with their proper action or cause the gate to bind, in addition to meeting the requirements of AWWA C 501.

2.3.5 Stems

The stems shall be of stainless steel conforming to ASTM A 276, Type 302, 303, 304 with a 63 micro-inch finish if machine cut or 32 micro-inch if rolled threads, and shall be of the sizes recommended by the manufacturer. No detectable flaws or surface imperfections will be permitted. The stems shall be provided with thrust nuts of corrosion-resisting metal and shall have adjustable stop nuts to limit the upward and downward travel of the stems. The stems shall be of a size to withstand the axial compressive and tensile forces created during gate operation under the specified unbalanced heads and to transmit in compression at least two times the rated output of the lift with a 25 pound effort on the crank or handwheel. Threads on stems shall be machine cut or rolled with single or double lead threads of the Acme type. The exterior corners of the threads shall be given slight radius of approximately 0.015 inch in order to prevent them from acting as cutting edges as the stem passes through the left nut.

2.3.6 Stem Guides

Stem guides shall be a manufacturer's standard product, except as specified provided herein, and shall be adjustable in two directions to provide full adjustment for proper alignment of the stem. The stem bearing, in the stem guides, shall be brass or bronze brushed. The guides shall be anchored in an approved manner with not less than two bolts.

2.3.7 Asphalt and Sand

Asphalt and sand fill mixture shall be a relatively stiff mix of road

asphalt and clean sand. The mixture shall be well tamped so as to have full contact with the embedded frame, and so as to provide a firm fill in the recess.

2.4 OPERATING HOISTS

2.4.1 Hoists

Sluice gates shall be provided with a manual hoisting unit. Manual hoisting unit shall be designed to operate in conjunction with portable operators as specified below. Floor stands for the electric actuator shall be designed specifically for this purpose. Manual hoisting units shall be of the hand crank operated, enclosed, pedestal type, equipped with machine cut gears, having gear ratios recommended by the hoist manufacturer. The hoisting units shall be made of cast iron or cast steel. Exposed fastening of 1-1/2 inch diameter and less shall have American Standard hexagon-socket (Allen) type wrench heads. The hoist shall have a cast bronze lift nut, threaded to match and engage with the stem threads. The lift nut shall be provided with ball or roller bearings both above and below a flange on the lift nut, to accommodate the opening and closing thrusts. Each hoist shall be provided with an integral position indicator. A brass plate shall be attached to the lift housing to show counter reading with gate in fully closed position. Each hoist shall be designed to unseat the slide from its wedging device at the maximum head with a maximum force of 40 pounds at 15 inch radius. Means for lubrication of the hoist shall be provided. No more than 16 turns of the hand crank or handwheel shall be required to move the gate 1 inch. A removable, cast- iron crank with a rotating brass grip and a radius of 15 inch shall be provided. All hoists shall be capable of being driven by the same portable operator.

2.4.2 Position Indicators

Weathertight and dust-tight stem position indicators shall be provided for all gate stands. The indicators shall be of the dial or counter type, mounted in a cast housing on top of the lift, and with the face of the counter showing through a recessed window in the housing and easily read from the crank location.

2.4.3 Stem Covers

Weathertight and dust-tight stem covers shall be provided to enclose and protect the threaded portion of the gate stem. Slotted galvanized steel stem covers shall be provided. The top of the stem shall be visible through the slot throughout its distance of travel during opening and closing operations. The slot shall be covered with a vandal resistant clear plastic material as recommended by the stem manufacturer and as approved. The above plastic material shall be installed as recommended by the stem manufacturer.

2.4.4 Bolts and Nuts

All anchor bolts for the rising stem type sluice gate frames and guides, stem guides, hoists and floor stands, and all bolts and studs used in the sluice gate leaves, frames and guides, and stem guides shall be stainless steel conforming to the requirements of ASTM A 276, type 304.

2.5 PORTABLE OPERATOR

Two power operating devices shall be provided for opening and closing of

all sluice gates in the project. The operator shall be portable, heavy duty drill type, mounted on a tripod.

2.5.1 Electric Motor Operated Drill

The operator shall be portable and capable of opening and closing the gates at the speed and torque specified. The drill shall be reversing type. The dimensions of the coupling for connecting the drill to the gates shall be determined by the Contractor after gate selection. The wrench shall be designed for outdoor service and operate on 120 volt, single phase, 60 hz service. The drill shall be capable of providing a minimum of 30 foot-pounds of torque for continuous duty while operating at a speed of not less than 140 RPM. The drill shall develop a stall torque of 75 foot-pounds. Fifty feet of three conductor, heavy duty cable, shall be provided with the drill for use as an extension cord. The cable shall be complete with a 3 pole plug. An operating stand shall be provided with the drill. The operating stand shall be designed to withstand the stall torque of the drill. Drill shall be similar to Milwaukee 2404 or equal.

2.5.1.1 Torque Limiter Coupling

A detachable overload release type torque limiting device shall be furnished so as to cause the drill to turn free if the output torque exceeds 50 foot pounds. Resetting shall be accomplished simply by allowing the drill to stop and reversing the rotational direction. The torque coupling shall be manufactured and designed to be torsionally rigid and allow for angular misalignment similar to Model 405 as manufactured by American Autogard Corporation, Rockford, Illinois. The torque limiter coupling shall be factory set and equipped with tamper proof shield and dust and wash-down resistant cover. The input side of the coupling shall be equipped with an adapter shaft. The adapter shaft shall be tool steel with a minimum impact energy rating of 150 percent of the torque limit. The adapter shaft shall be of the diameter, as recommended by the coupling manufacturer and approved by the Contracting Officer and shall be set screwed and keyed to coupling. The other end of the adapter shaft shall be a No.3 external Morse Taper in accordance with ANSI B5.10 and shall properly mate with the approved power drill.

2.5.1.2 Adapter Sockets

The Contractor shall provide adapter sockets of each size and type necessary to connect the torque coupling of the power drill to each of the handwheel shafts of the approved sluice gate actuators. The coupling side of all the adapter sockets shall be shaft mounted of the diameter, set screwed and keyed as recommended by the coupling manufactuer and approved by the Contracting Officer. The handwheel side of the adapter sockets shall determined by the Contractor and individually configured to mate with the handwheel shafts of each approved permanently mounted actuators. The adapter sockets shall be tool steel with a minimum impact energy rating of 150 percent of the output torque of the portable actuator.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Instructions

The setting, installation, assembly, lubrication, and testing of the gates

and hoisting units shall be in accordance with the instructions of the gate manufacturer as approved by the Contracting Officer. These instructions shall be submitted for approval prior to any gate installation work. An erecting engineer shall inspect and determine the adherence to the above instructions for the setting of the gate thimble, rail assemblies, the stem guide anchor bolts, and the hoisting unit anchor bolts; the alignment and assembly of the stem to the sluice gate, stem guides, and hoisting unit; and observe the initial gate operations using the hoist. The Contractor shall make all arrangements for the presence of the erecting engineer for this inspection. The presence of the erecting engineer, however, will not relieve the Contractor of full responsibility.

Wall thimbles and anchor bolts shall be set in place prior to the placing of concrete. Each unit shall be accurately aligned and, if upon completion of the work there is any misalignment or other defective workmanship which is likely to impede the operation of the gate, the necessary corrections shall be made by the Contractor at no additional expense to the Government. The bottom frame member of flush bottom sluice gates shall be embedded in an asphalt mixture as shown.

Flush bottom gate seal shall be filled with lean concrete or asphalt and sand mixture. Asphalt and sand fill mixture shall be a relatively stiff mix of road asphalt and clean sand. The asphalt material shall be Asphalt Cement (AC), Penetration Grade 120/150. The asphalt content shall not be less than 7 percent of the mix. The sand shall conform to the quality and gradation of fine aggregate for concrete as specified in ASTM C 33. The mixture shall be well tamped so as to have full contact with the embedded frame and to provide a firm fill in the recess.

3.1.2 Gate Vendor's Erecting Engineer

This erecting engineer shall be experienced in the specific installation of sluice gates as a complete system. Installation experience shall include as a minimum three successful installations of which at least one must have been in the last two years and at least one must have been a gate of the larger size furnished with this project. The Gate Vendor shall coordinate with the Contractor on the most advantageous times and durations necessary for his erecting engineer to be at construction site and be confident of the proper installation and operational function of their product. The Vendor's erecting engineer shall initiate instructions for all actions necessary for the proper receipt, inspections, handling, assembly, installation, operation, and testing of this sluice gate system furnished by his company under this contract. Discrepancies shall be reported to the Contracting Officer. The Vendor's erecting engineer shall also keep records of measurements and actions taken during his visits and shall furnish a copy to the Contracting Officer on request or at the completion of each visit. Multiple visits may be required depending on installation sequencing. One of the visits shall be during final preparation and performance of the installed acceptance test. The erecting engineer shall instruct the Contractor in the operation and maintenance features of his company's installed sluice gate product. The following information will be submitted with the submittal package to verify the qualifications of the engineer:

a. Experience, years of service, etc., as an erecting engineer.

b. List of successful gate installations with owner's address and phone number.

c. Size and type control of the installed gates.

3.1.3 Assembly

Prior to assembly, the gate stems shall be thoroughly cleaned, for inspection by the Contracting Officer or his representative. All parts of the gates and operating mechanisms shall be installed and fitted together so that after final assembly there will be no interference through bad alignment, or any warping or twisting of the members that would in any way interfere with operation. All finished contact or bearing surfaces shall be true and exact to insure full and complete contact. All bolts for attaching the gate frames, stem guides, and operating hoists shall be accurately embedded at the time of placing concrete. Provisions for lubrication of the operating mechanisms shall be made and the lubrication systems shall be properly filled with suitable lubricant as recommended by the manufacturer of the hoists. When the sluice gate slide is in the fully closed position and wedged in position against the frame, maximum clearance between mating faces shall not exceed 0.004 inch.

3.2 TESTS

After final assembly, each gate shall be tested in the presence of the gate vendor's erecting engineer and the Contracting Officer or his representative by raising and lowering it throughout its complete travel by means of its operating mechanism and to demonstrate that it complies with the specifications. Any defective part of error in the construction or alignment of the complete gate discovered during the tests and trials shall be immediately corrected by the Contractor without cost to the Government.

Upon completion of the installation, each gate shall be lubricated and operated through as many cycles of opening and closing as may be necessary to demonstrate proper functioning of the gates and that the units are free from binding or other defects.

3.2.1 Testing

The portable operator shall be tested in the presence of the Contracting Officer in raising and lowering the gates.

3.3 PAINTING

Stainless steel gates shall not require painting. The gate manufacturer shall be responsible for shop prime and finish painting of all sluice gates and appurtenances supplied under this contract. All coatings shall conform with VOC Emission Regulations in effect at the manufacturing location and at project site to allow touch-up or recoating to be performed with the same products. The type of paint shall be as specified in the following schedule. Where required by application the coating shall be approved for contact with drinking water by the NSF, EPA, or other appropriate governing agencies. Number of coats, mil thickness and surface preparation shall be in accordance with the paint manufacturer's recommendations for that application, but in no case shall be less than the requirements in the following schedule. All coatings shall be free of carcinogens as listed on the IARC monographs. Colors are to be manufacturer's standards, provided they are selected for ease of manufacturer's standards, provided they are selected for ease of field touch- up and color match and are fade resistant. Colors shall be selected to provide contrast between the product and the prime coat, and between the prime coat and the finish coat, to insure uniform covering and coating thickness. All coatings shall be

applied in accordance with the paint manufacturer's recommendations for thinning, technique and safety precautions.

3.3.1 Paint Schedule

Application	Material	Preparation	1st Coat	2nd Coat	3rd Coat
Gates, wall thimbles	Cast Iron	SP 6	Amine Mod. Pol. Epoxy Amerlock 400 or Equal 5 mils min.	Amine Mod. Pol. Epoxy Amerlock 400 or Equal 5 mils min.	None

3.4 TOOLS

One set of wrenches and special tools required for the operation and maintenance of the sluice gates installed under this contract shall be furnished at the time of the trial operation.

3.5 QUALITY CONTROL

The Contractor shall establish and maintain quality control for work under this section to assure compliance with contract requirements and maintain records of his quality control for all construction operations including, but not limited to, the following:

a. Materials and workmanship.

b. Installation.

c. Trial operations of each gate.

d. Adjustment.

A copy of the records of inspections and tests, as well as the records of corrective action taken, shall be furnished to the Government as directed by the Contracting Officer.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15131

PUMPS AND EQUIPMENT

PART 1 GENERAL

1.1 SCOPE
1.2 REFERENCES
1.3 SUBMITTALS
1.4 WELDING QUALIFICATIONS

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.1.1 Standard Products
2.1.2 Coordination
2.1.3 Nameplates
2.1.4 Instruction Plates
2.1.5 Verification Of Dimensions
2.2 MATERIALS
2.2.1 Materials Not Specifically Described
2.2.2 Material Requirements
2.3 HARNESSED COUPLING FOR GOVERNMENT FURNISHED VERTICAL PUMPS
2.4 DISCHARGE PIPING
2.5 SUBMERSIBLE SUMP PUMP
2.5.1 General
2.5.2 Capacities
2.5.3 Speed
2.5.4 Pump casings
2.5.5 Wear Ring System
2.5.6 Impellers
2.5.7 Shafts And Seals
2.5.8 Shaft Seal System
2.5.9 Pump Lifting System
2.5.9.1 Guide Bar System
2.5.9.2 Pump Discharge Elbows
2.5.10 Cooling System
2.5.11 Painting
2.5.12 Electrical
2.5.12.1 Rating
2.5.13 Pump Cables
2.5.14 Alarms
2.5.15 Special Tools
2.5.16 Spare Parts
2.6 PORTABLE JIB CRANE FOR SUBMERSIBLE PUMP

PART 3 EXECUTION

3.1 FABRICATION AND MACHINING
3.1.1 Machine Work
3.1.2 Castings
3.1.2.1 Casting repair

3.1.2.2 Visually Examine
3.1.2.3 Acceptance Criteria
3.1.3 Bolted Connections
3.1.4 Holes for Regular Bolts
3.1.5 Holes for Fitted Bolts
3.1.6 Holes for High-Strength Bolts
3.1.7 Metallic Coating
3.1.8 Metalwork
3.1.8.1 Flame Cutting of Material
3.1.8.2 Stress-Relieving Procedure
3.1.9 Surface Finishes
3.1.10 Welding
3.1.11 Shop Assembly
3.2 INSTALLATION
3.2.1 General
3.2.2 Transportation of Government Furnished Pumps and Equipment
3.2.3 Packaging, Marking, and Acceptance
3.2.3.1 Spare Parts And Special Tools
3.2.4 Packing Lists
3.2.5 Labeling Boxes
3.2.6 Inspection
3.2.7 Services Of Vertical Pump Manufacturer Erecting Engineer
3.2.8 Sole Plate Installation
3.3 FIELD TESTING
3.3.1 General
3.3.2 Field Testing
3.3.3 Vibration Measurements
3.3.4 Pump Wet Testing
3.3.4.1 Recorded Measurements
3.3.5 Lubricating System Tests
3.4 WARRANTY
3.4.1 Defects or Failures Within the Warranty Period

-- End of Section Table of Contents --

SECTION 15131

PUMPS AND EQUIPMENT

PART 1 GENERAL

1.1 SCOPE

This section covers the installation of Government Furnished vertical pumps and motors as shown. This section also covers furnishing and installing the submersible sump pumps and accessories.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 27	(1995) Steel Castings, Carbon, for General Application
ASTM A 36	(2001) Carbon Structural Steel
ASTM A 48	(2000) Gray Iron Castings
ASTM A 108	(1999) Steel Bars, Carbon, Cold Finished, Standard Quality
ASTM A 123	(2001) Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products
ASTM A 276	(2000) Stainless Steel Bars and Shapes
ASTM A 285	(1996) Pressure Vessel Plates, Carbon Steel, Low and Intermediate Tensile Strength
ASTM A 516	(1996) Pressure Vessel Plates, Carbon Steel, for Moderate and Lower Temperature Service
ASTM A 564	(1999) Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A 576	(1990b; R 00) Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A 668	(1996) Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A 743	(1998) Castings Iron-Chromium, Iron-Chromium-Nickel, Corrosion-Resistant, for general Use

ASTM B 148	(1992) Aluminum-Bronze Sand Castings
ASTM B 584	(2000) Copper Alloy Sand Castings for General Applications
ASTM E 709	(1995) Magnetic Particle Examination

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME 17	(1992) Boiler and Pressure Vessel Code; Section IX, Welding And Brazing Qualifications
ASME B4.1	(1994) Preferred Limits and Fits for Cylindrical Parts
ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(1998) Motors and Generators

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G, ED

Shop drawings, including catalog cuts and manufacturer's data, shall be submitted for approval. Shop drawings shall be neat, legible, and of sufficient size so as to be easily read and/or reproduced. The following items shall be submitted:

a) Outline drawings of all proposed submersible pumps showing all pertinent dimensions and weight of the various components of the pumps. The name of each pump manufacturer shall be stated.

b) Dimensioned cross sectional drawings of the submersible pumps and components. Pumps and motors shall be shown as a complete assembly.

c) Installation Details. Include installation details for the proposed submersible pumps. Scaled layout drawings of the pumping

stations shall be submitted showing the installation of all new pumps including the Government Furnished pumps.

SD-03 Product Data

Coating Systems; G, ED

The proposed coating (painting) systems and procedures for the submersible pumps and components shall be submitted.

Warranty; G, ED

A copy of the pump warranty for each submersible pump furnished shall be submitted.

Spare Parts Listing; G, ED

Spare parts listing for the submersible pumps.

SD-05 Design Data

Pump Capacity-Head Curves; G, ED

Pump capacity-head curves for the submersible pumps with the brake horsepower (BHP) and the net positive suction head required (NPSHR) requirements presented; operating points shall be indicated on the pump curves. Efficiency data shall be plotted..

SD-06 Test Reports

Field Testing; G, ED

Submit test data from field testing of submersible pumps and Government Furnished vertical pumps as specified in Paragraph: Field Testing.

SD-07 Certificates

Material Listing & Certification; G, ED

Material listing and material certification of the proposed submersible pumps. Include listing of all pump components. Include the associated industry standard for all materials and components.

Welding Certification

Welding qualification and certification shall be submitted.

SD-08 Manufacturer's Instructions

Installation And Erection Instructions; G, ED

The Contractor shall submit five copies of a printed and bound manual describing the procedures, to be followed by a pump installation contractor with supervision of an erecting engineer, for erecting, assembling, and installing the submersible pumps. The proposed manuals shall be submitted with the pump shop drawing submittals.

A. The installation description shall be a complete, orderly, step-by-step explanation of the various operations required to install each types of submersible pump. It shall describe all special procedures and outline special precautions. It shall also include such things as bolt torque values, permissible wear ring clearances, recommended instrument set-ups, recommended gages and instruments, bearing clearances, and similar details.

B. The description shall be complemented and supplemented by drawings, sketches, photographs, and similar materials as necessary. The overall result shall be a description which may be comprehended by an engineer or mechanic without extensive experience in erecting or installing submersible pumps of the types required.

SD-10 Operation and Maintenance Data

Operation And Maintenance Manual; G, ED

The Contractor shall submit, prior to delivery of any submersible pumps to the project work site, five copies of a manual containing complete information in connection with the operation, lubrication, adjustment, routine and special maintenance, disassembly, repair, and reassembly of the submersible pumps and accessories. The manual shall also have a listing of special tools required for working on the submersible pumps and controls. The manual shall incorporate complete information on the controls covered under this section and SECTION: PUMP STATION CONTROL; and include operation and maintenance procedures, special features, and instructions for setting all adjustable controls and equipment. Comprehensive as-built drawings, photographs, factory test results, and sketches of the submersible pumps shall be included. The manual shall include complete diagnostic information on the submersible pumps and all approved shop drawing submittals on the submersible pump and controls. The manual shall be complete enough and provide enough details so the submersible pumps can be operated using the manual.

A. Parts list: The operation and maintenance manual shall have a complete parts list for the submersible pumps, and controls including spare parts. The list shall clearly show all details and parts, and all parts shall be adequately described and have identification markings and include sources for all parts.

B. Manuals shall be made up with hard cover post type binders and printed on 8-1/2 inch by 11 inch high quality paper with indexed, tabbed section dividers. Large sheets shall be neatly folded and installed with post hole reinforcements such that sheets can unfold without need to open binder posts. Drawings, sketches, and parts lists incorporated in the manual may be reduced to page size provided such reductions are clear and easily legible: otherwise they may be folded into the manual.

1.4 WELDING QUALIFICATIONS

Welding operators, welders, and tack welders shall be qualified and, as necessary, re-qualified for the particular type of work. Qualification

shall be in accordance with one of the following codes: Part III, Section 5 of AWS D1.1; or Section IX of ASME 17. Contractor shall certify by name to Contracting Officer the welders and welding operators so qualified, including date of qualification, code, and procedures under which each qualified. Prior qualification may be accepted provided the welder has performed satisfactory work under the code for which he qualified within the preceding three months. Contractor shall require welder or welding operator to repeat qualifying tests when, in the opinion of Contracting Officer, work indicates reasonable doubt as to welder's proficiency. In such cases, welder shall be re-certified as required above. The welder shall be considered disqualified until successful completion of retest. All expenses in connection with qualification and re-qualification shall be borne by Contractor.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Submersible pumps and Government Furnished vertical pumps shall be installed at the pumping locations as shown. The term "pump" shall mean the assembled pump-motor unit complete with base plate, discharge elbow, bowl assembly, etc. Submersible pumps shall be complete with integral motor, discharge elbow, and guide system.

2.1.1 Standard Products

All submersible pumps supplied shall be the product of a pump manufacturer who has produced at least 50 units of the models required under this contract.

2.1.2 Coordination

Electrical requirements are given in SECTION: PUMP CONTROL EQUIPMENT. All submersible pump shop drawings and control shop drawings will be rejected unless this work is properly coordinated. All submersible pumps shall be furnished complete with motors.

2.1.3 Nameplates

Each major item of equipment shall have the manufacturer's name, address, type/style, model, serial number, and catalog number on a plate secured to the item of equipment. Nameplates shall be made of corrosion resisting metal with raised or depressed lettering on a contrasting colored background. Submersible pump nameplates shall also include horsepower, voltage, current, speed, and phase data.

2.1.4 Instruction Plates

As necessary, each item of equipment shall be equipped with suitably installed instruction plates including warnings and cautions describing special and important procedures to be followed during starting, operating, and servicing the equipment. The plates shall be made of corrosion resisting metal with raised or depressed lettering on a contrasting colored background.

2.1.5 Verification Of Dimensions

The Contractor shall be familiar with all details of the work, verify all dimensions in the field, verify that the Government Furnished pumps will

fit as indicated on the drawings, and shall advise the Contracting Officer of any discrepancy prior to performing the work.

2.2 MATERIALS

2.2.1 Materials Not Specifically Described

Materials not specifically described shall, as far as practicable, conform to the latest approved industry standard(s) covering the appropriate class or types of materials.

2.2.2 Material Requirements

Designated items shall conform to the following:

Item	Requirements
Cast Iron	ASTM A 48, Class No. 30A, 30B and 30C
Cast Steel	ASTM A 27, Grade 65-35, annealed
Copper Alloy Castings	ASTM B 584, Alloy No. C93700 or C86300
Corrosion-Resistant Castings	ASTM A 743, Nickel or Chromium
Cold Rolled Steel Bars	ASTM A 108, Minimum Working Strength 65,000 pounds per square inch
Structural Steel	ASTM A 36
Hot Rolled Steel Bars	ASTM A 576, Grades: G10200, G10450, G11410
Hot Rolled Stainless	ASTM A 564, Grade 517400
Bars and Shapes:	
Steel Plates, Structural	ASTM A 285, Grade B
Steel Plates, Pressure	ASTM A 516, Grade 55
Vessel	
Steel Forgings	ASTM A 668, Class F

2.3 HARNESSED COUPLING FOR GOVERNMENT FURNISHED VERTICAL PUMPS

Provide flexible mechanical coupling connecting pump discharge elbow to discharge piping equal to Dresser style 38 coupling or Straub Grip or approved equal. Coupling shall provide axial restraint. Furnish middle ring without pipe stop to facilitate installation and removal of coupling.

2.4 DISCHARGE PIPING

Specific requirements are given in SECTION 15200 DISCHARGE PIPELINES. Vertical pumps shall be designed for above the floor discharge as shown.

2.5 SUBMERSIBLE SUMP PUMP

2.5.1 General

Submersible sump pumps shall be furnished complete with discharge elbow, guide system, and access cover. Pump and motor shall be integral with each other and supplied as a complete unit. Sump pumps shall be similar to that manufactured by Flygt, KSB, or equal.

2.5.2 Capacities

Discharge not less than 1000 gallons per minute against a Total Dynamic Head (TDH) of 23 feet of water. Pumps shall be minimum 75% overall

efficient at this primary condition point.

2.5.3 Speed

The speed of the pumps shall not exceed 1200 revolutions per minute.

2.5.4 Pump casings

Pump casings shall be made of ASTM A 48, Class 30, cast iron. The casing shall be of single piece design and shall have smooth fluid passages.

2.5.5 Wear Ring System

A wear ring system shall be installed to provide efficient sealing between the volute and impeller. The wear ring shall consist of a stationary ring made of bronze insert which is press-fitted into the volute inlet, and a rotating stainless steel ASTM A 276, Type 316 ring which is force-fitted into the impeller runner.

2.5.6 Impellers

Impellers shall be gray cast iron conforming to ASTM A 48 Class 30, or of aluminum bronze conforming to ASTM B 148 Grade D; and double shrouded non-clogging design having a long thrulet without acute turns. The impellers shall be capable of handling solids found in wastewater.

2.5.7 Shafts And Seals

Pump and drive shaft shall be a single combined shaft. The pump shaft and drive shaft shall be of ASTM A 276, Type 420 stainless steel and shall be completely isolated from the pumped liquid.

2.5.8 Shaft Seal System

Each pump shall be provided with a tandem mechanical rotating shaft seal system. Seals shall run in a oil reservoir. Lapped seal faces must be hydrodynamically lubricated at a constant rate. The lower seal unit, between the oil sump and the volute, shall contain one stationary and one positively driven rotating tungsten-carbide ring. The upper seal unit, between the motor housing and oil sump, shall contain one positively driven rotating carbon ring and one stationary tungsten-carbide seal. Positively driven means the rotating seal is driven from the shaft by virtue of a mechanical connection (i.e., set screw, clip, key, etc.). The use of an elastomeric sealing member driving the seal face by friction on the shaft surface shall not be permitted. Each seal interface shall be held in contact by its own spring system. As alternate seal materials, silicon carbide/silicone carbide for the lower seal unit and carbon/tool steel for the upper seal unit shall be accepted. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable. Shaft seals without a positively driven rotating member or conventional double mechanical seals containing a common single spring acting between the upper and lower unit shall not be accepted. Each pump shall be provided with an oil chamber for the shaft sealing system. The oil chamber shall be designed to assure that air is left in the oil chamber, to absorb the expansion of the oil due to temperature variations. The drain and inspection ports, with positive anti-leak seal, shall be easily accessible from the outside of the pump.

2.5.9 Pump Lifting System

Each pump shall be furnished with a lifting bar to facilitate handling. The lifting bars shall be stainless steel, chrome-nickel steel, or chrome-moly steel. The bar shall be so designed and arranged to allow safe handling of the pump as required during shipping, installation, and maintenance.

2.5.9.1 Guide Bar System

Each pump shall be furnished with a stainless steel guide cable or guide bar system for lifting the pump in and out of the wetwell and connecting to the discharge elbow. Guide bar system shall be either a single or double rail system. Guide bars shall be galvanized steel.

2.5.9.2 Pump Discharge Elbows

Each pump shall be furnished with a discharge elbow. Pump discharge elbows shall be manufactured by the pump manufacturer. Each discharge elbow shall be matched marked to its respective pump and shall be shipped and packaged with such respective pump. Discharge elbows shall be made of either cast iron or cast steel and consist of a flange for automatically mating with the pump discharge bowl when the pump is lowered into place. Discharge elbows shall be the long radius type. Each discharge elbow shall have a cast iron or cast steel shoe for anchoring to the sump floor. The seal between the pump volute and discharge shoe shall be designed to remain tight and intact under any pump thrust.

2.5.10 Cooling System

Each pump unit shall have an adequately designed cooling system, consisting of a water jacket which encircles the stator housing; alternatively, cooling fins may be used. The water jacket shall be provided with a separate circulation of the pumped liquid. Cooling media channels and ports shall be non-clogging by virtue of their dimensions. All cooling paths or ports shall be internal to the pump and motor water jacket to preclude clogging or physical abuse. Either type of cooling system shall be designed to allow for continuous pump operation at rated capacity with the external water level at the minimum pump submergence level.

2.5.11 Painting

Pump exteriors shall be painted with the submersible pump manufacturers paint system.

2.5.12 Electrical

Pump motors shall be squirrel-cage, induction, shell type design, housed in an air-filled chamber, and NEMA Design B type. The pump unit and motor unit shall be closed coupled to form a single integral unit. The stator winding and stator leads shall be insulated with moisture resistant Class F insulation which will resist a temperature of 155 ^{o}C. The stator shall be dipped and baked three times in Class F varnish. The motor shall be designed for continuous duty, capable of sustaining a minimum of ten starts per hour. The rotor bars and short circuit rings shall be made of copper or aluminum.

2.5.12.1 Rating

Each motor shall be wound for 3-phase, 60 Hz, alternating current, and 480 volt operation. Maximum horsepower shall be 15 horsepower. The motor shall

be designed for operation in a 20 ^{o}C ambient temperature and all temperature rises shall be above this ambient temperature. The rated horsepower of the motor shall be not less than 110 percent of the determined maximum load requirement for the full capacity-head curve of the pump. The motor shall have a service factor of 1.15. The temperature rise above the ambient temperature for the class of insulation used shall be in accordance with paragraph MG 1-12.42 of NEMA MG 1.

2.5.13 Pump Cables

Each pump shall be supplied with 50 feet of electrical cable. Each cable shall be suitable for submersible pump application per NEC NFPA 70. Cable sizing shall conform to NFPA 70. A cable rack shall be provided for supporting the motor leads and float switch leads.

2.5.14 Alarms

The following alarm features shall be provided for all the sump pumps:

a) Over temperature alarm: The motor over temperature alarm circuit shall be actuated by three thermal sensors embedded in the stator windings of the pump motor (one switch in each stator phase). The pump motor shall stop on over temperature and not restart until the over temperature alarm is manually reset and the motor temperature has cooled to the appropriate temperature.

b) Overload alarm: The motor overload circuit on the pump motor shall stop the motor upon overload and not restart until the overload condition is corrected and manually reset.

2.5.15 Special Tools

The Contractor shall furnish all specials tools that are unique to the pump for proper installation, testing, operation, and/or maintenance. Special tools shall be delivered with the pumps.

2.5.16 Spare Parts

All spare parts shall be duplicates of the original parts furnished and shall be interchangeable with those parts. The Contractor shall furnish at a minimum the following spare parts:

a. Two sets of seal assemblies, wear rings, and motor sensors for the submersible sump pump.

2.6 PORTABLE JIB CRANE FOR SUBMERSIBLE PUMP

Jib crane shall be provided as shown on the drawings. Jib crane shall be hand operated, 2000 pound capacity at a 4 foot reach similar to that manufactured by Thern or equal. Jib crane shall have an electro-static finish with stainless steel components and accessories. Wire rope shall be stainless steel, 7 by 7 or 7 by 19 construction, and minimum of 1/4 inch in diameter. Jib crane shall provide 30 feet of lift. Jib crane shall be removable from its base.

PART 3 EXECUTION

3.1 FABRICATION AND MACHINING

3.1.1 Machine Work

All tolerances, allowances, and gauges for metal fits between plain, non-threaded cylindrical parts shall conform to ASME B4.1 for the class of fit required.

3.1.2 Castings

Each casting shall have a mark number cast or stamped upon it. In addition, each casting weighing more than 500 pounds shall have the heat number cast or stamped upon it. Warped or otherwise distorted castings that are oversize to an extent that could interfere with proper fit with other parts of the machinery or structure will be rejected. Cracked castings of non-weldable materials (i.e., cast iron, etc.) will be rejected. Repairs to castings shall not be made without prior approval.

3.1.2.1 Casting repair

Castings shall have all unsound material or defects removed by chipping, machining, air-arc gouging, or grinding; and shall be repaired by welding. Welding repairs shall conform to the welding procedures which shall have been submitted and approved for the type material involved. Stress relief annealing, where required, shall be accomplished prior to final machining.

3.1.2.2 Visually Examine

Visually examine each casting for defects. Examine visually defective impeller and other castings using Magnetic Particle Tests. Magnetic particle tests and inspection shall conform to ASTM E 709. Do not use castings with defects in steel disclosed by magnetic particle test which exceed the degree permitted by ASTM E 709.

3.1.2.3 Acceptance Criteria

Criteria for acceptance of castings and casting repairs, including the approved welding procedure for each material used, shall be developed by the Contractor. Standards that are not definitive or that delegate discretionary authority for acceptability of castings or casting repairs to manufacturer's representatives or other individuals are not acceptable. Castings not meeting approved criteria shall be either rejected or repaired as dictated by approved standards.

3.1.3 Bolted Connections

Bolts, nuts, and washers shall conform to the applicable requirements of PARAGRAPH: MATERIALS AND MATERIAL STANDARDS for the types required.

3.1.4 Holes for Regular Bolts

Holes for regular bolts shall be drilled or sub-drilled and reamed in the shop. Holes shall be accurately located, smooth, perpendicular to the member, and cylindrical.

3.1.5 Holes for Fitted Bolts

Holes for fitted bolts shall be match-reamed or drilled in the shop. Holes shall be smooth, perpendicular to the member, and cylindrical. Burrs resulting from reaming shall be removed. The threads shall be entirely outside of the holes. The body diameter of the bolt shall have tolerances

as recommended by ASME B4.1 for the class of fit required. Fitted bolts shall be fitted in reamed holes by selective assembly to provide an LN-2 fit.

3.1.6 Holes for High-Strength Bolts

Holes for high-strength bolts shall be accurately spaced, perpendicular to the member, and cylindrical. If the thickness of the material is greater than the diameter of the bolt, the holes shall be either drilled full size or shall be sub-drilled and then reamed to full size. Poor matching of holes will be cause for rejection. Drifting done during assembly shall not distort the metal or enlarge the holes. For slight mismatching, reaming to a larger diameter for the next standard size bolt will be allowed.

3.1.7 Metallic Coating

Zinc coatings shall be applied in a manner, thickness, and quality conforming to ASTM A 123. Where the zinc coating is destroyed by cutting, welding, or other causes, the affected areas shall be re-galvanized to the thickness and quality required for the original zinc coating.

3.1.8 Metalwork

3.1.8.1 Flame Cutting of Material

Flame cutting of material other than steel shall be subject to approval of Contracting Officer. Shearing shall be accurately done, and all portions of work neatly finished. Steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a smooth surface free from cracks and notches is secured. Surfaces and edges to be welded shall be prepared in accordance with Section 3 of AWS D1.1. Chipping and/or grinding will not be required except where specified and as necessary to remove slag and sharp edges of mechanically guided or hand-guided cuts not exposed to view. Visible or exposed hand-guided cuts shall be chipped, ground, or machined to metal free of voids, discontinuities, and foreign materials.

3.1.8.2 Stress-Relieving Procedure

After all fabrication welding is completed, and prior to any machining, stress-relieve suction bell by heat treatment. Contractor shall submit proposed stress-relieving procedure for approval by Contracting Officer.

3.1.9 Surface Finishes

Where surface finishes are indicated, or on Contractor's drawings, or are specified herein, symbols used or finishes specified shall be in accordance with ASME B46.1. Values of roughness height specified are the arithmetical average deviation expressed in microinches. Roughness specified is the maximum value and any lesser degree will be satisfactory unless otherwise called for on drawings. Compliance with specified surface shall be determined by sense of feel and by visual inspection of work compared to Roughness Comparison Specimens, in accordance with provisions of ASME B46.1. Values of roughness width and waviness height are not specified, but shall be consistent with general type of finish specified by roughness height. Flaws such as scratches, ridges, holes, peaks, cracks, or checks, which will make part unsuitable for intended use, will be cause for rejection.

3.1.10 Welding

Unless otherwise authorized or specified, welding of steel shall be by electric arc-welding process, using a method that excludes atmosphere from molten metal. Welding of steel, unless specified otherwise, shall conform to applicable provisions of AWS D1.1. Temporary welds required for fabrication and erection shall be made under controlled conditions prescribed herein for permanent work. Each temporary weld shall be removed after serving its purpose and ground flush with adjacent surfaces.

3.1.11 Shop Assembly

Unless otherwise specified, each piece of machinery furnished, shall be assembled in the shop to determine correctness of fabrication and matching of component parts. Tolerances shall not exceed those specified or shown on Contractor's manufacturing drawings and each assembled unit shall be closely checked to ensure that all necessary clearances have been provided and that binding does not occur in any moving part. Assembly in shop shall be in the same position as final installation in the field unless otherwise specified. Perform assembly and disassembly work in the presence of a Government representative, unless waived in writing by Contracting Officer, and immediately remedy errors or defects disclosed without cost to Government. Before disassembly for shipment, matchmark each piece of a machine or structure to facilitate erection in the field. Indicate location of matchmarks by circling with a ring of white paint after the shop coat of paint has been applied, or as otherwise directed.

3.2 INSTALLATION

3.2.1 General

The Contractor shall install all Government furnished vertical pumps and accessories such as the lubrication system in accordance with the manufacturer's installation procedure as outlined in the Government furnished installation manuals. A total of six Government furnished vertical pumps shall be installed as shown. Four of these pumps shall be identical to each other and are for installation in the new pump stations as shown. The remaining two pumps shall be similar in design except they are for installation in the existing pump stations as shown. These pumps will have a different column length as shown on the drawings. The pumps are the electric, axial flow, vertical, type. The Contractor shall supply and install the submersible sump pumps in accordance with the manufacturer's installation procedure. All pump installation work shall be coordinated with electrical work.

3.2.2 Transportation of Government Furnished Pumps and Equipment

The Government furnished pumps and equipment are stored at a facility at Wahpeton, North Dakota. The Contractor shall coordinate with the Contracting Officer to obtain the exact location of the facility and shall make arrangements to have the facility available as needed. The Contractor shall be responsible to load the Government furnished pumps and equipment at the facility, transport to the installation site, and unload at the installation site. The Contractor shall visually inspect the equipment at the facility to and all during the loading, transporting and unloading operations to determine the appearance of damage to the packaging or the equipment and any such damage determined shall be reported to the Contracting Officer immediately.

3.2.3 Packaging, Marking, and Acceptance

The Contractor shall insure to have the submersible pumps and control equipment delivered as completely assembled and wired as feasible in order to minimize site installation work. The manufacturer's standard packing method, as approved, for the pumps and control panels shall be submitted at least 10 calendar days prior to the shipping date. Items to be shipped shall be protected against moisture or water damage and kept dry at all times. The pumps and pump control panels shall be crated in order to protect them from damage during shipment and storage: crating shall allow vertical storage. Any relay or other device which cannot withstand the hazards of shipment when mounted in place shall be carefully packed and shipped separately.

3.2.3.1 Spare Parts And Special Tools

Spare parts and special tools for the Government furnished pumps will be provided and are packed separately.

3.2.4 Packing Lists

Packing lists are available for all items shipped under the pump supply contract.

3.2.5 Labeling Boxes

All boxes and crates have been tagged and/or labeled to clearly identify the contents. Spare parts and special tools have been plainly marked. Packing lists include the following information:

(1) Project name

(2) Contract number

(3) Part description and quantity (including the manufacturer's name and the part number)

3.2.6 Inspection

Within five calendar days after delivery to the designated point of shipment, the items shall be inspected by the Contracting Officer. The inspection shall include an accounting of the items delivered and a visual inspection to determine any possible damage during shipment. If this inspection reveals any defects or deviations from contract requirements which could render the items unsuitable for the use intended, the Contractor shall repair each such identified deficiency. In the event deficiencies cannot be acceptably corrected, the equipment will be subject to rejection.

3.2.7 Services Of Vertical Pump Manufacturer Erecting Engineer

The services of an erecting engineer will be provided for the vertical pumps as part of the vertical pump supply contract. Ten calendar days on the site and four calendar days of transit time have been included for erection engineer services under the vertical pump supply contract. The Contractor shall coordinate with the Contracting Officer for the presence of the erecting engineer. The erecting engineer for the vertical pumps will have the same duties as noted for the erecting engineer for the submersible pumps except that the erecting engineer will report directly to the Contracting Officer. The Contractor shall coordinate with and work

directly with the erecting engineer to obtain the correct installation and testing and shall immediately report any conflicts to the Contracting Officer.

3.2.8 Sole Plate Installation

All permanent foundation materials such as anchor bolts shall be furnished by the Contractor. All temporary materials such as leveling nuts shall also be furnished by the Contractor. The Contractor shall submit the sole plate and pump baseplate installation for review. Sole plate shall be at least the size of the pump baseplate. Contractor may use either leveling nuts or jacking screws to level the sole plate. The sole plate shall be leveled to within a slope tolerance of plus or minus 0.025 inches over 10 feet measured in any direction. Grout shall be placed under the sole plate after leveling is completed. Top of sole plate shall be at the finished floor elevation.

3.3 FIELD TESTING

3.3.1 General

All equipment shall be operated by the Contractor at his own expense to determine if joints leak and if the pumps have been properly erected and connected. Such testing shall be made at the direction of the Contracting Officer. The Contractor shall furnish all the electricity, lubricants, and water required for the testing.

3.3.2 Field Testing

Field testing for the pump units shall be conducted within a reasonable time following completion of the equipment installation. The Contractor and Contracting Officer will jointly determine the date on which installation of the equipment is considered to have been completed to the extent that the testing can be performed. The testing shall thereafter proceed as expeditiously as practicable with all testing to be completed within 30 calendar days after the installation completion date.

3.3.3 Vibration Measurements

Vibration measurements, in both axial and radial directions, shall be made by the Contractor on all the pumps. Measurements will be made on pump casing flanges, pump base plate, motor, and, if possible, on bearing housings. Vibration measurements will be analyzed by Government personnel to determine acceptability of pumping installation.

3.3.4 Pump Wet Testing

All pumping units shall be run under operating conditions to insure that there are no leaks at any of the joints. Pumps shall be run under operating conditions for a total period of four hours. Should there be insufficient water to perform the testing, the Contracting Officer may at its option waive such testing. The Contractor shall demonstrate the removal and installation procedures of the submersible pumps by removing and then reinstalling them. Operation of the hoist shall be demonstrated.

3.3.4.1 Recorded Measurements

The Contractor shall measure and submit the following: each motor total electrical power draw (in KVA) and each motor active electric power draw

(in KW) for both the dry and wet testing; and the recorded actual operating revolutions per minute of each pump.

3.3.5 Lubricating System Tests

Test complete lubricating system for each pumping unit to determine that the system meets operational requirements specified. Any component parts that are damaged as the result of these tests or that fail to meet the requirements of the specification shall be replaced, reinstalled, and retested at the Contractor's expense.

3.4 WARRANTY

The following items shall be covered under an industry standard warranty.

(1) Submersible Pumps

3.4.1 Defects or Failures Within the Warranty Period

Defects or failures which develop within the warranty period shall be construed as due to faulty workmanship, materials, and/or design. Exceptions shall include instances where it can be conclusively proven that failure was a result of the Government's improper operation of the equipment, either prior to or after acceptance by the Government. Affected parts shall be replaced promptly with new parts by the manufacturer at no additional cost to the Government.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15200

DISCHARGE PIPELINES

PART 1 GENERAL

1.1 SCOPE
1.2 REFERENCES
1.3 SUBMITTALS

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.1.1 Asbestos Prohibition
2.1.2 Verification Of Dimensions
2.1.3 Welding Procedures
2.2 MATERIALS AND EQUIPMENT
2.2.1 Ductile Iron Pipe
2.2.2 Fittings
2.2.3 Protective Coatings And Linings
2.2.4 Bolts And Nuts
2.2.5 Hangers, Inserts, and Supports
2.2.6 Modular Mechanical Type Sealing Assembly
2.2.7 Sleeves
2.2.8 Flap Valves for Pump Discharge Lines

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Pipes And Fittings
3.1.2 Connecting Piping To Pumps
3.1.3 Assembly
3.1.4 Cutting of Pipe
3.1.5 Pipe Sleeves and Seals
3.2 TESTING
3.2.1 Pressure Test

-- End of Section Table of Contents --

SECTION 15200

DISCHARGE PIPELINES

PART 1 GENERAL

1.1 SCOPE

This section covers discharge piping, including installation requirements, for all new pumps. This section also covers requirements for the flap valves for the submersible pump discharge lines.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B1.1	(1989) Unified Inch Screw Threads (UN and UNR Thread Form)
ASME B16.5	(1996) Pipe Flanges and Flanged Fittings
ASME B18.2.1	(1996) Square and Hex Bolts and Screws Inch Series
ASME B18.2.2	(1987(R93)) Square and Hex Nuts (inch Series)
ASME Boiler and Pressure Vessel Code, Section IX	(1992) Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 536	(1984; R 99) Ductile Iron Castings
ASTM B 98	(1998) Copper-Silicon Alloy Rod, Bar, and Shapes
ASTM B 584	(2000) Copper Alloy Sand Castings for General Applications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C 104	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C 110	(1993) Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. for Water and Other Liquids
AWWA C 111	(1995) Rubber Gasket Joints for Ductile Iron Pipe and Gray-Iron Pressure Pipe and Fittings
AWWA C 115	(1994) Flanged Ductile-Iron Pipe with Threaded Flanges
AWWA C 150	(1991) Thickness Design of Ductile-Iron Pipe
AWWA C 151	(1991) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids

Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

MSS SP-58	(1988) Pipe Hangers and Supports - Materials, Design and Manufacture
MSS SP-69	(1991) Pipe Hangers and Supports - Selection and Application
MSS SP-89	(1991) Pipe Hangers and Supports - Fabrication and Installation Practices

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop drawings shall be submitted for all materials and equipment. Shop drawings shall include: manufacturer's descriptive and technical literature of the proposed piping, performance charts, catalog cuts of proposed flap valves; complete piping diagrams; details and data on equipment layout and anchorage, valves, couplings, and supports, anchors; and other details necessary to demonstrate that each proposed system has been coordinated and will properly function as a unit. The following shop drawings shall be submitted:

Layout and Installation of Pump Discharge Lines; G, ED

Shop drawings shall be submitted for the layout and installation of the pump discharge lines at all pump stations. The complete pump discharge piping system shall be shown on a scaled engineering

drawing. This shall include all piping within the limits of the pump stations. All support details and anchors (including any welding details) shall be shown. All valves and couplings shall be shown.

SD-03 Product Data

Manufacturer's Standard Coatings; G, ED

Data on the manufacturer's standard coatings for new valves, new pipes and new fittings shall be submitted.

SD-06 Test Reports

Performance Test Reports;

Upon completion, including testing, of each installed system, test reports shall be submitted in booklet form presenting all field tests performed. Performance test reports shall be included in the operation and maintenance manual specified in SECTION: PUMPING EQUIPMENT.

SD-07 Certificates

Certificates of Compliance for Piping; G, ED

Certificates of compliance shall be submitted for piping.

Certificates of Compliance for Anchors and Supports; G, ED

Certificate of compliance shall be submitted for anchors and supports.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Pipe sizes shall be as shown. In general, pipe material shall be ductile iron with flanged joints per AWWA C 115. Fittings and valves shall have flanged joints as shown. Materials and equipment shall be the standard products of manufacturers regularly engaged in the manufacture of such items. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 3 years prior to the contract award date.

2.1.1 Asbestos Prohibition

Asbestos and products containing asbestos shall not be used and will not be permitted in the contract work.

2.1.2 Verification Of Dimensions

The Contractor shall be familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy prior to performing the work.

2.1.3 Welding Procedures

Welding details for piping supports and anchors shall be submitted for approval. Welding shall be performed in accordance with qualified

procedures using qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX, and/or AWS D1.1.

2.2 MATERIALS AND EQUIPMENT

2.2.1 Ductile Iron Pipe

AWWA C 150 and AWWA C 151, thickness Class 53 for flanged piping. Pipe sizes as indicated on the drawings.

2.2.2 Fittings

Material, thickness, and pressure rating shall be per AWWA C 110 and AWWA C 111. Linings, coatings, and wrappings shall be as specified for the pipe except hand applications may be used when machine application is not practicable. Fittings shall conform to AWWA C 110 and ASME B16.5 as appropriate. Flanged end pipe shall be in accordance with AWWA C 115 Class 150. Flanges shall be ductile iron in accordance with AWWA C 110.

2.2.3 Protective Coatings And Linings

Pipes, fittings, and couplings shall be coated outside with a minimum 2 mil thickness (dry) asphalt paint in accordance with AWWA C 151. Piping shall be cement mortar lined per AWWA C 104.

2.2.4 Bolts And Nuts

Size, length, and number of bolts and nuts for the pipe flanges shall be in accordance with AWWA C 110 and AWWA C 115. Bolts shall conform to ASME B18.2.1 and nuts to ASME B18.2.2. Threads shall conform to ASME B1.1. All bolts and nuts shall be made from corrosion resistant 300 series stainless steel.

2.2.5 Hangers, Inserts, and Supports

MSS SP-58, MSS SP-69, and MSS SP-89. All supports and hangers shall be hot dipped galvanized steel.

2.2.6 Modular Mechanical Type Sealing Assembly

The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve with 316 stainless steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolt shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and the sleeve. Each sealing assembly shall be sized as recommended by the manufacturer to fit the pipe and sleeve involved.

2.2.7 Sleeves

Sleeves shall be fabricated from steel pipe, ductile iron pipe, or cast iron pipe.

2.2.8 Flap Valves for Pump Discharge Lines

Circular discharge flap valves shall be provided for flange mounting (to

the pump discharge line) and pump discharge service on the ductile iron discharge lines. Flap valves shall be rated for heavy duty service. Each valve shall be able to withstand stresses resulting from static head on the face of the gate and the reaction forces from discharge through the gate. The valve body shall be ductile iron conforming to ASTM A 536, spherically dished, with flanged faced and drilled for ASME B16.5 standard pipe flange. A resilient neoprene or Buna-N seat shall be bonded in a groove machined in the body. Hinge arms shall be high tensile bronze conforming to ASTM B 584 with silicon bronze pins conforming to ASTM B 98. Arms shall have two pivot points with adjustable lower pivot for limited rotation and a threaded upper hinge post for flap valve sensitivity. Spring bumpers shall be provided to prevent valves from opening more than 90 degrees. Lubrication fittings shall be provided at all bushings. Flap valves shall be similar to Rodney Hunt Series FV-ACP as manufactured by Rodney Hunt Co., Orange, Massachusetts.

PART 3 EXECUTION

3.1 INSTALLATION

Flap valves to be installed on the pump discharge lines. Install these valves at the discharge ends of the pipes as shown on the drawings. Installation shall be with a flanged connection to the pipe. Unless otherwise required, materials and equipment shall be installed in accordance with the manufacturer's written recommendations. The Contractor shall design and install all supports and anchors, as necessary, as submitted and as approved.

3.1.1 Pipes And Fittings

Piping shall be carefully laid out in advance and unnecessary cutting of materials shall be avoided. Pipe openings shall be closed with caps or plugs during installation. Equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury.

3.1.2 Connecting Piping To Pumps

Piping connections to the pumps shall be as shown.

3.1.3 Assembly

Pipe ends shall be clean and free from indentations, projections, and roll marks. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service and conform to AWWA C 110 and AWWA C 115. Assembly of the flanged joints and push-on joints shall be in accordance with the pipe manufacturer's standard method.

3.1.4 Cutting of Pipe

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Squeeze type mechanical cutters shall not be used for ductile iron.

3.1.5 Pipe Sleeves and Seals

Sleeves shall be set in structural members where indicated or approved. Each sleeve shall extend through the wall and be cut flush with each surface. Seals shall be installed as recommended by the manufacturer and as approved by the Contracting Officer.

3.2 TESTING

Piping at each pumping station shall be tested and inspected at the time of the pumping tests. If inspection or testing shows leaks or defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials.

3.2.1 Pressure Test

After the pipe is laid and the joints completed, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for 1 hour to a hydrostatic pressure test of 50 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, and valves shall be carefully examined during the test. Joints showing visible leakage shall be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, and valves, discovered in consequence of this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15895

HEATING & VENTILATING SYSTEMS

PART 1 GENERAL

1.1 SCOPE
1.2 REFERENCES
1.3 GENERAL REQUIREMENTS
1.3.1 General
1.3.2 Standard Products
1.3.3 Asbestos Prohibition
1.3.4 Nameplates
1.3.5 Instruction Plates
1.3.6 Verification of Dimensions
1.3.7 UL Compliance
1.4 SUBMITTALS

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT
2.1.1 Fans
2.1.1.1 Roof mounted exhaust fans
2.1.2 Heaters
2.1.2.1 Heater Controls
2.1.2.2 Heater Control Compartment
2.1.2.3 Heating Element
2.1.2.4 Fan Motor
2.1.3 Dampers
2.1.4 Ductwork
2.1.5 Grilles
2.1.6 Steel Sheets
2.1.7 Louvers
2.1.8 Air Quality monitoring System
2.1.9 Air Ventilation Blowers
2.1.10 Portable Gas Heater

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Ductwork
3.1.2 Unit Heaters
3.1.3 Electrical Work
3.2 TESTING
3.2.1 Fans
3.2.2 Heaters
3.2.3 Ductwork

-- End of Section Table of Contents --

SECTION 15895

HEATING & VENTILATING SYSTEMS

PART 1 GENERAL

1.1 SCOPE

This section covers heating and ventilating systems, ductwork, dampers, louvers, portable blowers, and portable heaters for the pump stations and pump station control buildings.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVING AND CONDITIONING ASSOCIATION INC. (AMCA)

AMCA 210	(1985) Laboratory Methods of Testing Fans for Rating

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A167	(1996) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
ASTM A525	(1993) Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS

NFPA 70	(2002) National Electrical Code

SHEET METAL AND AIR-CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC. (SMACNA) STANDARDS

SMACNA HVAC Duct Const	(1995) HVAC Duct Construction Standards-Metal and Flexible
SMACNA Leakage Test Mnl	(1985) HVAC Air Duct Leakage Test Manual

1.3 GENERAL REQUIREMENTS

1.3.1 General

The drawings indicate the extent and general arrangement of the heating and ventilating systems. Contractor shall be responsible for installing the systems per applicable local codes.

1.3.2 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. Heaters, blowers, exhaust fans, and dampers shall be from a standard catalogue line distributed by the manufacturer.

1.3.3 Asbestos Prohibition

Asbestos and products containing asbestos shall not be used.

1.3.4 Nameplates

Each major item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment. Plates shall be made of corrosion?resisting metal with raised or depressed lettering and contrasting background.

1.3.5 Instruction Plates

As necessary, each item of equipment shall be equipped with suitable located instruction plates, including any warnings and cautions describing any special and important procedures to be followed in starting, operating, and servicing the equipment. Plates shall be made of corrosion?resisting metal with raised or depressed lettering and contrasting background.

1.3.6 Verification of Dimensions

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

1.3.7 UL Compliance

Electrical appliances and equipment supplied shall meet the Underwriters Laboratory requirements regarding fire and casualty hazards. The label or listing by the Underwriters Laboratory will be accepted as proof of conforming with this requirement.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G, ED

Shop drawings shall be provided for all equipment and materials. Submittals shall include manufacturer's descriptive and technical literature, performance charts, and catalog cuts. Drawings shall

indicate clearances required for maintenance and operation. The following shop drawings shall be submitted:

a) Heating and ventilating systems. All support details shall be shown.

b) Wiring diagrams for the unit heaters and fans.

c) HVAC Control diagrams. Include HVAC control system schematics, ladder diagram, and sequence of operation. Show sequence of operation for all dampers.

SD-03 Product Data

Heating Equipment; G, ED

Provide manufacturer's bulletins, catalogue cuts, etc. on the heating equipment supplied under this contract. Rating, control information, physical dimensions, etc. shall be given.

Exhaust Fans; G, ED

Provide data on the exhaust fans to be supplied. Include information on horsepower, speed, air quantity, fan type, sound power level, and wiring data. Show all installation information and procedures including roof curbs.

Louvers and Dampers; G, ED

Provide information on louvers, motorized dampers, and gravity dampers. Include a damper schedule. Include size, type, rating, and material. Installation details for ductwork shall be provided. Include support details, size, and gauge.

Air Quality Monitoring Equipment; G, ED

Provide manufacturer's bulletins, catalogue cuts, etc. on the Air Quality Monitoring System supplied under this contract.

Air Ventilation Blower Equipment; G, ED

Air ventilation blower data. Include capacity, voltage, power, and phase data. Supply shop drawings on cart and hose.

Portable Heater; G, ED

Include capacity, engine specifications, dimensions, and manufacturer catalogue information.

SD-06 Test Reports

Balancing Reports; G, ED

Provide balancing reports for the exhaust systems installed.

Performance Test Reports; G, ED

Upon completion and testing of the installed system, test reports

shall be submitted in booklet form showing all field tests performed. Performance test reports shall be included in the operation and maintenance manual.

SD-10 Operation and Maintenance Data

Operating and Maintenance Instructions; G, ED

The Contractor shall incorporate all as-built and service information on heaters, fans, blowers, and dampers into the operation and maintenance manual specified in SECTION 15131 PUMPS AND EQUIPMENT. This information shall be provided in a separate section in the manual.

Operation and maintenance information shall include troubleshooting and diagnostic data, routine service information, wiring diagrams, and parts data. A source for parts and service shall be provided. A description and write-up of the control systems shall be included. Include complete HVAC control diagrams, sequence of operation, and ladder diagrams.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and equipment shall meet the requirements of publications and other requirements listed below.

2.1.1 Fans

Fans shall be tested and rated in accordance with AMCA 210. Fans may be directly connected to the motor shaft or indirectly connected to the motor by means of a V-belt drive. V-belt drives shall be designed for not less than 150 percent of the connected driving capacity. Fan and motor assemblies shall be provided with vibration isolation supports.

2.1.1.1 Roof mounted exhaust fans

Roof exhaust fans shall be aluminum and provided complete with roof curbs. Exhaust fans shall be propeller type, with sizes as scheduled on the drawings. Fans shall have a pre-lubricated ball bearing drive and motor shall be isolated from the exhaust stream. Motor shall be rated for continuous duty.

2.1.2 Heaters

Heaters shall be rated as shown on the drawings and shall be UL approved. Housing shall be heavy gauge, cold-rolled steel with a factory baked enamel finish. Heaters shall be wall mounted.

2.1.2.1 Heater Controls

Unit heaters shall be controlled by a remote thermostat, wall mounted as shown on the drawings. Thermostat for the unit heaters shall be line voltage, heavy duty with SPDT switch rated at 16.0 amps at 120 VAC and 40 to 90 degrees F temperature range.

2.1.2.2 Heater Control Compartment

Controls for the heaters shall be in an isolated compartment with a hinged cover which provides full access for servicing. All heater and control wiring shall terminate in the control compartment. Complete wiring diagram shall be attached to the inside of the access cover. Controls for the heaters shall include the following:

a) Heavy duty, 3-pole contractor which provides quiet, efficient operation.

b) Bi-metallic, snap action fan delay relay which energizes the fan after the heating element reaches operating temperature. Relay shall de?energize the fan after the thermostat is satisfied.

c) Thermal cut-out to de-energize the heating element if it overheats and resets when the temperature returns to normal.

d) Fused control transformer with 24 volt secondary.

2.1.2.3 Heating Element

Heating element shall be finned tubular steel and non-glowing.

2.1.2.4 Fan Motor

Fan motor shall be totally enclosed with thermal protector and sealed bearings.

2.1.3 Dampers

Dampers shall be parallel blade type, tight seal design. Frame shall be welded 12 gauge galvanized steel and blades shall be galvanized 14 gauge. ASTM 304 stainless steel jambs shall be provided.

2.1.4 Ductwork

All ductwork shall be galvanized steel sheets. Sheet metal ductwork shall comply with SMACNA HVAC Duct Const Standards. All ductwork shall be substantially airtight with no audible leaks, no dust marks showing at duct joints, connections to equipment and grilles.

2.1.5 Grilles

Units shall be single deflection, galvanized steel construction.

2.1.6 Steel Sheets

Steel sheets shall conform to ASTM A525. Stainless sheets shall conform to ASTM A167.

2.1.7 Louvers

Louvers shall be furnished for installation in walls as shown. Louvers shall be connected to dampers. Louvers shall be galvanized steel construction, factory painted to match the color of the building. Louvers shall be all welded construction, 16 gauge, minimum. Blades shall be galvanized, parallel or opposed as required. Blade edges shall be designed to carry water off to integral jamb downspouts. Design of the louver shall prevent rainwater from entering the airstream.

2.1.8 Air Quality monitoring System

The Contractor shall furnish an Air Quality Monitoring System for use in the wet well of the Pump Stations. One unit total shall be provided. The Air Quality Monitoring System shall be a portable combustible gas and oxygen detector, nickel-cadmium rechargeable battery powered, and packaged for outdoor use. The unit shall indicate oxygen partial pressure form 15.00% to 25.00% with plus or minus 0.25% resolution on the readout meter. An oxygen content alarm shall be factory preset to sound at the OSHA oxygen limits (19.5% low O2 and 22.0% high O2) and shall have adjustable alarm thresholds in at least 0.5% increments. The monitor system shall also test for OSHA compliance of at least the following gasses: CO (carbon monoxide), NO2 (nitrogen dioxide), H2S (hydrogen sulfide), and CH4 (methane). The Monitor system shall be capable of continuous monitoring for each gas, factory preset to alarm when the OSHA 1926.55 threshold is exceeded. Gage shall be scaled to read Apercent lower explosion limit@ (0% to 100%) scale. The system shall also be capable of separately detecting hydrogen sulfide gas in volumetric terms Aparts per million@ (ppm) within the minimum detection range 1 ppm to 40 ppm with adjustable alarm within the range. The alarm signal shall be loud audible (90+ db at 50 foot AA@ fast response, per SAE J919), as well as visual indicator lamp on the meter(s). Also included with the system shall be all the equipment required for meter calibration including pressure vessels with the required calibration gas, any special tools and parts, and complete instructions.

2.1.9 Air Ventilation Blowers

The Contractor shall furnish two air ventilation blowers for use at the pump stations. Each blower shall be portable, 480 volt AC powered adjustable air flow to at least 5300 CFM and shall come with a flexible waterproof outlet duct at least 16 inch diameter in size and in two 10 foot long connectable sections with splicing sleeve and connecting clamps. Each blower shall be mounted on a wheeled dolly and weigh not more than 90 pounds. Each blower motor, power cord and electrical plug connectors shall meet the requirements of SECTION 16415 ELECTRICAL WORK, INTERIOR. Each blower shall be equipped with a 50 foot extension cord detachable at blower with same disconnect at plug outlet. Each blower shall be weather proof to run unaffected in rain with NEMA 4 junctions and 3-phase TEFC motor. Each blower and base shall be similar to ACoppus TA-16" as manufactured by Coppus Engineering Corp., Worcester, Massachusetts, 01615-3999.

2.1.10 Portable Gas Heater

Unit shall be similar to Aerotech Herman Nelson BT400-45 or equal. Unit shall be trailer mounted and consist of gasoline engine, 25 feet of duct hose, and capable of 400,000 BTU heat output. Trailer unit shall be two wheeled with towing bar. Tires shall be pneumatic. Trailer unit shall be capable of 25 mph towing speed.

PART 3 EXECUTION

3.1 INSTALLATION

Unless otherwise indicated or specified, all materials and equipment shall be installed in accordance with the manufacturer's recommendations. Welding shall conform to AWS D1.1.

3.1.1 Ductwork

All ductwork shall be installed in accordance with SMACNA HVAC Duct Const standards. Ducts shall be secured and anchored to the building structures and shall be fabricated and installed in such a manner to prevent vibration under operating conditions.

3.1.2 Unit Heaters

Unit heaters shall be wall mounted as shown on the drawings. Thermostats shall be installed in accordance with the manufacturer's recommendation and located as shown on the drawings.

3.1.3 Electrical Work

Electrical work shall comply with NFPA 70 (NEC). Electric heaters specified herein shall be provided complete with motor and controls. Exhaust fans shall be provided with separate motor starters and disconnects mounted on the fan.

3.2 TESTING

Heating and ventilating systems specified under this section shall be tested and inspected at the time of the pumping tests. If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated.

3.2.1 Fans

The speed and direction of rotation of all fans shall be checked and verified. Motor current shall be measured. All the ventilation systems shall be operated for a period of not less than 15 minutes.

3.2.2 Heaters

All the heaters shall be operated for a period of not less than 15 minutes. Current draw shall be measured.

3.2.3 Ductwork

Ductwork shall be leak tested in accordance with SMACNA Leakage Test Mnl standards. Contractor shall conduct balancing test on all exhaust systems. Flow rates shall be within 10% of that shown on the drawings.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 WORK INCLUDED
1.1.1 GENERAL
1.1.2 Job Information
1.1.3 Application
1.1.4 Other Sections
1.2 SUBMITTALS
1.3 INTENT OF DRAWINGS AND SPECIFICATIONS
1.4 DRAWINGS
1.5 CODES, FEES, AND SALES TAX
1.6 MATERIAL AND EQUIPMENT
1.6.1 General
1.6.2 Major Components
1.6.3 Different Materials or Equipment
1.7 SUBSTITUTIONS AND APPROVAL OF MATERIALS
1.7.1 Procedures
1.8 APPROVAL OF CHANGES TO DRAWINGS OR SPECIFICATIONS
1.9 DAMAGE TO OTHER WORK
1.10 DATES OF COMPLETION
1.11 CLEAN-UP & PAINTING
1.12 TESTS
1.13 ELECTRICAL SERVICE TO PUMPING STATIONS
1.14 FIELD MEASUREMENTS
1.15 STRUCTURAL INTERFERENCES
1.16 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE
1.17 RECORD DRAWINGS
1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 WORK INCLUDED

1.1.1 GENERAL

In general, the work includes: Electrical work, materials, and operations as indicated on the drawings and as specified in the following articles of Division 16.

1.1.2 Job Information

Obtain at project site including:

A. Conditions affecting this section of the work
B. Accessibility
C. Storage space

1.1.3 Application

This Section of the specifications applies to all electrical work.

1.1.4 Other Sections

Electrical work indicated in other sections of the specifications to be done by the Contractor shall be included in the Contract.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Lighting Fixtures and Lamps Drawings; G, ED

Electronic Ballast Drawings; G, ED

Panelboard Drawings; G, ED

SD-10 Operation and Maintenance Data

Operation and Maintenance Manual;

Manual shall include the information specified in Paragraph: Operating and Maintenance Instructions of this section.

1.3 INTENT OF DRAWINGS AND SPECIFICATIONS

These specifications and attendant drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or materials necessary for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

1.4 DRAWINGS

A. The electrical drawings do not attempt to show the complete details of project construction which affect the electrical installation.

B. The Contractor shall refer to the architectural, civil, structural, and mechanical drawings for additional details which affect the proper installation of this work.

C. The Contractor is cautioned that diagrams showing electrical connections and/or circuiting are diagrammatic only and must not be used for obtaining lineal runs of wire or conduit.

D. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.

1.5 CODES, FEES, AND SALES TAX

A. The electrical installation shall comply with rules and regulations of the latest editions of the Occupational Safety and Health Act, National Electrical Code, State Electrical Code, Local Municipal Code, the Electrical Utility furnishing electrical energy to this project, other applicable National Fire Protection Association Codes, National Electrical Safety Code, present Manufacturing Standards (including NEMA), and any other board having jurisdiction over the electrical installation.

1. Most recent adopted edition of applicable codes and publications include, but are not limited to:

a. National Electrical Code.
b. Americans with Disabilities Act.
c. NFPA 101 Life Safety Code.
d. Guidelines for Construction and Equipment of Hospitals and Medical Facilities.
e. ANSI A17.1 Safety Code for Elevators and Escalators
f. BOCA National Building Code.

B. The Contractor shall not assume that any drawing or specification forming a part of the contract documents authorizes the violation of any code, regulation, or standard. Where conflicts arise, it shall be deemed that the contractor has estimated the cost of all work to be completed in accord with the prevailing code.

C. The Contractor shall be licensed to perform electrical work and shall pay all required fees and sales or use tax as applicable to this branch of work.

D. Upon completion of the work, the Contractor shall deliver to the Government without cost, all required certificates of inspection and approval.

1.6 MATERIAL AND EQUIPMENT

1.6.1 General

All material and equipment shall be new and of the quality used for the purpose in good commercial practice, and shall be standard product of reputable manufacturers.

1.6.2 Major Components

Each major component of equipment shall have the manufacturer's name, catalog number, and capacity of rating, on a nameplate securely affixed on the equipment in a conspicuous place. All material shall have a U.L. label where U.L. tests exist.

1.6.3 Different Materials or Equipment

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the Contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.

1.7 SUBSTITUTIONS AND APPROVAL OF MATERIALS

1.7.1 Procedures

See Division One for explanation of procedure. Further, the following shall apply:

A. All pertinent information shall be forwarded to the Contracting Officer for review and approval. This information shall be similar in format to shop drawings. Should information be lacking, approval request will be denied.

B. The Contracting Officer will have the right to determine the acceptance of material.

1.8 APPROVAL OF CHANGES TO DRAWINGS OR SPECIFICATIONS

Should any change in drawings or specifications be required to comply with National, State or Local regulations and/or field conditions, the Contractor shall refer same to Contracting Officer for approval before any work which deviates from the original requirements of the drawings and specifications is started. In the event of disagreements as to the necessity of such changes, the decision of the Contracting Officer shall be final.

1.9 DAMAGE TO OTHER WORK

The Contractor will be held rigidly responsible for all damages to the work of the Contractor or any other trade resulting from the execution of the

Contractor. It shall be the Contractor's responsibility to adequately protect the Contractor's work at all times. All damages resulting from the Contractor's operations shall be repaired, or the damaged portions replaced, by the party originally performing the work (to the entire satisfaction of the Contracting Officer), and all cost thereof shall be borne by the Contractor responsible for the damage.

1.10 DATES OF COMPLETION

The Contractor shall meet all completion dates established by the Contracting Officer and shall furnish all labor of all classes, required to meet such schedules and completion dates. Further, the Contractor shall become familiar with the delivery dates established by the manufacturers of materials and equipment which shall be ordered and expedited as required to conform with scheduling and completion dates.

1.11 CLEAN-UP & PAINTING

The Contractor shall at all times keep the premises free from excessive accumulation of waste materials or rubbish resulting from the Contractor's work, including tools, scaffolding, and surplus materials; and shall leave the Contractor's work room clean. At the time of final clean-up, all fixtures and equipment shall be thoroughly cleaned and left in proper conditions for their intended use.

All final clean-up, washing, painting, etc., shall be scheduled at a time when project is substantially complete and the possibility of additional soiling does not exist. The Contractor shall be responsible for the condition of all electrical equipment until acceptance of project by Government.

Clean interior of all panelboards, pull boxes, equipment enclosures, and all other debris resulting from electrical work.

Wash and wipe clean all lighting fixtures, lenses, and lamps.

All equipment shall have factory applied finish. Damaged finishes shall be refinished or replaced.

1.12 TESTS

The Contractor shall provide all instrumentation, labor, and conduct all tests required under these specifications. All instrumentation and personnel required for testing shall be provided by the Contractor, and all tests shall be conducted in the presence of the Contracting Officer or an authorized representative. All tests shall be made before any circuit or item of equipment is permanently energized.

Circuits shall be phased out and loads balanced within plus or minus 10% on each phase.

All phase conductors shall be entirely free from grounds and short circuits.

Inspect the ground system for adequate termination at all devices.

1.13 ELECTRICAL SERVICE TO PUMPING STATIONS

The Contractor shall coordinate with the applicable utility companies to provide electrical service to the two new pumping stations and for upgraded

electrical service to the two existing pumping stations. The Contractor shall pay all costs associated with providing the electrical service including the meter, transformer, and wiring.

1.14 FIELD MEASUREMENTS

The Contractor shall take all field measurements necessary for the Contractor's work and shall assume full responsibility for their accuracy.

1.15 STRUCTURAL INTERFERENCES

Should any structural interferences prevent the installation of the outlets, running of conduits, etc., at points shown on the drawings, the necessary minor deviations therefrom, as determined by the Contracting Officer, may be permitted. Minor changes in the position of the outlets or equipment if decided upon before the contractor has done any work shall be made without additional charge.

1.16 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

Before submitting a bid, the Contractor shall become familiar with all features of the building and site which may affect the execution of the Contractor's work. No extra payment will be allowed for the failure to obtain this information. If in the opinion of the Contractor there are omissions or errors in the plans or specifications, the Contractor shall clarify these points with the Contracting Officer before submitting a bid.

1.17 RECORD DRAWINGS

The Contractor shall keep a record of all conduit routes, wiring, and any other items of possible interest showing the recorded "as built" installation of the electrical system. A copy of these records shall be turned over to the Government at the completion of the project.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

Assemble material in new three-ring binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:

A. Copies of all approved submittals.
B. Manufacturer's wiring diagrams for electrically powered equipment.
C. Records of tests performed to certify compliance with system requirements.
D. Certificates of inspection by regulatory agencies.
E. Parts list for manufactured equipment.
F. Preventative maintenance recommendations.
G. Warranties.
H. Additional information as indicated in the technical specification sections.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16120

INSULATED WIRE AND CABLE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING
1.4 PROJECT/SITE CONDITIONS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Wire Table
2.1.2 Rated Circuit Voltages
2.1.3 Conductors
2.1.3.1 Material
2.1.3.2 Size
2.1.3.3 Stranding
2.1.3.4 Separator Tape
2.1.4 Insulation
2.1.4.1 Insulation Material
2.1.4.2 Insulation Thickness
2.1.5 Jackets
2.1.5.1 Jacket Material
2.1.5.2 Jacket Thickness
2.1.6 Identification
2.1.6.1 Color-coding
2.1.7 Dimensional Tolerance
2.2 TESTS, INSPECTIONS, AND VERIFICATIONS
2.2.1 Cable Data
2.2.2 Inspection and Tests
2.2.2.1 Flame Tests
2.2.2.2 Independent Tests
2.2.2.3 Reports

PART 3 EXECUTION (Not Applicable)

-- End of Section Table of Contents --

SECTION 16120

INSULATED WIRE AND CABLE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 383	(1974; R 1992) Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 7	(1988; Rev 4 1998) Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NEMA WC 8	(1988; Rev 3 1996) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Installation Instructions;

The Contractor shall submit cable manufacturing data as requested.

SD-06 Test Reports

Tests, Inspections, and Verifications;

Six certified copies of test reports shall be submitted by the Contractor.

1.3 DELIVERY, STORAGE, AND HANDLING

Reels shall remain the property of the Contractor.

1.4 PROJECT/SITE CONDITIONS

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Wire Table

Wire and cable shall be furnished in accordance with the requirements of the drawings and shall conform to the detailed requirements specified herein.

2.1.2 Rated Circuit Voltages

All wire and cable shall have minimum rated circuit voltages in accordance with Table 3-1 of NEMA WC 7 or NEMA WC 8.

2.1.3 Conductors

2.1.3.1 Material

Conductors shall conform to all the applicable requirements of Section 2 of NEMA WC 7 or Part 2 of NEMA WC 8 as applicable and shall be annealed copper. Copper conductors may be bare, or tin- or lead-alloy-coated, if required by the type of insulation used.

2.1.3.2 Size

Minimum wire size shall be No. 12 AWG for power and lighting circuits; No. 10 AWG for current transformer secondary circuits; No. 14 AWG for potential transformer, relaying, and control circuits; and No. 19 AWG for alarm circuits.

2.1.3.3 Stranding

Conductor stranding classes cited herein shall be as defined in Appendix L of NEMA WC 7 or NEMA WC 8, as applicable. Lighting conductors No. 10 AWG and smaller shall be solid or have Class B stranding. Any conductors used between stationary and moving devices, such as hinged doors or panels, shall have Class H or K stranding. All other conductors shall have Class B or C stranding, except that conductors shown on the drawings, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG.

2.1.3.4 Separator Tape

Where conductor shielding, strand filling, or other special conductor treatment is not required, a separator tape between conductor and insulation is permitted.

2.1.4 Insulation

2.1.4.1 Insulation Material

Insulation shall be cross-linked thermosetting polyethylene (XLPE) type, meeting the requirements of Section 3 or paragraph 7.7 of NEMA WC 7 as applicable, or an ethylene-propylene rubber (EPR) type meeting the requirements of Part 3 of NEMA WC 8.

2.1.4.2 Insulation Thickness

The insulation thickness for each conductor shall be based on its rated circuit voltage.

2.1.5 Jackets

All cables shall have jackets meeting the requirements of Section 4 of NEMA WC 7, or Part 4 of NEMA WC 8, as applicable, and as specified herein. Individual conductors of multiple-conductor cables shall be required to have jackets only if they are necessary for the conductor to meet other specifications herein. Jackets of single-conductor cables and of individual conductors of multiple-conductor cables, shall be in direct contact and adhere or be vulcanized to the conductor insulation. Multiple-conductor cables and shielded single-conductor cables shall be provided with a common overall jacket, which shall be tightly and concentrically formed around the core. Repaired jacket defects found and corrected during manufacturing are permitted if the cable, including jacket, afterward fully meets these specifications and the requirements of the applicable standards.

2.1.5.1 Jacket Material

The jacket shall be one of the materials listed below.

a. General Use

(1) Heavy-duty black neoprene (NEMA WC 8, paragraph 4.4.3).

(2) Heavy-duty chlorosulfonated polyethylene (NEMA WC 8, paragraph 4.4.10).

(3) Heavy-duty cross-linked (thermoset) chlorinated polyethylene (NEMA WC 8, paragraph 4.4.11).

2.1.5.2 Jacket Thickness

The minimum thickness of the jackets at any point shall be not less than 80 percent of the respective nominal thicknesses specified below.

a. Multiple-Conductor Cables - Thickness of the jackets of the individual conductors of multiple-conductor cables shall be as required by Section 4, Table 4-6 of NEMA WC 7 or Part 4, Table 4-4 of NEMA WC 8, and shall be in addition to the conductor insulation thickness required by Column B of Table 3-1 of the applicable NEMA publication for the insulation used. Thickness of the outer jackets or sheaths of the assembled multiple-conductor cables shall be as required by Section 4, Table 4-7, of NEMA WC 7 or Part 4, Table 4-5, of NEMA WC 8.

b. Single-Conductor Cables - Single-conductor cables, if nonshielded, shall have a jacket thickness as specified in Section 4, Table 4-4 of NEMA WC 7 or Part 4, Table 4-2 of NEMA WC 8.

2.1.6 Identification

2.1.6.1 Color-coding

Refer to Section 16415 ELECTRICAL WORK, INTERIOR for conductor identification and tagging.

2.1.7 Dimensional Tolerance

The outside diameters of single-conductor cables and of multiple-conductor cables shall not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Cable Data

Cable data shall be submitted for approval including dimensioned sketches showing cable construction, and sufficient additional data to show that these specifications will be satisfied.

2.2.2 Inspection and Tests

Inspection and tests of wire and cable furnished under these specifications shall be made by and at the plant of the manufacturer. The Government may perform further tests before or after installation. Testing in general shall comply with Section 6 of NEMA WC 7 or Part 6 of NEMA WC 8. Specific tests required for particular materials, components, and completed cables shall be as specified in the sections of the above standards applicable to those materials, components, and cable types. Tests shall also be performed in accordance with the additional requirements specified below.

2.2.2.1 Flame Tests

All multiple-conductor and single-conductor cable assemblies shall pass IEEE Std 383 flame tests, paragraph 2.5, using the ribbon gas burner. Single-conductor cables and individual conductors of multiple-conductor cables shall pass the flame test of NEMA WC 7, paragraph 7.7.3.1.3. If such tests, however, have previously been made on identical cables, these tests need not be repeated. Instead, certified reports of the original qualifying tests shall be submitted. In this case the reports furnished under paragraph REPORTS, shall verify that all of each cable's materials, construction, and dimensions are the same as those in the qualifying tests.

2.2.2.2 Independent Tests

The Government may at any time make visual inspections, continuity or resistance checks, insulation resistance readings, power factor tests, or dc high-potential tests at field test values. A cable's failure to pass these tests and inspections, or failure to produce readings consistent with acceptable values for the application, will be grounds for rejection of the cable.

2.2.2.3 Reports

Results of tests made shall be furnished. No wire or cable shall be shipped until authorized. Lot number and reel or coil number of wire and cable tested shall be indicated on the test reports.

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16415

ELECTRICAL WORK, INTERIOR

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL
1.2.1 Rules
1.2.2 Coordination
1.2.3 Special Environments
1.2.3.1 Weatherproof Locations
1.2.3.2 Ducts, Plenums and Other Air-Handling Spaces
1.2.4 Standard Products
1.2.5 Nameplates
1.2.5.1 Identification Nameplates
1.2.6 As-Built Drawings
1.3 SUBMITTALS
1.4 WORKMANSHIP

PART 2 PRODUCTS

2.1 CABLES AND WIRES
2.1.1 Equipment Manufacturer Requirements
2.1.2 Aluminum Conductors
2.1.3 Insulation
2.1.4 Bonding Conductors
2.1.5 Cord Sets and Power-Supply Cords
2.2 TRANSIENT VOLTAGE SURGE PROTECTION
2.3 CIRCUIT BREAKERS
2.3.1 MOLDED-CASE CIRCUIT BREAKERS
2.3.1.1 Construction
2.3.1.2 Ratings
2.3.1.3 Thermal-Magnetic Trip Elements
2.3.2 Solid-State Trip Elements
2.3.3 SWD Circuit Breakers
2.3.4 HACR Circuit Breakers
2.3.5 Ground Fault Circuit Interrupters
2.4 MOTOR SHORT-CIRCUIT PROTECTOR (MSCP)
2.4.1 Construction
2.4.2 Ratings
2.5 CONDUIT AND TUBING
2.5.1 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)
2.5.2 Electrical Plastic Tubing and Conduit
2.5.3 Flexible Conduit, Steel and Plastic
2.5.4 Intermediate Metal Conduit
2.5.5 Rigid Metal Conduit
2.6 CONDUIT AND DEVICE BOXES AND FITTINGS
2.6.1 Boxes, Metallic Outlet
2.6.2 Boxes, Switch (Enclosed), Surface-Mounted

2.6.3 Fittings for Conduit and Outlet Boxes
2.6.4 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing
2.7 CONNECTORS, WIRE PRESSURE
2.7.1 For Use With Copper Conductors
2.8 ELECTRICAL GROUNDING AND BONDING EQUIPMENT
2.8.1 Ground Rods
2.8.2 Ground Bus
2.9 ENCLOSURES
2.9.1 Cabinets and Boxes
2.9.2 Circuit Breaker Enclosures
2.10 LIGHTING FIXTURES, LAMPS, BALLASTS, EMERGENCY EQUIPMENT, CONTROLS AND ACCESSORIES
2.10.1 Lamps
2.10.2 Ballasts and Transformers
2.10.3 Fixtures
2.10.4 Lampholders, Starters, and Starter Holders
2.11 LOW-VOLTAGE FUSES AND FUSEHOLDERS
2.11.1 Fuses, Low Voltage Cartridge Type
2.11.2 Fuses, High-Interrupting-Capacity, Current-Limiting Type
2.11.3 Fuses, Class K, High-Interrupting-Capacity Type
2.11.4 Fuses, Class H
2.11.5 Fuses, Class R
2.11.6 Fuses, Class T
2.11.7 Fuses for Supplementary Overcurrent Protection
2.11.8 Fuseholders
2.12 INSTRUMENTS, ELECTRICAL INDICATING
2.13 MOTORS, AC, FRACTIONAL AND INTEGRAL
2.13.1 Rating
2.13.2 Motor Efficiencies
2.14 MOTOR CONTROLS AND MOTOR CONTROL CENTERS
2.14.1 General
2.14.2 Motor Starters
2.14.3 Thermal-Overload Protection
2.14.4 Low-Voltage Motor Overload Relays
2.14.4.1 General
2.14.4.2 Construction
2.14.4.3 Ratings
2.14.5 Automatic Control Devices
2.14.5.1 Direct Control
2.14.5.2 Pilot-Relay Control
2.14.5.3 Manual/Automatic Selection
2.15 PANELBOARDS
2.16 RECEPTACLES
2.16.1 Heavy Duty Grade
2.16.2 Ground Fault Interrupters
2.16.3 NEMA Standard Receptacle Configurations
2.17 Service Entrance Equipment
2.18 SPLICE, CONDUCTOR
2.19 SNAP SWITCHES
2.20 TAPES
2.20.1 Plastic Tape
2.20.2 Rubber Tape
2.21 TRANSFORMERS
2.21.1 Transformers, Dry-Type
2.21.2 Average Sound Level
2.22 ISOLATED POWER SYSTEM EQUIPMENT
2.23 WATTHOUR METERS, UTILITY REVENUE
2.24 INSTRUMENT TRANSFORMERS
2.24.1 General

2.24.2 Current Transformers
2.24.2.1 Current Transformers for kWH and Demand Metering (Low Voltage)
2.25 WIRING DEVICES

PART 3 EXECUTION

3.1 GROUNDING
3.1.1 Ground Rods
3.1.2 Ground Bus
3.1.3 Grounding Conductors
3.2 WIRING METHODS
3.2.1 Conduit and Tubing Systems
3.2.1.1 Pull Wires
3.2.1.2 Conduit Stub-Ups
3.2.1.3 Below Slab-on-Grade or in the Ground
3.2.1.4 Installing in Slabs Including Slabs on Grade
3.2.1.5 Changes in Direction of Runs
3.2.1.6 Supports
3.2.1.7 Exposed Raceways
3.2.1.8 Exposed Risers
3.2.1.9 Communications Raceways
3.2.2 Cables and Conductors
3.2.2.1 Sizing
3.2.2.2 Use of Aluminum Conductors in Lieu of Copper
3.2.2.3 Cable Splicing
3.2.2.4 Conductor Identification and Tagging
3.3 BOXES AND SUPPORTS
3.3.1 Box Applications
3.3.2 Brackets and Fasteners
3.3.3 Mounting in Walls, Ceilings, or Recessed Locations
3.3.4 Installation in Overhead Spaces
3.4 DEVICE PLATES
3.5 RECEPTACLES
3.5.1 Single and Duplex, 15 or 20-ampere, 125 volt
3.5.2 Weatherproof Applications
3.5.2.1 Damp Locations
3.5.2.2 Wet Locations
3.5.3 Special-Purpose or Heavy-Duty Receptacles
3.6 WALL SWITCHES
3.7 SERVICE EQUIPMENT
3.8 DISTRIBUTION PANELS AND POWER PANELS
3.8.1 Distribution Panels
3.8.2 Power Panels
3.9 FUSES
3.9.1 Cartridge Fuses; Current-Limiting Type
3.9.2 Motor and Transformer Circuit Fuses
3.10 UNDERGROUND SERVICE
3.11 MOTORS
3.12 MOTOR CONTROL
3.12.1 Contacts
3.12.2 Safety Controls
3.13 MOTOR-DISCONNECT MEANS
3.14 TRANSFORMER INSTALLATION
3.15 LIGHTING FIXTURES, LAMPS AND BALLASTS
3.15.1 Lamps
3.15.2 Lighting Fixtures
3.15.2.1 Accessories
3.15.2.2 Ceiling Fixtures

3.15.2.3 Suspended Fixtures
3.15.3 Emergency Light Sets
3.16 BATTERY CHARGERS
3.17 EQUIPMENT CONNECTIONS
3.17.1 Motors and Motor Control
3.17.2 Installation of Government-Furnished Equipment
3.18 CIRCUIT PROTECTIVE DEVICES
3.19 REPAIR OF EXISTING WORK
3.20 FIELD TESTING
3.20.1 Safety
3.20.2 Ground-Resistance Tests
3.20.3 Ground-Grid Connection Inspection
3.20.4 Cable Tests
3.20.4.1 Low Voltage Cable Tests
3.20.5 Motor Tests
3.20.6 Circuit Breaker Tests
3.20.6.1 Circuit Breakers, Molded Case
3.20.7 Protective Relays
3.21 OPERATING TESTS
3.22 ACCEPTANCE

-- End of Section Table of Contents --

SECTION 16415

ELECTRICAL WORK, INTERIOR

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.1	(1995) Code for Electricity Metering
ANSI C12.4	(1984; R 1996) Mechanical Demand Registers
ANSI C12.10	(1997) Electromechanical Watthour Meters
ANSI C12.11	(1987; R 1993) Instrument Transformers for Revenue Metering, 10 kV BIL Through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
ANSI C37.16	(1997) Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors - Preferred Ratings, Related Requirements, and Application Recommendations
ANSI C39.1	(1981; R 1992) Requirements for Electrical Analog Indicating Instruments
ANSI C57.12.10	(1988) Safety Requirements for Transformers 230 kV and Below 833/958 Through 8333/10417 kVA, Single-Phase, and 750/862 Through 60 000/80 000/100 000 kVA, Three-Phase Without Load Tap Charging; and 3750/4687 Through 60 000/80 000/100 000 kVA With Load Tap Charging
ANSI C57.12.13	(1982) Conformance Requirements for Liquid-Filled Transformers Used in Unit Installations, Including Unit Substations
ANSI C57.12.27	(1982) Conformance Requirements for Liquid-Filled Distribution Transformers Used in Pad-Mounted Installations, Including Unit Substations
ANSI C57.12.50	(1981; R 1989) Ventilated Dry-type Distribution Transformers 1 to 500 kVA, Single-Phase; and 15 to 500 kVA, Three-Phase with High-Voltage 601 to 34 500 Volts, Low-Voltage 120 to 600 Volts

ANSI C57.12.51	(1981; R 1989) Ventilated Dry-Type Power Transformers, 501 kVA and Larger, Three-Phase, with High-Voltage 601 to 34 500 Volts, Low-Voltage 208Y/120 to 4160 Volts
ANSI C57.12.52	(1981; R 1989) Sealed Dry-Type Power Transformers, 501 kVA and Larger, Three-Phase with High-Voltage 601 to 34 500 Volts, Low-Voltage 208Y/120 to 4160 Volts
ANSI C57.12.70	(1978; R 1993) Terminal Markings and Connections for Distribution and Power Transformers
ANSI C78.1	(1991; C78.1a; R 1996) Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics
ANSI C78.20	(1995) Electric Lamps - Characteristics of Incandescent Lamps A, G, PS, and Similar Shapes with E26 Medium Screw Bases
ANSI C78.21	(1995) Physical and Electrical Characteristics - Incandescent Lamps - PAR and R Shapes
ANSI C78.1350	(1990) 400-Watt, 100-Volt, S51 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1351	(1989) 250-Watt, 100-Volt S50 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1352	(1990) 1000-Watt, 250-Volt, S52 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1355	(1989) 150-Watt, 55-Volt S55 High-Pressure Sodium Lamps
ANSI C78.1375	(1996) 400-Watt, M59 Single-Ended Metal-Halide Lamps
ANSI C78.1376	(1996) 1000-Watt, M47 Single-Ended Metal-Halide Lamps
ANSI C78.2A	(1991) 18 & 26- Watt, Compact Fluorescent Quad Tube Lamps
ANSI C78.2B	(1992) 9 & 13-Watt, Compact Fluorescent Quad Tube Lamps
ANSI C80.5	(1995) Rigid Aluminum Conduit
ANSI C82.1	(1997) Specifications for Fluorescent Lamp Ballasts
ANSI C82.4	(1992) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

ANSI C135.30	(1988) Zinc-Coated Ferrous Ground Rods for Overhead or Underground Line Construction

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 1	(1995) Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D 709	(1992; R 1997) Laminated Thermosetting Materials
ASTM D 4059	(1996) Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 18	Industrial, Scientific, and Medical Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(1997) National Electrical Safety Code
IEEE C37.13	(1990; R 1995) Low-Voltage AC Power Circuit Breakers Used in Enclosures
IEEE C37.20.1	(1993) Metal-Enclosed Low-Voltage Power Circuit-Breaker Switchgear
IEEE C57.12.00	(1993) IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.80	(1996) Terminology for Power and Distribution Transformers
IEEE C57.12.90	(1993) Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers
IEEE C57.13	(1993) Instrument Transformers
IEEE C57.98	(1993) Guide for Transformer Impulse Tests
IEEE C57.100	(1986; R 1992) Test Procedure for Thermal Evaluation of Oil-Immersed Distribution Transformers
IEEE C62.41	(1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth

	Surface Potentials of a Ground System (Part 1)
IEEE Std 242	(1986; R 1991) Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
IEEE Std 399	(1997) Recommended Practice for Industrial and Commercial Power Systems Analysis

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA AB 1	(1993) Molded Case Circuit Breakers and Molded Case Switches
NEMA BU 1	(1994) Busways
NEMA FU 1	(1986) Low Voltage Cartridge Fuses
NEMA ICS 1	(1993) Industrial Control and Systems
NEMA ICS 2	(1993) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 3	(1993) Industrial Control and Systems Factory Built Assemblies
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures
NEMA LE 4	(1987) Recessed Luminaires, Ceiling Compatibility
NEMA MG 1	(1998) Motors and Generators
NEMA MG 10	(1994) Energy Management Guide for Selection and Use of Polyphase Motors
NEMA OS 1	(1996) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA OS 2	(1986; Errata Aug 1986; R 1991) Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA PB 1	(1995) Panelboards
NEMA PB 2	(1995) Deadfront Distribution Switchboards
NEMA PE 5	(1996) Utility Type Battery Chargers
NEMA RN 1	(1989) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA SG 3	(1995) Power Switching Equipment
NEMA ST 20	(1992) Dry-Type Transformers for General Applications
NEMA TC 2	(1990) Electrical Polyvinyl Chloride (PVC) Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 13	(1993) Electrical Nonmetallic Tubing (ENT)
NEMA VE 1	(1996) Metal Cable Tray Systems
NEMA WD 1	(1983; R 1989) General Requirements for Wiring Devices
NEMA WD 6	(1988) Wiring Devices - Dimensional Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 101	(1997; Errata 97-1; TIA 97-1) Life Safety Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(1993; Rev thru Jan 1995) Flexible Metal Conduit
UL 4	(1996) Armored Cable
UL 5	(1996) Surface Metal Raceways and Fittings
UL 6	(1997) Rigid Metal Conduit
UL 20	(1995; Rev thru Oct 1998) General-Use Snap Switches
UL 44	(1997; Rev Mar 1999) Rubber-Insulated Wires and Cables
UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 67	(1993; Rev thru Nov 1995) Panelboards
UL 83	(1998; Rev thru Sep 99) Thermoplastic-Insulated Wires and Cables
UL 98	(1994; Rev thru Jun 1998) Enclosed and Dead-Front Switches
UL 198B	(1995) Class H Fuses
UL 198C	(1986; Rev thru Feb 1998) High-Interrupting-Capacity Fuses, Current-Limiting Types

UL 198D	(1995) Class K Fuses
UL 198E	(1988; Rev Jul 1988) Class R Fuses
UL 198G	(1988; Rev May 1988) Fuses for Supplementary Overcurrent Protection
UL 198H	(1988; Rev thru Nov 1993) Class T Fuses
UL 198L	(1995; Rev May 1995) D-C Fuses for Industrial Use
UL 360	(1996; Rev thru Oct 1997) Liquid-Tight Flexible Steel Conduit
UL 467	(1993; Rev thru Apr 1999) Grounding and Bonding Equipment
UL 486A	(1997; Rev thru Dec 1998) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486B	(1997; Rev Jun 1997) Wire Connectors for Use with Aluminum Conductors
UL 486C	(1997; Rev thru Aug 1998) Splicing Wire Connectors
UL 486E	(1994; Rev thru Feb 1997) Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
UL 489	(1996; Rev thru Dec 1998) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(1996; Rev thru Sep 1998) Attachment Plugs and Receptacles
UL 506	(1994; Rev Oct 1997) Specialty Transformers
UL 508	(1999) Industrial Control Equipment
UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 512	(1993; R Dec 1995) Fuseholders
UL 514A	(1996; Rev Dec 1999) Metallic Outlet Boxes
UL 514B	(1997; Rev Oct 1998) Fittings for Cable and Conduit
UL 514C	(1996; R Sep 1998) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 542	(1994; Rev thru Jul 1998) Lampholders,

	Starters, and Starter Holders for Fluorescent Lamps
UL 651	(1995; Rev thru Oct 1998) Schedule 40 and 80 Rigid PVC Conduit
UL 651A	(1995; Rev thru Apr 1998) Type EB and A Rigid PVC Conduit and HDPE Conduit
UL 674	(1994; Rev thru Oct 1998) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations
UL 698	(1999) Industrial Control Equipment for Use in Hazardous (Classified) Locations
UL 719	(1999) Nonmetallic-Sheathed Cables
UL 797	(1993; Rev thru Mar 1997) Electrical Metallic Tubing
UL 817	(1994; Rev thru Jul 1998) Cord Sets and Power-Supply Cords
UL 844	(1995; Rev thru Aug 1997) Electric Lighting Fixtures for Use in Hazardous (Classified) Locations
UL 845	(1995; Rev Feb 1996) Motor Control Centers
UL 854	(1996; Rev Apr 1998) Service-Entrance Cables
UL 857	(1994; Rev thru May 1999) Busways and Associated Fittings
UL 869A	(1998) Reference Standard for Service Equipment
UL 877	(1993; Rev thru May 1997) Circuit Breakers and Circuit-Breaker Enclosures for Use in Hazardous (Classified) Locations
UL 886	(1994; Rev thru Apr 1999) Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations
UL 891	(1994; Rev thru Jan 1995) Dead-Front Switchboards
UL 916	(1998) Energy Management Equipment
UL 924	(1995; Rev thru Oct 97) Emergency Lighting and Power Equipment
UL 935	(1995; Rev thru Oct 1998)Fluorescent-Lamp Ballasts
UL 943	(1993; Rev thru May 1998)Ground-Fault Circuit-Interrupters

UL 1004	(1994; Rev thru Dec 1997) Electric Motors
UL 1010	(1995; Rev thru Dec 1996)Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations
UL 1022	(1998) Line Isolation Monitors
UL 1029	(1994; Rev thru Dec 1997) High-Intensity-Discharge Lamp Ballasts
UL 1047	(1995; Rev Jul 1998) Isolated Power Systems Equipment
UL 1236	(1994; Rev thru Dec 1997) Battery Chargers for Charging Engine-Starter Batteries
UL 1242	(1996; Rev Mar 1998) Intermediate Metal Conduit
UL 1449	(1996; Rev thru Oct 1998) Transient Voltage Surge Suppressors
UL 1564	(1993; Rev Sep 1998) Industrial Battery Chargers
UL 1569	(1995; Rev thru Sep 1998) Metal-Clad Cables
UL 1570	(1995; Rev thru Jun 1997) Fluorescent Lighting Fixtures
UL 1571	(1995; Rev thru Jun 1997) Incandescent Lighting Fixtures
UL 1572	(1995; Rev thru Jun 1997) High Intensity Discharge Lighting Fixtures
UL 1660	(1994; Rev Apr 1998) Liquid-Tight Flexible Nonmetallic Conduit
UL Elec Const Dir	(1998) Electrical Construction Equipment Directory

1.2 GENERAL

1.2.1 Rules

The installation shall conform to the requirements of NFPA 70 and NFPA 101, unless more stringent requirements are indicated or shown.

1.2.2 Coordination

The drawings indicate the extent and the general location and arrangement of equipment, conduit, and wiring. The Contractor shall become familiar with all details of the work and verify all dimensions in the field so that the outlets and equipment shall be properly located and readily accessible. Lighting fixtures, outlets, and other equipment and materials shall be carefully coordinated with mechanical or structural features prior to

installation and positioned according to architectural reflected ceiling plans; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement when uniform illumination is required, or asymmetrically located to suit conditions fixed by design and shown. Raceways, junction and outlet boxes, and lighting fixtures shall not be supported from sheet metal roof decks. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change. The Contractor shall coordinate the electrical requirements of the mechanical work and provide all power related circuits, wiring, hardware and structural support, even if not shown on the drawings. The Contractor shall be responsible for installation, mounting, and connection of all Government-furnished equipment as specified and shown on drawings.

1.2.3 Special Environments

1.2.3.1 Weatherproof Locations

Wiring, Fixtures, and equipment in designated locations shall conform to NFPA 70 requirements for installation in damp or wet locations.

1.2.3.2 Ducts, Plenums and Other Air-Handling Spaces

Wiring and equipment in ducts, plenums and other air-handling spaces shall be installed using materials and methods in conformance with NFPA 70 unless more stringent requirements are indicated in this specification or on the contract drawings.

1.2.4 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

1.2.5 Nameplates

1.2.5.1 Identification Nameplates

Major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated. Designation of motors shall coincide with their designation in the motor control center or panel. Unless otherwise specified, identification nameplates shall be made of laminated plastic in accordance with ASTM D 709 with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened with black-finished round-head drive screws, except motors, or approved nonadhesive metal fasteners. When the nameplate is to be installed on an irregular-shaped object, the Contractor shall devise an approved support suitable for the application and ensure the proper installation of the supports and nameplates. In all instances, the nameplate shall be installed in a conspicuous location. At the option of the Contractor, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The front of each panelboard, motor control center, switchgear, and switchboard shall have a nameplate to indicate the phase letter, corresponding color and arrangement of the phase conductors. The following equipment, as a minimum, shall be provided with identification nameplates:

Minimum 1/4 inch High Letters	Minimum 1/8 inch High Letters
Panelboards	Control Power Transformers
Starters	Control Devices
Safety Switches	Instrument Transformers
Motor Control Centers	
Transformers	
Equipment Enclosures	
Switchgear	
Switchboards	
Motors	

Each panel, section, or unit in motor control centers, switchgear or similar assemblies shall be provided with a nameplate in addition to nameplates listed above, which shall be provided for individual compartments in the respective assembly, including nameplates which identify "future," "spare," and "dedicated" or "equipped spaces."

1.2.6 As-Built Drawings

Following the project completion or turnover, within 30 days the Contractor shall furnish 2 sets of as-built drawings to the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Interior Electrical Equipment; G, ED.

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams, and other information necessary to define the installation. Detail drawings shall show the rating of items and systems and how the components of an item and system are assembled, function together, and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall show physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded. Detail drawings shall as a minimum include:

a. Transformers.

b. Switchgear.

c. Battery system including calculations for the battery and charger.

d. Voltage regulators.

e. Grounding resistors.

f. Motors and rotating machinery.

g. Motor control centers.

h. Busway systems.

i. Single line electrical diagrams including primary, metering, sensing and relaying, control wiring, and control logic.

j. Sway bracing for suspended luminaires.

Structural drawings showing the structural or physical features of major equipment items, components, assemblies, and structures, including foundations or other types of supports for equipment and conductors. These drawings shall include accurately scaled or dimensioned outline and arrangement or layout drawings to show the physical size of equipment and components and the relative arrangement and physical connection of related components. Weights of equipment, components and assemblies shall be provided when required to verify the adequacy of design and proposed construction of foundations or other types of supports. Dynamic forces shall be stated for switching devices when such forces must be considered in the design of support structures. The appropriate detail drawings shall show the provisions for leveling, anchoring, and connecting all items during installation, and shall include any recommendations made by the manufacturer.

Electrical drawings including single-line and three-line diagrams, and schematics or elementary diagrams of each electrical system; internal wiring and field connection diagrams of each electrical device when published by the manufacturer; wiring diagrams of cabinets, panels, units, or separate mountings; interconnection diagrams that show the wiring between separate components of assemblies; field connection diagrams that show the termination of wiring routed between separate items of equipment; internal wiring diagrams of equipment showing wiring as actually provided for this project. Field wiring connections shall be clearly identified.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures, including changes in related portions of the project and the reasons why, shall be submitted with the detail drawings. Approved departures shall be made at no additional cost to the Government.

SD-03 Product Data

Manufacturer's Catalog; G, ED.

Data composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

Material, Equipment, and Fixture Lists; G, ED.

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each item.

As-Built Drawings; G, ED.

The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

Onsite Tests; G, ED.

A detailed description of the Contractor's proposed procedures for on-site tests.

SD-06 Test Reports

Factory Test Reports; G, ED.

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of equipment used, with calibration certifications.

b. A copy of measurements taken.

c. The dates of testing.

d. The equipment and values to be verified.

e. The conditions specified for the test.

f. The test results, signed and dated.

g. A description of adjustments made.

Field Test Plan; G, ED.

A detailed description of the Contractor's proposed procedures for onsite test submitted 30 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Field Test Reports; G, ED.

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of equipment used, with calibration certifications.

b. A copy of measurements taken.

c. The dates of testing.

d. The equipment and values to be verified.

e. The conditions specified for the test.

f. The test results, signed and dated.

g. A description of adjustments made.

h. Final position of controls and device settings.

SD-07 Certificates

Materials and Equipment; G, ED.

The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted. However, materials and equipment installed in hazardous locations must bear the UL label unless the data submitted from other testing agency is specifically approved in writing by the Contracting Officer. Items which are required to be listed and labeled in accordance with Underwriters Laboratories must be affixed with a UL label that states that it is UL listed. No exceptions or waivers will be granted to this requirement. Materials and equipment will be approved based on the manufacturer's published data.

For other than equipment and materials specified to conform to UL

publications, a manufacturer's statement indicating complete compliance with the applicable standard of the American Society for Testing and Materials, National Electrical Manufacturers Association, or other commercial standard, is acceptable.

1.4 WORKMANSHIP

Materials and equipment shall be installed in accordance with NFPA 70, recommendations of the manufacturer, and as shown.

PART 2 PRODUCTS

Products shall conform to the respective publications and other requirements specified below. Materials and equipment not listed below shall be as specified elsewhere in this section. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.1 CABLES AND WIRES

Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and ampacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.

2.1.1 Equipment Manufacturer Requirements

When manufacturer's equipment requires copper conductors at the terminations or requires copper conductors to be provided between components of equipment, provide copper conductors or splices, splice boxes, and other work required to meet manufacturer's requirements.

2.1.2 Aluminum Conductors

Aluminum conductors shall not be used.

2.1.3 Insulation

Unless indicated otherwise, or required by NFPA 70, power and lighting wires shall be 600-volt, Type XHHW or XHHW-2 conforming to UL 83, except that grounding wire may be type THHW conforming to UL 83; remote-control and signal circuits shall be Type THWN or XHHW, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

2.1.4 Bonding Conductors

ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.1.5 Cord Sets and Power-Supply Cords

UL 817.

2.2 TRANSIENT VOLTAGE SURGE PROTECTION

Transient voltage surge suppressors shall be provided as indicated. Surge suppressors shall meet the requirements of IEEE C62.41 and be UL listed and labeled as having been tested in accordance with UL 1449. Surge suppressor ratings shall be 480 volts rms, operating voltage; 60 Hz; 3-phase; 4 wire with ground; transient suppression voltage (peak let-through voltage) of 500 volts. Fuses shall not be used as surge suppression.

2.3 CIRCUIT BREAKERS

2.3.1 MOLDED-CASE CIRCUIT BREAKERS

Molded-case circuit breakers shall conform to NEMA AB 1 and UL 489and UL 877 for circuit breakers and circuit breaker enclosures located in hazardous (classified) locations. Circuit breakers may be installed in panelboards, switchboards, enclosures, motor control centers, or combination motor controllers.

2.3.1.1 Construction

Circuit breakers shall be suitable for mounting and operating in any position. Lug shall be listed for copper conductors only in accordance with UL 486E. Single-pole circuit breakers shall be full module size with not more than one pole per module. Multi-pole circuit breakers shall be of the common-trip type having a single operating handle such that an overload or short circuit on any one pole will result in all poles opening simultaneously. Sizes of 100 amperes or less may consist of single-pole breakers permanently factory assembled into a multi-pole unit having an internal, mechanical, nontamperable common-trip mechanism and external handle ties. All circuit breakers shall have a quick-make, quick-break overcenter toggle-type mechanism, and the handle mechanism shall be trip-free to prevent holding the contacts closed against a short-circuit or sustained overload. All circuit breaker handles shall assume a position between "ON" and "OFF" when tripped automatically. All ratings shall be clearly visible.

2.3.1.2 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. The interrupting rating of the circuit breakers shall be at least equal to the available short-circuit current at the line terminals of the circuit breaker and correspond to the UL listed integrated short-circuit current rating specified for the panelboards and switchboards. Molded-case circuit breakers shall have nominal voltage ratings, maximum continuous-current ratings, and maximum short-circuit interrupting ratings in accordance with NEMA AB 1. Ratings shall be coordinated with system X/R ratio.

2.3.1.3 Thermal-Magnetic Trip Elements

Thermal magnetic circuit breakers shall be provided as shown. Automatic operation shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. The instantaneous magnetic trip shall be adjustable and accessible from the front of all circuit breakers on frame sizes above 150 amperes.

2.3.2 Solid-State Trip Elements

Solid-state circuit breakers shall be provided as shown. All electronics shall be self-contained and require no external relaying, power supply, or

accessories. Printed circuit cards shall be treated to resist moisture absorption, fungus growth, and signal leakage. All electronics shall be housed in an enclosure which provides protection against arcs, magnetic interference, dust, and other contaminants. Solid-state sensing shall measure true RMS current with error less than one percent on systems with distortions through the 13th harmonic. Peak or average actuating devices are not acceptable. Current sensors shall be torodial construction, encased in a plastic housing filled with epoxy to protect against damage and moisture and shall be integrally mounted on the breaker. Where indicated on the drawings, circuit breaker frames shall be rated for 100 percent continuous duty. Circuit breakers shall have tripping features as shown on the drawings and as described below:

a. Long-time current pick-up, adjustable from 50 percent to 100 percent of continuous current rating.

b. Adjustable long-time delay.

c. Short-time current pick-up, adjustable from 1.5 to 9 times long-time current setting.

d. Adjustable short-time delay.

e. Instantaneous current pick-up, adjustable from 1.5 to 9 times long-time current setting.

f. Ground-fault pick-up, adjustable from 20 percent to 60 percent of sensor rating, but not greater than 1200 amperes. Sensing of ground-fault current at the main bonding jumper or ground strap will not be permitted.

g. Adjustable ground-fault delay.

h. Overload and ground-fault trip indicators shall be provided.

2.3.3 SWD Circuit Breakers

Circuit breakers rated 15 or 20 amperes and intended to switch 277 volts or less fluorescent lighting loads shall be marked "SWD."

2.3.4 HACR Circuit Breakers

Circuit breakers 60 amperes or below, 240 volts, 1-pole or 2-pole, intended to protect multi-motor and combination-load installations involved in heating, air conditioning, and refrigerating equipment shall be marked "Listed HACR Type."

2.3.5 Ground Fault Circuit Interrupters

UL 943. Breakers equipped with ground fault circuit interrupters shall have ground fault class, interrupting capacity, and voltage and current ratings as indicated.

2.4 MOTOR SHORT-CIRCUIT PROTECTOR (MSCP)

Motor short-circuit protectors shall conform to UL 508 and shall be provided as shown. Protectors shall be used only as part of a combination motor controller which provides coordinated motor branch-circuit overload and short-circuit protection, and shall be rated in accordance with the

requirements of NFPA 70.

2.4.1 Construction

Motor short-circuit protector bodies shall be constructed of high temperature, dimensionally stable, long life, nonhygroscopic materials. Protectors shall fit special MSCP mounting clips and shall not be interchangeable with any commercially available fuses. Protectors shall have 100 percent one-way interchangeability within the A-Y letter designations. All ratings shall be clearly visible.

2.4.2 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. Letter designations shall be A through Y for motor controller Sizes 0, 1, 2, 3, 4, and 5, with 100,000 amperes interrupting capacity rating. Letter designations shall correspond to controller sizes as follows:

CONTROLLER SIZE	MSCP DESIGNATION
NEMA O	A-N
NEMA 1	A-P
NEMA 2	A-S
NEMA 3	A-U
NEMA 4	A-W
NEMA 5	A-Y

2.5 CONDUIT AND TUBING

2.5.1 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797

2.5.2 Electrical Plastic Tubing and Conduit

NEMA TC 2.

2.5.3 Flexible Conduit, Steel and Plastic

General-purpose type, UL 1; liquid tight, UL 360, and UL 1660.

2.5.4 Intermediate Metal Conduit

UL 1242.

2.5.5 Rigid Metal Conduit

UL 6.

2.6 CONDUIT AND DEVICE BOXES AND FITTINGS

2.6.1 Boxes, Metallic Outlet

NEMA OS 1 and UL 514A.

2.6.2 Boxes, Switch (Enclosed), Surface-Mounted

UL 98.

2.6.3 Fittings for Conduit and Outlet Boxes

UL 514B.

2.6.4 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing

UL 514B.

2.7 CONNECTORS, WIRE PRESSURE

2.7.1 For Use With Copper Conductors

UL 486A.

2.8 ELECTRICAL GROUNDING AND BONDING EQUIPMENT

UL 467.

2.8.1 Ground Rods

Ground rods shall be of copper-clad steel conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length of the sectional type driven full length into the earth.

2.8.2 Ground Bus

The ground bus shall be bare copper conductor or flat copper in one piece, if practicable.

2.9 ENCLOSURES

NEMA ICS 6, unless otherwise specified. All equipment enclosures shall be NEMA 12 for indoor use and NEMA 4X for outdoor use.

2.9.1 Cabinets and Boxes

Cabinets and boxes with volume greater than 100 cubic inches shall be in accordance with UL 50, hot-dip, zinc-coated, if sheet steel.

2.9.2 Circuit Breaker Enclosures

UL 489.

2.10 LIGHTING FIXTURES, LAMPS, BALLASTS, EMERGENCY EQUIPMENT, CONTROLS AND ACCESSORIES

The following specifications are supported and supplemented by information and details on the drawings. Additional fixtures, if shown, shall conform to this specification. Lamps, lampholders, ballasts, transformers, electronic circuitry and other lighting system components shall be constructed according to industry standards. Equipment shall be tested and listed by a recognized independent testing laboratory for the expected installation conditions. Equipment shall conform to the standards listed below. General descriptions of required fixtures can be found at

http://cadlib.wes.army.mil/html/detlib/gif/d502gif/D502262E.gif. Fixture sheets are also attached at the end of this section.

2.10.1 Lamps

Lamps shall be constructed to operate in the specified fixture, and shall function without derating life or output as listed in published data. Lamps shall meet the requirements of the Energy Policy Act of 1992.

a. Incandescent and tungsten halogen lamps shall be designed for 125 volt operation (except for low voltage lamps), shall be rated for minimum life of 2,000 hours, and shall have color temperature between 2,800 and 3,200 degrees Kelvin. Tungsten halogen lamps shall incorporate quartz capsule construction. Lamps shall comply with ANSI C78.20 and sections 238 and 270 of ANSI C78.21.

b. Fluorescent lamps shall have color temperature of 3,000 degrees Kelvin. They shall be designed to operate with the ballasts and circuitry of the fixtures in which they will be used. Fluorescent lamps, including spares, shall be manufactured by one manufacturer to provide for color and performance consistency. Fluorescent lamps shall comply with ANSI C78.1. Fluorescent tube lamp efficiencies shall meet or exceed the following requirements.

T8, 32 watts	(4' lamp)	2800 lumens
T12,34 watts	(4' lamp)	2800 lumens
T8,59 watts	(8' lamp)	5700 lumens
T12,60 watts	(8' lamp)	5600 lumens
T8/U,31-32 watts	(U-tube)	2600 lumens
T12/U,34 watts	(U-tube)	2700 lumens

(1) Linear fluorescent lamps, unless otherwise indicated, shall be 4 feet long 32 watt T8, 265 mA, with minimum CRI of 75. Lamps of other lengths or types shall be used only where specified or shown. Lamps shall deliver rated life when operated on rapid start ballasts.

(2) Small compact fluorescent lamps shall be twin, double, or triple tube configuration as shown with bi-pin or four-pin snap-in base and shall have minimum CRI of 85. They shall deliver rated life when operated on ballasts as shown. 9 and 13 watt double tube lamps shall comply with ANSI C78.2B. 18 and 26 watt double tube lamps shall comply with ANSI C78.2A. Minimum starting temperature shall be 32 degrees F for twin tube lamps and for double and triple twin tube lamps without internal starter; and 15 degrees F for double and triple twin tube lamps with internal starter.

c. High intensity discharge lamps, including spares, shall be manufactured by one manufacturer in order to provide color and performance consistency. High intensity discharge lamps shall be designed to operate with the ballasts and circuitry of the fixtures in which they will be used and shall have wattage, shape and base as shown. High intensity discharge lamps, unless otherwise shown, shall have medium or mogul screw base and minimum starting temperature of -20 degrees F. Metal halide lamps, unless otherwise shown, shall have minimum CRI of 65; color temperature of 4,300

degrees Kelvin; shall be -BU configuration if used in base-up position; and shall be -H or high output configuration if used in horizontal position. Lamps shall comply with all applicable ANSI C78.1350, ANSI C78.1351, ANSI C78.1352, ANSI C78.1355,ANSI C78.1375, and ANSI C78.1376.

2.10.2 Ballasts and Transformers

Ballasts or transformers shall be designed to operate the designated lamps within their optimum specifications, without derating the lamps. Lamp and ballast combinations shall be certified as acceptable by the lamp manufacturer.

a. Fluorescent ballasts shall comply with ANSI C82.1 and shall be mounted integrally within fluorescent fixture housing unless otherwise shown. Ballasts shall have maximum current crest factor of 1.7; high power factor; Class A sound rating; maximum operating case temperature of 77 degrees F above ambient; and shall be rated Class P. Unless otherwise indicated, the minimum number of ballasts shall be used to serve each individual fixture. A single ballast may be used to serve multiple fixtures if they are continuously mounted, identically controlled and factory manufactured for that installation with an integral wireway.

(1) Compact fluorescent ballasts shall comply with IEEE C62.41 Category A transient voltage variation requirements and shall be mounted integrally within compact fluorescent fixture housing unless otherwise shown. Ballasts shall have minimum ballast factor of 0.95; maximum current crest factor of 1.6; high power factor; maximum operating case temperature of 77 degrees F above ambient; shall be rated Class P; and shall have a sound rating of Class A. Ballasts shall meet FCC Class A specifications for EMI/RFI emissions. Ballasts shall operate from nominal line voltage of 120 volts at 60 Hz and maintain constant light output over a line voltage variation of ± 10%. Ballasts shall have an end-of-lamp-life detection and shut-down circuit. Ballasts shall be UL listed and shall contain no PCBs. Ballasts shall contain potting to secure PC board, provide lead strain relief, and provide a moisture barrier.

(2) Electronic fluorescent ballasts shall comply with 47 CFR 18 for electromagnetic interference. Ballasts shall withstand line transients per IEEE C62.41, Category A. Ballasts shall have total harmonic distortion between 10 and 20%; minimum frequency of 20,000Hz; filament voltage between 2.5 and 4.5 volts; maximum starting inrush current of 20 amperes; and shall comply with the minimum Ballast Efficacy Factors shown in the table below. Minimum starting temperature shall be 30 degrees F. Ballasts shall carry a manufacturer's full warranty of three years, including a minimum $10 labor allowance per ballast.

ELECTRONIC FLUORESCENT BALLAST EFFICACY FACTORS

LAMP TYPE	TYPE OF STARTER & LAMP	NOMINAL OPERATIONAL VOLTAGE	NUMBER OF LAMPS	MINIMUM BALLAST EFFICACY FACTOR

ELECTRONIC FLUORESCENT BALLAST EFFICACY FACTORS

32W T8	rapid	120 or 277 V	1	2.54
	start		2	1.44
	linear &		3	0.93
	U-tubes		4	0.73

b. High intensity discharge ballasts shall comply with UL 1029 and, if multiple supply types, with ANSI C82.4. Ballasts shall have minimum ballast factor of 0.9; high power factor; Class A sound rating; and maximum operating case temperature of 77 degrees F above ambient.

(1) Electronic high intensity discharge ballasts shall be constant wattage autotransformer type; shall have less than 10% ballast loss; shall have total harmonic distortion between 10 and 20%; and shall have a minimum starting temperature of 0 degrees F.

(2) Magnetic high intensity discharge ballasts shall have a minimum starting temperature of -20 degrees F.

2.10.3 Fixtures

Fixtures shall be in accordance with the size, shape, appearance, finish, and performance shown. Unless otherwise indicated, lighting fixtures shall be provided with housings, junction boxes, wiring, lampholders, mounting supports, trim, hardware and accessories for a complete and operable installation. Recessed housings shall be minimum 20 gauge cold rolled or galvanized steel as shown. Extruded aluminum fixtures shall have minimum wall thickness of 0.125 inches. Plastic lenses shall be 100% virgin acrylic or as shown. Glass lenses shall be tempered. Heat resistant glass shall be borosilicate type. Conoid recessed reflector cones shall be Alzak with clear specular low iridescent finish.

a. Incandescent fixtures shall comply with UL 1571. Incandescent fixture specular reflector cone trims shall be integral to the cone and shall be finished to match. Painted trim finishes shall be white with minimum reflectance of 88%. Low voltage incandescent fixtures shall have integral step-down transformers.

b. Fluorescent fixtures shall comply with UL 1570. Recessed ceiling fixtures shall comply with NEMA LE 4. Fixtures shall be plainly marked for proper lamp and ballast type to identify lamp diameter, wattage, color and start type. Marking shall be readily visible to service personnel, but not visible from normal viewing angles. Fluorescent fixture lens frames on recessed and surface mounted troffers shall be one assembly with mitered corners. Parabolic louvers shall have a low iridescent finish and 45 degree cut-off. Louver intersection joints shall be hairline type and shall conceal mounting tabs or other assembly methods. Louvers shall be free from blemishes, lines or defects which distort the visual surface. Integral ballast and wireway compartments shall be easily accessible without the use of special tools. Housings shall be constructed to include grounding necessary to start the lamps. Open fixtures shall be equipped with a sleeve, wire guard, or other positive means to prevent lamps from falling. Medium bi-pin lampholders shall be twist-in type with positive locking position. Long compact fluorescent fixtures and fixtures utilizing U-bend lamps shall have clamps or secondary lampholders to support the

free ends of the lamps.

c. High intensity discharge fixture shall comply with UL 1572. Recessed ceiling fixtures shall comply with NEMA LE 4. Reflectors shall be anodized aluminum. Fixtures for horizontal lamps shall have position oriented lampholders. Lampholders shall be pulse-rated to 5,000 volts. Fixtures indicated as classified or rated for hazardous locations or special service shall be designed and independently tested for the environment in which they are installed. Recessed lens fixtures shall have extruded aluminum lens frames. Ballasts shall be integral to fixtures and shall be accessible without the use of special tools. Remote ballasts shall be encased and potted. Lamps shall be shielded from direct view with a UV absorbing material such as tempered glass, and shall be circuited through a cut-off switch which will shut off the lamp circuit if the lens is not in place.

d. Emergency lighting fixtures and accessories shall be constructed and independently tested to meet the requirements of applicable codes. Batteries shall be Nicad or equal with no required maintenance, and shall have a minimum life expectancy of five years and warranty period of three years.

e. Exit Signs

Exit signs shall be ENERGY STAR compliant, thereby meeting the following requirements. Input power shall be less than 5 watts per face. Letter size and spacing shall adhere to NFPA 101. Luminance contrast shall be greater than 0.8. Average luminance shall be greater than 15 cd/m^2 measured at normal (0 degree) and 45 degree viewing angles. Minimum luminance shall be greater than 8.6 cd/m^2 measured at normal and 45 degree viewing angles. Maximum to minimum luminance shall be less than 20:1 measured at normal and 45 degree viewing angles. The manufacturer warranty for defective parts shall be at least 5 years.

2.10.4 Lampholders, Starters, and Starter Holders

UL 542

2.11 LOW-VOLTAGE FUSES AND FUSEHOLDERS

2.11.1 Fuses, Low Voltage Cartridge Type

NEMA FU 1.

2.11.2 Fuses, High-Interrupting-Capacity, Current-Limiting Type

Fuses, Class G, J, L and CC shall be in accordance with UL 198C.

2.11.3 Fuses, Class K, High-Interrupting-Capacity Type

UL 198D.

2.11.4 Fuses, Class H

UL 198B.

2.11.5 Fuses, Class R

UL 198E.

2.11.6 Fuses, Class T

UL 198H.

2.11.7 Fuses for Supplementary Overcurrent Protection

UL 198G.

2.11.8 Fuseholders

UL 512.

2.12 INSTRUMENTS, ELECTRICAL INDICATING

ANSI C39.1.

2.13 MOTORS, AC, FRACTIONAL AND INTEGRAL

Motors, ac, fractional and integral horsepower, 500 hp and smaller shall conform to NEMA MG 1 and UL 1004for motors; NEMA MG 10 for energy management selection of polyphase motors. In addition to the standards listed above, motors shall be provided with efficiencies as specified in the table "MINIMUM NOMINAL EFFICIENCIES" below.

2.13.1 Rating

The horsepower rating of motors should be limited to no more than 125 percent of the maximum load being served unless a NEMA standard size does not fall within this range. In this case, the next larger NEMA standard motor size should be used.

2.13.2 Motor Efficiencies

All permanently wired polyphase motors of 1 hp or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 1 hp or more with open, drip proof or totally enclosed fan cooled enclosures shall be high efficiency type, unless otherwise indicated. Motor efficiencies indicated in the tables apply to general-purpose, single-speed, polyphase induction motors. Applications which require definite purpose, special purpose, special frame, or special mounted polyphase induction motors are excluded from these efficiency requirements. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

MINIMUM NOMINAL MOTOR EFFICIENCIES
OPEN DRIP PROOF MOTORS

kW	1200 RPM	1800 RPM	3600 RPM
0.746	82.5	85.5	80.0
1.12	86.5	86.5	85.5
1.49	87.5	86.5	86.5
2.24	89.5	89.5	86.5
3.73	89.5	89.5	89.5

MINIMUM NOMINAL MOTOR EFFICIENCIES

5.60	91.7	91.0	89.5
7.46	91.7	91.7	90.2
11.2	92.4	93.0	91.0
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	93.6
44.8	95.0	95.0	94.1
56.9	95.0	95.0	94.5
74.6	95.0	95.4	94.5
93.3	95.4	95.4	95.0
112.0	95.8	95.8	95.4
149.0	95.4	95.8	95.4
187.0	95.4	96.2	95.8
224.0	95.4	95.0	95.4
261.0	94.5	95.4	95.0
298.0	94.1	95.8	95.0
336.0	94.5	95.4	95.4
373.0	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

kW	1200 RPM	1800 RPM	3600 RPM
0.746	82.5	85.5	78.5
1.12	87.5	86.5	85.5
1.49	88.5	86.5	86.5
2.24	89.5	89.5	88.5
3.73	89.5	89.5	89.5
5.60	91.7	91.7	91.0
7.46	91.7	91.7	91.7
11.2	92.4	92.4	91.7
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	94.1
44.8	94.5	95.0	94.1
56.9	95.0	95.4	94.5
74.6	95.4	95.4	95.0
93.3	95.4	95.4	95.4
112.0	95.8	95.8	95.4
149.0	95.8	96.2	95.8
187.0	95.6	96.2	95.9
224.0	95.4	96.1	95.8
261.0	94.5	96.2	94.8
298.0	94.5	95.8	94.5
336.0	94.5	94.5	94.5
373.0	94.5	94.5	94.5

MINIMUM NOMINAL MOTOR EFFICIENCIES
OPEN DRIP PROOF MOTORS

HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	80.0
1.5	86.5	86.5	85.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

2	87.5	86.5	86.5
3	89.5	89.5	86.5
5	89.5	89.5	89.5
7.5	91.7	91.0	89.5
10	91.7	91.7	90.2
15	92.4	93.0	91.0
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	93.6
60	95.0	95.0	94.1
75	95.0	95.0	94.5
100	95.0	95.4	94.5
125	95.4	95.4	95.0
150	95.8	95.8	95.4
200	95.4	95.8	95.4
250	95.4	96.2	95.8
300	95.4	95.0	95.4
350	94.5	95.4	95.0
400	94.1	95.8	95.0
450	94.5	95.4	95.4
500	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	78.5
1.5	87.5	86.5	85.5
2	88.5	86.5	86.5
3	89.5	89.5	88.5
5	89.5	89.5	89.5
7.5	91.7	91.7	91.0
10	91.7	91.7	91.7
15	92.4	92.4	91.7
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	94.1
60	94.5	95.0	94.1
75	95.0	95.4	94.5
100	95.4	95.4	95.0
125	95.4	95.4	95.4
150	95.8	95.8	95.4
200	95.8	96.2	95.8
250	95.6	96.2	95.9
300	95.4	96.1	95.8
350	94.5	96.2	94.8
400	94.5	95.8	94.5
450	94.5	94.5	94.5
500	94.5	94.5	94.5

2.14 MOTOR CONTROLS AND MOTOR CONTROL CENTERS

2.14.1 General

NEMA ICS 1, NEMA ICS 2, NEMA ICS 3 and NEMA ICS 6, and UL 508 and UL 845. Panelboards supplying non-linear loads shall have neutrals sized for 200 percent of rated current.

2.14.2 Motor Starters

Combination starters shall be provided with fusible switches.

2.14.3 Thermal-Overload Protection

Each motor of 1/8 hp or larger shall be provided with thermal-overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller, or shall be mounted in a separate enclosure. Unless otherwise specified, the protective device shall be of the manually reset type. Single or double pole tumbler switches specifically designed for alternating-current operation only may be used as manual controllers for single-phase motors having a current rating not in excess of 80 percent of the switch rating.

2.14.4 Low-Voltage Motor Overload Relays

2.14.4.1 General

Thermal overload relays shall conform to NEMA ICS 2 and UL 508. Overload protection shall be provided either integral with the motor or motor controller, and shall be rated in accordance with the requirements of NFPA 70. Standard units shall be used for motor starting times up to 7 seconds. Quick trip units shall be used on hermetically sealed, submersible pumps, and similar motors.

2.14.4.2 Construction

Manual reset type thermal relay shall be melting alloy construction. Automatic reset type thermal relays shall be bimetallic construction. Magnetic current relays shall consist of a contact mechanism and a dash pot mounted on a common frame.

2.14.4.3 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. Trip current ratings shall be established by selection of the replaceable overload device and shall not be adjustable. Where the controller is remotely-located or difficult to reach, an automatic reset, non-compensated overload relay shall be provided. Manual reset overload relays shall be provided otherwise, and at all locations where automatic starting is provided. Where the motor is located in a constant ambient temperature, and the thermal device is located in an ambient temperature that regularly varies by more than minus 18 degrees F, an ambient temperature-compensated overload relay shall be provided.

2.14.5 Automatic Control Devices

2.14.5.1 Direct Control

Automatic control devices (such as thermostats, float or pressure switches) which control the starting and stopping of motors directly shall be designed for that purpose and have an adequate horsepower rating.

2.14.5.2 Pilot-Relay Control

Where the automatic-control device does not have such a rating, a magnetic starter shall be used, with the automatic-control device actuating the pilot-control circuit.

2.14.5.3 Manual/Automatic Selection

a. Where combination manual and automatic control is specified and the automatic-control device operates the motor directly, a double-throw, three-position tumbler or rotary switch (marked MANUAL-OFF-AUTOMATIC) shall be provided for the manual control.

b. Where combination manual and automatic control is specified and the automatic-control device actuates the pilot control circuit of a magnetic starter, the magnetic starter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC.

c. Connections to the selector switch shall be such that; only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low-or high-pressure cutouts, high-temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Control circuit connections to any MANUAL-OFF-AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with wiring diagram approved by the Contracting Officer unless such diagram is included on the drawings. All controls shall be 120 volts or less unless otherwise indicated.

2.15 PANELBOARDS

Dead-front construction, NEMA PB 1 and UL 67.

2.16 RECEPTACLES

2.16.1 Heavy Duty Grade

NEMA WD 1. Devices shall conform to all requirements for heavy duty receptacles.

2.16.2 Ground Fault Interrupters

UL 943, Class A or B.

2.16.3 NEMA Standard Receptacle Configurations

NEMA WD 6.

a. Single and Duplex, 15-Ampere and 20-Ampere, 125 Volt

15-ampere, non-locking: NEMA type 5-15R, locking: NEMA type L5-15R,
20-ampere, non-locking: NEMA type 5-20R, locking: NEMA type L5-20R.

2.17 Service Entrance Equipment

UL 869A.

2.18 SPLICE, CONDUCTOR

UL 486C.

2.19 SNAP SWITCHES

UL 20.

2.20 TAPES

2.20.1 Plastic Tape

UL 510.

2.20.2 Rubber Tape

UL 510.

2.21 TRANSFORMERS

Single- and three-phase transformers shall have two windings per phase. Full-capacity standard NEMA taps shall be provided in the primary windings of transformers unless otherwise indicated. Three-phase transformers shall be configured with delta-wye windings, except as indicated. "T" connections may be used for transformers rated 15 kVA or below. Transformers supplying non-linear loads shall be UL listed as suitable for supplying such loads with a total K-factor not to exceed K-13 and have neutrals sized for 200 percent of rated current.

2.21.1 Transformers, Dry-Type

Transformers shall have 220 degrees C insulation system for transformers 15 kVA and greater, and shall have 180 degrees C insulation system for transformers rated 10 kVA and less, with temperature rise not exceeding 150 degrees C under full-rated load in maximum ambient temperature of 40 degrees C. Transformer of 150 degrees C temperature rise shall be capable of carrying continuously 100 percent of nameplate kVA without exceeding insulation rating.

a. 600 Volt or Less Primary:

NEMA ST 20, UL 506, general purpose, dry-type, self-cooled, ventilated. Transformers shall be provided in NEMA 1 enclosure. Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.

2.21.2 Average Sound Level

The average sound level in decibels (dB) of transformers shall not exceed the following dB level at 12 inches for the applicable kVA rating range listed unless otherwise indicated:

kVA Range	dB Sound Level
1-50	50
51-150	55
151-300	58
301-500	60
501-700	62

kVA Range	dB Sound Level
701-1000	64
1001-1500	65
1501 & above	70

2.22 ISOLATED POWER SYSTEM EQUIPMENT

UL 1047, with monitor UL 1022.

2.23 WATTHOUR METERS, UTILITY REVENUE

Watthour meters shall conform to ANSI C12.1 and ANSI C12.10, except numbered terminal wiring sequence and case size may be the manufacturer's standard. Watthour meters shall be of the socket-mounted outdoor type having a 15-minute, cumulative form, demand register meeting ANSI C12.4 and provided with not less than two and one-half stators. Watthour demand meters shall have factory-installed electronic pulse initiators meeting the requirements of ANSI C12.1. Pulse initiators shall be solid-state devices incorporating light-emitting diodes, phototransistors, and power transistors, except that mercury-wetted output contacts are acceptable. Initiators shall be totally contained within watthour demand meter enclosures, shall be capable of operating up to speeds of 500 pulses per minute with no false pulses, and shall require no field adjustments. Initiators shall be calibrated for a pulse rate output of one pulse per 1/4 disc revolution of the associated meter and shall be compatible with the indicated equipment.

2.24 INSTRUMENT TRANSFORMERS

2.24.1 General

Instrument transformers shall comply with ANSI C12.11 and IEEE C57.13. Instrument transformers shall be configured for mounting in/on the device to which they are applied. Polarity marks on instrument transformers shall be visually evident and shown on drawings.

2.24.2 Current Transformers

Unless otherwise indicated, bar, wound, or window-type transformers are acceptable; and except for window-type units installed over insulated buses, transformers shall have a BIL rating consistent with the rated BIL of the associated switchgear or electric power apparatus bushings, buses or conductors. Current transformers shall have the indicated ratios. The continuous thermal-current rating factor shall be not less than 2.0. Other thermal and mechanical ratings of current transformer and their primary leads shall be coordinated with the design of the circuit breaker and shall be not less than the momentary rating of the associated circuit breaker. Circuit protectors shall be provided across secondary leads of the current transformers to prevent the accidental open-circuiting of the transformers while energized. Each terminal of each current transformer shall be connected to a short-circuiting terminal block in the circuit interrupting mechanism cabinet, power transformer terminal cabinet, and in the associated instrument and relay cabinets.

2.24.2.1 Current Transformers for kWH and Demand Metering (Low Voltage)

Current transformers shall conform to IEEE C57.13. Provide current transformers with a metering accuracy Class of 0.3 through B-0.2, with a

minimum RF of 3.0 for 300 ampere services, and a Class of 0.3 through B-0.2, with a minimum RF of 4.0 for 400 ampere services, and a Class of 0.3 through B-0.5, with a minimum RF of 3.0 for 600 ampere services, and a Class of 0.3 through B-0.5, with a minimum RF of 1.5 for 1200 ampere services at 30 degrees C, with 600-volt insulation, and 10 kV BIL. Provide butyl-molded, window-type current transformers mounted in the current transformer cabinet.

2.25 WIRING DEVICES

NEMA WD 1 for wiring devices, and NEMA WD 6 for dimensional requirements of wiring devices.

PART 3 EXECUTION

3.1 GROUNDING

Grounding shall be in conformance with NFPA 70, the contract drawings, and the following specifications.

3.1.1 Ground Rods

The resistance to ground shall be measured using the fall-of-potential method described in IEEE Std 81. The maximum resistance of a driven ground shall not exceed 25 ohms under normally dry conditions. If this resistance cannot be obtained with a single rod, 2 additional rods not less than 6 feet on centers, or if sectional type rods are used, 2 additional sections may be coupled and driven with the first rod. In high-ground-resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately. Connections below grade shall be fusion welded. Connections above grade shall be fusion welded or shall use UL 467 approved connectors.

3.1.2 Ground Bus

Ground bus shall be provided in the electrical equipment rooms as indicated. Noncurrent-carrying metal parts of transformer neutrals and other electrical equipment shall be effectively grounded by bonding to the ground bus. The ground bus shall be bonded to both the entrance ground, and to a ground rod or rods as specified above having the upper ends terminating approximately 4 inches above the floor. Connections and splices shall be of the brazed, welded, bolted, or pressure-connector type, except that pressure connectors or bolted connections shall be used for connections to removable equipment.

3.1.3 Grounding Conductors

A green equipment grounding conductor, sized in accordance with NFPA 70 shall be provided, regardless of the type of conduit. Equipment grounding bars shall be provided in all panelboards. The equipment grounding conductor shall be carried back to the service entrance grounding connection or separately derived grounding connection. All equipment grounding conductors, including metallic raceway systems used as such, shall be bonded or joined together in each wiring box or equipment enclosure. Metallic raceways and grounding conductors shall be checked to assure that they are wired or bonded into a common junction. Metallic boxes and enclosures, if used, shall also be bonded to these grounding conductors by an approved means per NFPA 70. When switches, or other

utilization devices are installed, any designated grounding terminal on these devices shall also be bonded to the equipment grounding conductor junction with a short jumper.

3.2 WIRING METHODS

Wiring shall conform to NFPA 70, the contract drawings, and the following specifications. Unless otherwise indicated, wiring shall consist of insulated conductors installed in rigid zinc-coated steel conduit. Wire fill in conduits shall be based on NFPA 70 for the type of conduit and wire insulations specified.

3.2.1 Conduit and Tubing Systems

Conduit and tubing systems shall be installed as indicated. Conduit sizes shown are based on use of copper conductors with insulation types as described in paragraph WIRING METHODS. Minimum size of raceways shall be 3/4 inch. Only metal conduits will be permitted when conduits are required for shielding or other special purposes indicated, or when required by conformance to NFPA 70. Bushings, manufactured fittings or boxes providing equivalent means of protection shall be installed on the ends of all conduits and shall be of the insulating type, where required by NFPA 70. Only UL listed adapters shall be used to connect EMT to rigid metal conduit, cast boxes, and conduit bodies. Penetrations of above grade floor slabs, time-rated partitions and fire walls shall be firestopped in accordance with local codes and standards. Except as otherwise specified, IMC may be used as an option for rigid steel conduit in areas as permitted by NFPA 70. Raceways shall not be installed under the firepits of boilers and furnaces and shall be kept 6 inches away from parallel runs of flues, steam pipes and hot-water pipes. Raceways crossing structural expansion joints or seismic joints shall be provided with suitable expansion fittings or other suitable means to compensate for the building expansion and contraction and to provide for continuity of grounding. Wiring installed in underfloor raceway system shall be suitable for installation in wet locations.

3.2.1.1 Pull Wires

A pull wire shall be inserted in each empty raceway in which wiring is to be installed if the raceway is more than 50 feet in length and contains more than the equivalent of two 90-degree bends, or where the raceway is more than 150 feet in length. The pull wire shall be of No. 14 AWG zinc-coated steel, or of plastic having not less than 200 pounds per square inch tensile strength. Not less than 10 inches of slack shall be left at each end of the pull wire.

3.2.1.2 Conduit Stub-Ups

Where conduits are to be stubbed up through concrete floors, a short elbow shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Wiring shall be extended in rigid threaded conduit to equipment, except that where required, flexible conduit may be used 6 inches above the floor. Empty or spare conduit stub-ups shall be plugged flush with the finished floor with a threaded, recessed plug.

3.2.1.3 Below Slab-on-Grade or in the Ground

Electrical wiring below slab-on-grade shall be protected by a conduit system. Conduit passing vertically through slabs-on-grade shall be rigid steel or IMC. Rigid steel or IMC conduits installed below slab-on-grade or in the earth shall be field wrapped with 0.010 inch thick pipe-wrapping plastic tape applied with a 50 percent overlay, or shall have a factory-applied polyvinyl chloride, plastic resin, or epoxy coating system.

3.2.1.4 Installing in Slabs Including Slabs on Grade

Conduit installed in slabs-on-grade shall be rigid steel or IMC. Conduits shall be installed as close to the middle of concrete slabs as practicable without disturbing the reinforcement. Outside diameter shall not exceed 1/3 of the slab thickness and conduits shall be spaced not closer than 3 diameters on centers except at cabinet locations where the slab thickness shall be increased as approved by the Contracting Officer. Where conduit is run parallel to reinforcing steel, the conduit shall be spaced a minimum of one conduit diameter away but not less than one inch from the reinforcing steel.

3.2.1.5 Changes in Direction of Runs

Changes in direction of runs shall be made with symmetrical bends or cast-metal fittings. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways in damp and wet locations shall be avoided where possible. Lodgment of plaster, dirt, or trash in raceways, boxes, fittings and equipment shall be prevented during the course of construction. Clogged raceways shall be cleared of obstructions or shall be replaced.

3.2.1.6 Supports

Metallic conduits and tubing,and the support system to which they are attached, shall be securely and rigidly fastened in place to prevent vertical and horizontal movement at intervals of not more than 10 feet and within 3 feet of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangers, threaded C-clamps, beam clamps, or ceiling trapeze. Loads and supports shall be coordinated with supporting structure to prevent damage or deformation to the structure. Loads shall not be applied to joist bridging. Attachment shall be by wood screws or screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring-steel-tension clamps on steel work. Nail-type nylon anchors or threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine screws. Raceways or pipe straps shall not be welded to steel structures. Cutting the main reinforcing bars in reinforced concrete beams or joists shall be avoided when drilling holes for support anchors. Holes drilled for support anchors, but not used, shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported using wire or nylon ties. Raceways shall be independently supported from the structure. Upper raceways shall not be used as a means of support for lower raceways. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Cables and raceways shall not be supported by ceiling grids. Except where permitted by NFPA 70, wiring shall not be supported by ceiling support systems. Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts where required by NFPA 70, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box;

otherwise, a single locknut and bushing may be used. Threadless fittings for electrical metallic tubing shall be of a type approved for the conditions encountered.

3.2.1.7 Exposed Raceways

Exposed raceways shall be installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. Raceways under raised floors and above accessible ceilings shall be considered as exposed installations in accordance with NFPA 70 definitions.

3.2.1.8 Exposed Risers

Exposed risers in wire shafts of multistory buildings shall be supported by U-clamp hangers at each floor level, and at intervals not to exceed 10 feet.

3.2.1.9 Communications Raceways

Communications raceways indicated shall be installed in accordance with the previous requirements for conduit and tubing and with the additional requirement that no length of run shall exceed 50 feet for 1/2 inch and 3/4 inch sizes, and 100 feet for 1 inch or larger sizes, and shall not contain more than two 90-degree bends or the equivalent. Additional pull or junction boxes shall be installed to comply with these limitations whether or not indicated. Inside radii of bends in conduits of 1 inch size or larger shall not be less than ten times the nominal diameter.

3.2.2 Cables and Conductors

Installation shall conform to the requirements of NFPA 70. Covered, bare or insulated conductors of circuits rated over 600 volts shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 600 volts or less.

3.2.2.1 Sizing

Unless otherwise noted, all sizes are based on copper conductors and the insulation types indicated. Sizes shall be not less than indicated. Branch-circuit conductors shall be not smaller than No. 12 AWG. Conductors for branch circuits of 120 volts more than 100 feet long and of 277 volts more than 230 feet long, from panel to load center, shall be no smaller than No. 10 AWG. Class 1 remote control and signal circuit conductors shall be not less than No. 14 AWG. Class 2 remote control and signal circuit conductors shall be not less than No. 16 AWG. Class 3 low-energy, remote-control and signal circuits shall be not less than No. 22 AWG.

3.2.2.2 Use of Aluminum Conductors in Lieu of Copper

Aluminum conductors shall not be used.

3.2.2.3 Cable Splicing

Splices shall be made in an accessible location. Crimping tools and dies shall be approved by the connector manufacturer for use with the type of connector and conductor.

a. Copper Conductors, 600 Volt and Under: Splices in conductors No. 10 AWG and smaller diameter shall be made with an insulated, pressure-type connector. Splices in conductors No. 8 AWG and

larger diameter shall be made with a solderless connector and insulated with tape or heat-shrink type insulating material equivalent to the conductor insulation.

3.2.2.4 Conductor Identification and Tagging

Power, control, and signal circuit conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation. Phase conductors of low voltage power circuits shall be identified by color coding. Phase identification by a particular color shall be maintained continuously for the length of a circuit, including junctions.

a. Color coding shall be provided for service, feeder, branch, and ground conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in the same raceway or box, other neutral shall be white with colored (not green) stripe. The color coding for 3-phase and single-phase low voltage systems shall be as follows:

   120/208-volt, 3-phase: Black(A), red(B), and blue(C).
   277/480-volt, 3-phase: Brown(A), orange(B), and yellow(C).
   120/240-volt, 1-phase: Black and red.

b. Conductor phase and voltage identification shall be made by color-coded insulation for all conductors smaller than No. 6 AWG. For conductors No. 6 AWG and larger, identification shall be made by color-coded insulation, or conductors with black insulation may be furnished and identified by the use of half-lapped bands of colored electrical tape wrapped around the insulation for a minimum of 3 inches of length near the end, or other method as submitted by the Contractor and approved by the Contracting Officer.

c. Control and signal circuit conductor identification shall be made by color-coded insulated conductors, plastic-coated self-sticking printed markers, permanently attached stamped metal foil markers, or equivalent means as approved. Control circuit terminals of equipment shall be properly identified. Terminal and conductor identification shall match that shown on approved detail drawings. Hand lettering or marking is not acceptable.

3.3 BOXES AND SUPPORTS

Boxes shall be provided in the wiring or raceway systems where required by NFPA 70 for pulling of wires, making connections, and mounting of devices or fixtures. Pull boxes shall be furnished with screw-fastened covers. Indicated elevations are approximate, except where minimum mounting heights for hazardous areas are required by NFPA 70. Unless otherwise indicated, boxes for wall switches and general purpose receptacles shall be mounted 48 inches above finished floors. Switch and outlet boxes located on opposite sides of fire rated walls shall be separated by a minimum horizontal distance of 24 inches. The total combined area of all box openings in fire rated walls shall not exceed 100 square inches per 100 square feet. Maximum box areas for individual boxes in fire rated walls vary with the manufacturer and shall not exceed the maximum specified for that box in UL Elec Const Dir. Only boxes listed in UL Elec Const Dir shall be used in

fire rated walls.

3.3.1 Box Applications

Each box shall have not less than the volume required by NFPA 70 for number of conductors enclosed in box. Boxes for metallic raceways shall be listed for the intended use when located in normally wet locations, when flush or surface mounted on outside of exterior surfaces, or when located in hazardous areas. Boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces shall be gasketed. Boxes for mounting lighting fixtures shall be not less than 4 inches square, or octagonal, except smaller boxes may be installed as required by fixture configuration, as approved. Cast-metal boxes with 3/32 inch wall thickness are acceptable. Large size boxes shall be NEMA 12 or as shown. Boxes in other locations shall be sheet steel when permitted by NFPA 70. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers.

3.3.2 Brackets and Fasteners

Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength, with bolts and metal expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screw or welded studs on steel work. Threaded studs driven in by powder charge and provided with lockwashers and nuts, or nail-type nylon anchors may be used in lieu of expansion shields, or machine screws. Penetration of more than 1-1/2 inches into reinforced-concrete beams or more than 3/4 inch into reinforced-concrete joists shall avoid cutting any main reinforcing steel. The use of brackets which depend on gypsum wallboard or plasterboard for primary support will not be permitted. In partitions of light steel construction, bar hangers with 1 inch long studs, mounted between metal wall studs or metal box mounting brackets shall be used to secure boxes to the building structure. When metal box mounting brackets are used, additional box support shall be provided on the side of the box opposite the brackets. This additional box support shall consist of a minimum 12 inch long section of wall stud, bracketed to the opposite side of the box and secured by two screws through the wallboard on each side of the stud. Metal screws may be used in lieu of the metal box mounting brackets.

3.3.3 Mounting in Walls, Ceilings, or Recessed Locations

In walls or ceilings of concrete, tile, or other non-combustible material, boxes shall be installed so that the edge of the box is not recessed more than 1/4 inch from the finished surface. Boxes mounted in combustible walls or ceiling material shall be mounted flush with the finished surface. The use of gypsum or plasterboard as a means of supporting boxes will not be permitted. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers, as required. The bottom of boxes installed in masonry-block walls for concealed wiring shall be mounted flush with the top of a block to minimize cutting of the blocks, and boxes shall be located horizontally to avoid cutting webs of block. Separate boxes shall be provided for flush or recessed fixtures when required by the fixture terminal operating temperature, and fixtures shall be readily removable for access to the boxes unless ceiling access panels are provided.

3.3.4 Installation in Overhead Spaces

In open overhead spaces, cast-metal boxes threaded to raceways need not be separately supported except where used for fixture support; cast-metal boxes having threadless connectors and sheet metal boxes shall be supported directly from the building structure or by bar hangers. Hangers shall not be fastened to or supported from joist bridging. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved type fastener not more than 24 inches from the box.

3.4 DEVICE PLATES

One-piece type device plates shall be provided for all outlets and fittings. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel, cast-metal. Screws shall be of metal with countersunk heads, in a color to match the finish of the plate. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional-type device plates will not be permitted. Plates installed in wet locations shall be gasketed and provided with a hinged, gasketed cover, unless otherwise specified.

3.5 RECEPTACLES

3.5.1 Single and Duplex, 15 or 20-ampere, 125 volt

Single and duplex receptacles shall be extra hard use specification grade, rated 20 amperes, 125 volts, two-pole, three-wire, grounding type with polarized parallel slots. Bodies shall be of gray to match color of switch handles in the same room, and supported by mounting strap having plaster ears. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Receptacle shall be side-wired with two screws per terminal. The third grounding pole shall be connected to the metal mounting yoke. Switched receptacles shall be the same as other receptacles specified except that the ungrounded pole of each suitable receptacle shall be provided with a separate terminal. Only the top receptacle of a duplex receptacle shall be wired for switching application. Receptacles with ground fault circuit interrupters shall have the current rating as indicated, and shall be UL Class A type unless otherwise shown. Ground fault circuit protection shall be provided as required by NFPA 70 and as indicated on the drawings.

3.5.2 Weatherproof Applications

Weatherproof receptacles shall be suitable for the environment, damp or wet as applicable, and the housings shall be labeled to identify the allowable use. Receptacles shall be marked in accordance with UL 514A for the type of use indicated; "Damp locations", "Wet Locations", "Wet Location Only When Cover Closed". Assemblies shall be installed in accordance with the manufacturer's recommendations.

3.5.2.1 Damp Locations

Receptacles in damp locations shall be mounted in an outlet box with a gasketed, weatherproof, cast-metal cover plate (device plate, box cover) and a gasketed cap (hood, receptacle cover) over each receptacle opening. The cap shall be either a screw-on type permanently attached to the cover plate by a short length of bead chain or shall be a flap type attached to the cover with a spring loaded hinge.

3.5.2.2 Wet Locations

Receptacles in wet locations shall be installed in an assembly rated for such use whether the plug is inserted or withdrawn, unless otherwise indicated. In a duplex installation, the receptacle cover shall be configured to shield the connections whether one or both receptacles are in use.

3.5.3 Special-Purpose or Heavy-Duty Receptacles

Special-purpose or heavy-duty receptacles shall be of the type and of ratings and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle-type plug shall be furnished with each receptacle. Locking type receptacles, rated 30 amperes or less, shall be locked by rotating the plug. Locking type receptacles, rated more than 50 amperes, shall utilize a locking ring.

3.6 WALL SWITCHES

Wall switches shall be specification grade, fast-make, positive break, snap switches with grounding terminal. The wall switch handle and switch plate color shall be gray. Wiring terminals shall be of the screw type or of the solderless pressure type having suitable conductor-release arrangement. Not more than two switches shall be installed in a single-gang position. Switches shall be rated 20-ampere 120-volt for use on alternating current only. Pilot lights indicated shall consist of yoke-mounted candelabra-base sockets rated at 75 watts, 125 volts, and fitted with glass or plastic jewels. A clear 6-watt lamp shall be furnished and installed in each pilot switch. Jewels for use with switches controlling motors shall be green, and jewels for other purposes shall be red.

3.7 SERVICE EQUIPMENT

Service-disconnecting means shall be of the enclosed molded-case circuit breaker type with an external handle for manual operation. When service disconnecting means is a part of an assembly, the assembly shall be listed as suitable for service entrance equipment. Enclosures shall be sheet metal with hinged cover for surface mounting unless otherwise indicated.

3.8 DISTRIBUTION PANELS AND POWER PANELS

Circuit breakers and switches used as a motor disconnecting means shall be capable of being locked in the open position. Door locks shall be keyed alike. Nameplates shall be as approved. Directories shall be typed to indicate loads served by each circuit and mounted in a holder behind a clear protective covering. Busses shall be copper.

3.8.1 Distribution Panels

Quantity and identification shall be as shown on drawings. Distribution panels shall be in accordance with UL 67 and NEMA PB 1. Panels will be of a Dead-front construction, with molded case circuit breakers, and be surface mounted. Distribution panels will be rated for 480Y/277 volts ac, 3-phase, 4 wire, with a main bus capacity of 600 or 1200 amperes, as shown on the drawings, and a neutral bus capacity of 150 percent of the main bus. Busses will be of copper construction. Distribution panels will be equipped with bolt-on, enclosed thermal-magnetic protective, quick make, quick break,

trip indicating, circuit breakers, with a rating of 14,000 symmetrical amperes at 277 volts.

3.8.2 Power Panels

Quantity and identification shall be as shown on drawings. Power panels shall be in accordance with UL 67 and NEMA PB 1. Panels will be of a Dead-front construction, with molded case circuit breakers, and be surface mounted. Distribution panels will be rated for 208Y/120 volts ac, 3-phase, 4 wire, with a main bus capacity of 100 amperes, as shown on the drawings, and a neutral bus capacity of 150 percent of the main bus. Busses will be of copper construction. Power panels will be equipped with bolt-on, enclosed thermal-magnetic protective, quick make, quick break, trip indicating, circuit breakers, with a rating of 10,000 symmetrical amperes at 240 volts.

3.9 FUSES

Equipment provided under this contract shall be provided with a complete set of properly rated fuses when the equipment manufacturer utilize fuses in the manufacture of the equipment, or if current-limiting fuses are required to be installed to limit the ampere-interrupting capacity of circuit breakers or equipment to less than the maximum available fault current at the location of the equipment to be installed. Fuses shall have a voltage rating of not less than the phase-to-phase circuit voltage, and shall have the time-current characteristics required for effective power system coordination. Time-delay and non-time-delay options shall be as specified.

3.9.1 Cartridge Fuses; Current-Limiting Type

Cartridge fuses, current-limiting type, Class RK1 shall have tested interrupting capacity not less than 200,000 amperes. Fuse holders shall be the type that will reject all Class H fuses.

3.9.2 Motor and Transformer Circuit Fuses

Motor, motor controller, transformer, and inductive circuit fuses shall be Class RK1 or RK5, current-limiting, time-delay with 200,000 amperes interrupting capacity.

3.10 UNDERGROUND SERVICE

Unless otherwise indicated, interior conduit systems shall be stubbed out 5 feet beyond the building wall and 2 feet below finished grade, for interface with the exterior service lateral conduits. Outside conduit ends shall be bushed when used for direct burial service lateral conductors. Outside conduit ends shall be capped or plugged until connected to exterior conduit systems. Contractor shall provide and install exterior, underground, conduit and cable system, from building service disconnect to secondary side of Utility provided transformer. All service cable and conduit will be installed and terminated in accordance with the requirements of NFPA 70. Contractor shall be responsible for all costs associated with establishing required services. Contractor shall be responsible for all costs associated with relocation or termination of existing services, for construction of the levee system.

3.11 MOTORS

Each motor shall conform to the hp and voltage ratings indicated, and shall have a service factor and other characteristics that are essential to the proper application and performance of the motors under conditions shown or specified. Three-phase motors for use on 3-phase 208-volt systems shall have a nameplate rating of 200 volts. Unless otherwise specified, all motors shall have open frames, and continuous-duty classification based on a 40 degree C ambient temperature reference. Polyphase motors shall be squirrel-cage type, having normal-starting-torque and low-starting-current characteristics, unless other characteristics are specified in other sections of these specifications or shown on contract drawings. The Contractor shall be responsible for selecting the actual horsepower ratings and other motor requirements necessary for the applications indicated. When electrically driven equipment furnished under other sections of these specifications materially differs from the design, the Contractor shall make the necessary adjustments to the wiring, disconnect devices and branch-circuit protection to accommodate the equipment actually installed.

3.12 MOTOR CONTROL

Each motor or group of motors requiring a single control shall be provided under other sections of these specifications with a suitable controller and devices that will perform the functions as specified for the respective motors. Each motor of 1/8 hp or larger shall be provided with thermal-overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller, or shall be mounted in a separate enclosure. Unless otherwise specified, the protective device shall be of the manually reset type. Single or double pole tumbler switches specifically designed for alternating-current operation only may be used as manual controllers for single-phase motors having a current rating not in excess of 80 percent of the switch rating. Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have an adequate horsepower rating. When the automatic-control device does not have such a rating, a magnetic starter shall be used, with the automatic-control device actuating the pilot-control circuit. When combination manual and automatic control is specified and the automatic-control device operates the motor directly, a double-throw, three-position tumbler or rotary switch shall be provided for the manual control; when the automatic-control device actuates the pilot control circuit of a magnetic starter, the latter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low- or high-pressure cutouts, high-temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Control circuit connections to any MANUAL-OFF-AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with wiring diagram approved by the Contracting Officer unless such diagram is included on the drawings. All controls shall be 120 volts or less unless otherwise indicated.

3.12.1 Contacts

Unless otherwise indicated, contacts in miscellaneous control devices such as float switches, pressure switches, and auxiliary relays shall have current and voltage ratings in accordance with NEMA ICS 2 for rating

designation B300.

3.12.2 Safety Controls

Safety controls for boilers shall be connected to a 2-wire, 120 volt grounded circuit supplied from the associated boiler-equipment circuit. Where the boiler circuit is more than 120 volts to ground, safety controls shall be energized through a two-winding transformer having its 120 volt secondary winding grounded. Overcurrent protection shall be provided in the ungrounded secondary conductor and shall be sized for the load encountered.

3.13 MOTOR-DISCONNECT MEANS

Each motor shall be provided with a disconnecting means when required by NFPA 70 even though not indicated. For single-phase motors, a single or double pole toggle switch, rated only for alternating current, will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating. Switches shall disconnect all ungrounded conductors.

3.14 TRANSFORMER INSTALLATION

Three-phase transformers shall be connected only in a delta-wye configuration as indicated. "T" connections may be used for transformers rated at 15 kVA or below. Dry-type transformers shown located within 5 feet of the exterior wall shall be provided in a weatherproof enclosure. Transformers to be located within the building may be provided in the manufacturer's standard, ventilated indoor enclosure designed for use in 40 degrees C ambient temperature, unless otherwise indicated.

3.15 LIGHTING FIXTURES, LAMPS AND BALLASTS

This paragraph shall cover the installation of lamps, lighting fixtures and ballasts in interior or building mounted applications.

3.15.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Lamps installed and used for working light during construction shall be replaced prior to turnover to the Government if more than 15% of their rated life has been used. Lamps shall be tested for proper operation prior to turn-over and shall be replaced if necessary with new lamps from the original manufacturer. 10% spare lamps of each type, from the original manufacturer, shall be provided.

3.15.2 Lighting Fixtures

Fixtures shall be as shown and shall conform to the following specifications and shall be as detailed on the drawings. Illustrations shown on the drawings are indicative of the general type desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar designs and equivalent energy efficiency, light distribution and brightness characteristics, and of equal finish and quality will be acceptable if approved. In suspended acoustical ceilings with fluorescent fixtures, the fluorescent emergency light fixtures shall be furnished with self-contained battery packs.

3.15.2.1 Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.

3.15.2.2 Ceiling Fixtures

Ceiling fixtures shall be coordinated with and suitable for installation in, on or from the ceiling as shown. Installation and support of fixtures shall be in accordance with NFPA 70 and manufacturer's recommendations. Where seismic requirements are specified herein, fixtures shall be supported as shown or specified. Recessed fixtures shall have adjustable fittings to permit alignment with ceiling panels. Recessed fixtures installed in fire-resistive ceiling construction shall have the same fire rating as the ceiling or shall be provided with fireproofing boxes having materials of the same fire rating as the ceiling, in conformance withUL Elec Const Dir. Surface-mounted fixtures shall be suitable for fastening to the ceiling panel structural supports.

3.15.2.3 Suspended Fixtures

Suspended fixtures shall be provided with swivel hangers or hand-straights so that they hang plumb. Pendants, rods, or chains 4 feet or longer excluding fixture shall be braced to prevent swaying using three cables at 120 degrees of separation. Suspended fixtures in continuous rows shall have internal wireway systems for end to end wiring and shall be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces. Aligning splines shall be used on extruded aluminum fixtures to assure hairline joints. Steel fixtures shall be supported to prevent "oil-canning" effects. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown. Maximum distance between suspension points shall be 10 feet or as recommended by the manufacturer, whichever is less.

Suspended fixtures installed in seismic areas shall have 45% swivel hangers and shall be located with no obstructions within the 45% range in all directions. The stem, canopy and fixture shall be capable of 45% swing.

3.15.3 Emergency Light Sets

Emergency light sets shall conform to UL 924 with the number of heads as indicated. Sets shall be permanently connected to the wiring system by conductors installed in short lengths of flexible conduit.

3.16 BATTERY CHARGERS

Battery chargers shall be installed in conformance with NFPA 70.

3.17 EQUIPMENT CONNECTIONS

Wiring not furnished and installed under other sections of the specifications for the connection of electrical equipment as indicated on the drawings shall be furnished and installed under this section of the specifications. Connections shall comply with the applicable requirements of paragraph WIRING METHODS. Flexible conduits 6 feet or less in length shall be provided to all electrical equipment subject to periodic removal,

vibration, or movement and for all motors. All motors shall be provided with separate grounding conductors. Liquid-tight conduits shall be used in damp or wet locations.

3.17.1 Motors and Motor Control

Motors, motor controls, and motor control centers shall be installed in accordance with NFPA 70, the manufacturer's recommendations, and as indicated. Wiring shall be extended to motors, motor controls, and motor control centers and terminated.

3.17.2 Installation of Government-Furnished Equipment

Contractor shall be responsible for installation and connection of all Government-furnished equipment. This includes installation and mounting, connection of power and control wiring, and all required interconnections. Government-furnished equipment shall include, but not be limited to the following:

a. Electrical generator.

b. Automatic transfer switch.

c. Pump motor controller.

d. Pump motor starters.

e. Pump motors.

f. Level indicators.

g. SCADA system.

3.18 CIRCUIT PROTECTIVE DEVICES

The Contractor shall calibrate, adjust, set and test each new adjustable circuit protective device to ensure that they will function properly prior to the initial energization of the new power system under actual operating conditions.

3.19 REPAIR OF EXISTING WORK

The work shall be carefully laid out in advance, and where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceiling, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Government.

3.20 FIELD TESTING

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 30 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspection recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed,

personnel involved, devices tested, serial number and name of test equipment, and test results. All field test reports will be signed and dated by the Contractor.

3.20.1 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.20.2 Ground-Resistance Tests

The resistance of the grounding grid shall be measured using the fall-of-potential method defined in IEEE Std 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

a. Single rod electrode - 25 ohms.

b. Grid electrode - 5 ohms.

3.20.3 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. The Contractor shall notify the Contracting Officer 96 hours before the site is ready for inspection.

3.20.4 Cable Tests

The Contractor shall be responsible for identifying all equipment and devices that could be damaged by application of the test voltage and ensuring that they have been properly disconnected prior to performing insulation resistance testing. An insulation resistance test shall be performed on all low and medium voltage cables after the cables are installed in their final configuration and prior to energization. The test voltage shall be 500 volts DC applied for one minute between each conductor and ground and between all possible combinations of conductors. The minimum value of resistance shall be:

R in megohms = (rated voltage in kV + 1) x 1000/(length of cable in feet)

Each cable failing this test shall be repaired or replaced. The repaired cable system shall then be retested until failures have been eliminated.

3.20.4.1 Low Voltage Cable Tests

a. Continuity test.

b. Insulation resistance test.

3.20.5 Motor Tests

a. Phase rotation test to ensure proper directions.

b. High potential test on each winding to ground.

c. Insulation resistance of each winding to ground.

3.20.6 Circuit Breaker Tests

The following field tests shall be performed on circuit breakers.

3.20.6.1 Circuit Breakers, Molded Case

a. Insulation resistance test phase-to-phase, all combinations.

b. Insulation resistance test phase-to-ground, each phase.

c. Closed breaker contact resistance test.

d. Manual operation of the breaker.

3.20.7 Protective Relays

Protective relays shall be visually and mechanically inspected, adjusted, tested, and calibrated in accordance with the manufacturer's published instructions. These tests shall include pick-up, timing, contact action, restraint, and other aspects necessary to insure proper calibration and operation. Relay settings shall be implemented in accordance with the coordination study. Relay contacts shall be manually or electrically operated to verify that the proper breakers and alarms initiate. Relaying current transformers shall be field tested in accordance with IEEE C57.13.

3.21 OPERATING TESTS

After the installation is completed, and at such time as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the specified requirements. An operating test report shall be submitted in accordance with paragraph FIELD TEST REPORTS.

3.22 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16528

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 SYSTEM DESCRIPTION
1.3.1 Lighting System
1.3.2 Design Requirements for Lighting
1.3.3 Electrical Requirements
1.3.4 Interface Between Lighting System and Power Distribution
1.3.5 Nameplates
1.3.6 Standard Products
1.3.7 Unusual Service Conditions
1.4 CORROSION PROTECTION
1.4.1 Aluminum Materials
1.4.2 Ferrous Metal Materials
1.4.2.1 Hardware
1.4.2.2 Equipment
1.4.3 Finishing

PART 2 PRODUCTS

2.1 STANDARD PRODUCT
2.2 BANNER ARMS
2.2.1 On Aluminum, Steel, Fiberglass, and Concrete Poles
2.3 CABLE
2.3.1 Insulated Cable
2.3.2 Bare Copper Conductors
2.4 CABLE SPLICES AND CONNECTORS
2.4.1 Twist-On Sealed Waterproof Connectors
2.4.2 Low Voltage Waterproof Mechanical Connector Kit
2.5 CONDUIT, DUCTS AND FITTINGS
2.5.1 Conduit, Rigid Steel
2.5.2 Conduit Coatings
2.5.3 Conduit Fittings and Outlets
2.5.3.1 Boxes, Metallic Outlets
2.5.3.2 Boxes, Nonmetallic, Outlet and Flush-Device Boxes and Covers
2.5.3.3 Boxes, Switch (Enclosed), Surface Mounted
2.5.3.4 Fittings for Conduit and Outlet Boxes
2.5.3.5 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing
2.5.4 Non-Metallic Duct
2.6 GROUND RODS
2.7 POLES
2.7.1 Decorative Street Light Pole for Single Decorative Luminaires
2.7.2 Decorative Street Light Pole for Single Residential Area Luminaire
2.7.3 Steel Poles
2.7.4 Anchor Bolts
2.8 POLE LINE HARDWARE

2.9 ELECTRICAL ENCLOSURES
2.9.1 Interior Enclosures
2.9.2 Exposed-to-Weather Enclosures
2.9.3 Corrosion Resistant Enclosures
2.9.4 Street Light Control Center
2.9.4.1 Cabinet Enclosure
2.9.4.2 Circuit Breakers
2.9.4.3 Lighting Contactors
2.9.4.4 Test Switches
2.9.4.5 Terminal Blocks
2.9.4.6 Electronic Time Switches
2.9.4.7 Photocell Controls
2.9.4.8 Electrical Equipment and Wiring
2.10 ILLUMINATION
2.10.1 General Lighting
2.10.1.1 Downtown Single Decorative Street Light Luminaire
2.10.1.2 Single Residential Area Street Light Luminaire
2.11 LAMPS AND BALLASTS, HIGH INTENSITY DISCHARGE (HID) SOURCES
2.11.1 High-Pressure Sodium
2.11.2 Mercury Vapor
2.11.3 Metal-Halide
2.12 LAMPS, FLUORESCENT
2.13 LUMINAIRE COMPONENTS
2.14 LIGHTING CONTROL EQUIPMENT
2.14.1 Photo-Control Devices
2.14.2 Timer Control Switches
2.14.3 Safety Switches
2.14.4 Magnetic Contactor
2.15 PHOTOMETRIC DISTRIBUTION CLASSIFICATION
2.16 LUMINAIRES, FLOODLIGHTING
2.16.1 HID and Incandescent
2.16.2 Fluorescent
2.17 FIXTURES
2.17.1 Accessories
2.17.2 Special Fixtures
2.17.3 In-Line Fuse

PART 3 EXECUTION

3.1 GENERAL
3.1.1 Current Site Conditions
3.1.2 Existing Equipment
3.2 ENCLOSURE PENETRATIONS
3.3 PREVENTION OF CORROSION
3.3.1 Aluminum
3.3.2 Steel Conduits
3.3.3 Cold Galvanizing
3.4 CABLE INSTALLATION
3.4.1 Splices
3.4.2 Direct Burial
3.4.2.1 Trenching
3.4.2.2 Boring
3.4.2.3 Requirements for Installation in Duct
3.4.2.4 Location of Cable Splices
3.4.2.5 Warning Tape
3.5 CONNECTIONS TO BUILDINGS
3.6 DUCT LINES
3.6.1 Requirements
3.6.2 Treatment

3.6.3 Nonencased Direct-Burial
3.6.4 Installation of Couplings
3.6.4.1 Plastic Duct
3.6.5 Concrete
3.6.6 Duct Line Markers
3.7 HANDHOLES
3.7.1 Construction
3.7.2 Appurtenances
3.7.3 Ground Rods
3.8 POLE INSTALLATION
3.8.1 Pole Brackets
3.8.2 Concrete Foundations
3.8.3 Rigid Conduit Ells
3.8.4 Aluminum and Steel Pole Installation
3.8.4.1 Cast-In-Place Foundations
3.9 LIGHTING
3.9.1 Lamps
3.9.2 Fixture Installation
3.9.2.1 Accessories
3.9.2.2 In-Line Fuses
3.9.2.3 Special Fixtures
3.10 LIGHTING CONTROL SYSTEM
3.10.1 Photo-Control
3.10.2 Time Control Switches
3.10.3 Magnetic Contactors
3.11 GROUNDING
3.11.1 Ground Rods
3.11.2 Items to be Grounded
3.11.3 Lighting Pole
3.12 TESTS
3.12.1 Operating Test
3.12.2 Ground Resistance Measurements

-- End of Section Table of Contents --

SECTION 16528

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LTS-3	(1994) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C78.1	(1991; C78.1a; R 1996) Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics
ANSI C78.40	(1992) Mercury Lamps
ANSI C78.1350	(1990) 400-Watt, 100-Volt, S51 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1351	(1989) 250-Watt, 100-Volt S50 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1352	(1990) 1000-Watt, 250-Volt, S52 Single-Ended High-Pressure Sodium Lamps
ANSI C78.1355	(1989) 150-Watt, 55-Volt S55 High-Pressure Sodium Lamps
ANSI C78.1375	(1996) 400-Watt, M59 Single-Ended Metal-Halide Lamps
ANSI C78.1376	(1996) 1000-Watt, M47 Single-Ended Metal-Halide Lamps
ANSI C80.1	(1995) Rigid Steel Conduit - Zinc Coated
ANSI C82.4	(1992) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
ANSI C119.1	(1986; R 1997) Sealed Insulated Underground Connector Systems Rated 600 Volts
ANSI C135.1	(1979) Galvanized Steel Bolts and Nuts for

	Overhead Line Construction
ANSI C135.14	(1979) Staples with Rolled or Slash Points for Overhead Line Construction
ANSI C136.2	(1996) Luminaires, Voltage Classification Roadway Lighting Equipment
ANSI C136.3	(1995) Roadway Lighting Equipment-Luminaire Attachments
ANSI C136.6	(1997) Roadway Lighting Equipment - Metal Heads and Reflector Assemblies - Mechanical and Optical Interchangeability
ANSI C136.9	(1990) Roadway Lighting - Socket Support Assemblies for Use in Metal Heads - Mechanical Interchangeability
ANSI C136.10	(1996) Roadway Lighting- Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
ANSI C136.11	(1995) Multiple Sockets for Roadway Lighting Equipment
ANSI C136.15	(1986) Roadway Lighting, High-Intensity-Discharge and Low-Pressure Sodium Lamps in Luminaires -

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(1998) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 575	(1996) Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A 576	(1990b; R 00) Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM B 2	(1994) Medium-Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA RP-8	(1983; R 1993) Roadway Lighting

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(1997) National Electrical Safety Code
IEEE C136.13	(1987; R 1997) Metal Brackets for Wood Poles
IEEE Std 81	(1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(1993) Industrial Control and Systems
NEMA ICS 2	(1993) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 6	(1993) Industrial Control and Systems, Enclosures
NEMA OS 1	(1996) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA OS 2	(1986; Errata Aug 1986; R 1991) Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA RN 1	(1989) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 6	(1990) PVC and ABS Plastic Utilities Duct for Underground Installation
NEMA TC 9	(1990) Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 6	(1997) Rigid Metal Conduit
UL 44	(1997; Rev Mar 1999) Rubber-Insulated Wires and Cables
UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 83	(1998; Rev thru Sep 99)

	Thermoplastic-Insulated Wires and Cables
UL 98	(1994; Rev thru Jun 1998) Enclosed and Dead-Front Switches
UL 467	(1993; Rev thru Apr 1999) Grounding and Bonding Equipment
UL 486A	(1997; Rev thru Dec 1998) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486B	(1997; Rev Jun 1997) Wire Connectors for Use with Aluminum Conductors
UL 493	(1995) Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
UL 514A	(1996; Rev Dec 1999) Metallic Outlet Boxes
UL 514B	(1997; Rev Oct 1998) Fittings for Cable and Conduit
UL 514C	(1996; R Sep 1998) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 651	(1995; Rev thru Oct 1998) Schedule 40 and 80 Rigid PVC Conduit
UL 651A	(1995; Rev thru Apr 1998) Type EB and A Rigid PVC Conduit and HDPE Conduit
UL 854	(1996; Rev Apr 1998) Service-Entrance Cables
UL 1029	(1994; Rev thru Dec 1997) High-Intensity-Discharge Lamp Ballasts
UL 1571	(1995; Rev thru Jun 1997) Incandescent Lighting Fixtures
UL 1572	(1995; Rev thru Jun 1997) High Intensity Discharge Lighting Fixtures

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Lighting System; G, ED
Detail Drawings; G, ED

Detail drawings for the complete system and for poles, lighting fixtures, banner arms, handholes, controllers, and streetlight control center.

As-Built Drawings;

Final as-built drawings shall be finished drawings on mylar or vellum and shall be delivered with the final test report.

SD-03 Product Data

Equipment and Materials;

Data published by the manufacturer of each item on the list of equipment and material, to permit verification that the item proposed is of the correct size, properly rated or applied, or is otherwise suitable for the application and fully conforms to the requirements specified.

SD-06 Test Reports

Operating Test; G, ED

Test procedures and reports for the Operating Test. After receipt by the Contractor of written approval of the test procedures, the Contractor shall schedule the tests. The final test procedures report shall be delivered after completion of the tests.

Ground Resistance Measurements;

The measured resistance to ground of each separate grounding installation, indicating the location of the rods, the resistance of the soil in ohms per millimeter and the soil conditions at the time the measurements were made. The information shall be in writing.

SD-10 Operation and Maintenance Data

Lighting System;

A draft copy of the operation and maintenance manuals, prior to beginning the tests for use during site testing. Final copies of the manuals as specified bound in hardback, loose-leaf binders, within 30 days after completing the field test. The draft copy used during site testing shall be updated with any changes required, prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of each subcontractor installing equipment and systems, and nearest service representatives for each item of equipment for each system. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the field test shall include modifications made during installation checkout and acceptance.

1.3 SYSTEM DESCRIPTION

1.3.1 Lighting System

The lighting system shall be configured as specified and shown. The system

shall include all fixtures, hardware, poles, cables, connectors, adapters and appurtenances needed to provide a fully functional lighting system.

1.3.2 Design Requirements for Lighting

The lighting system shall be configured as specified and shown. Equipment shall conform to NFPA 70 and IEEE C2. The lighting configuration shall provide sufficient light for each area. The system shall include all fixtures, hardware, poles, cables, connectors, adapters, and appurtenances needed to provide a fully functional lighting system.

1.3.3 Electrical Requirements

The equipment shall operate from a voltage source as shown, plus or minus 10 percent, and 60 Hz, plus or minus 2 percent.

1.3.4 Interface Between Lighting System and Power Distribution

Conductors shall be as indicated.

1.3.5 Nameplates

Each major component of equipment shall have a nonferrous metal or engraved plastic nameplate which shall show, as a minimum, the manufacturer's name and address, the catalog or style number, the electrical rating in volts, and the capacity in amperes or watts.

1.3.6 Standard Products

Materials and equipment shall be standard products of manufacturer regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

1.3.7 Unusual Service Conditions

Equipment and materials furnished under this section shall be suitable for the following unusual service conditions: ambient temperature -40 degrees F.

1.4 CORROSION PROTECTION

1.4.1 Aluminum Materials

Aluminum shall not be used in contact with earth or concrete. Where aluminum conductors are connected to dissimilar metal, fittings conforming to UL 486B shall be used.

1.4.2 Ferrous Metal Materials

1.4.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

1.4.2.2 Equipment

Equipment and component items, including but not limited to metal poles and ferrous metal luminaires not hot-dip galvanized or porcelain enamel

finished, shall be provided with corrosion-resistant finishes which shall withstand 480 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The scribed test mark and test evaluation shall have a rating of not less than 7 in accordance with TABLE 1, (procedure A) of ASTM D 1654. Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

1.4.3 Finishing

Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory, shall be as specified in Section 09900 PAINTING, GENERAL.

PART 2 PRODUCTS

2.1 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.2 BANNER ARMS

2.2.1 On Aluminum, Steel, Fiberglass, and Concrete Poles

Poles shall be provided with banner arms of the style and of the length indicated on drawings. Banner arms shall conform to the design of the pole provided. The banner arms shall be capable of supporting the equipment to be mounted on it with the maximum wind and ice loading encountered at the site. Strength of banner arms shall be in accordance with IEEE C136.13. Steel banner arms shall be galvanized. Wood banner arms shall not be used.

2.3 CABLE

The Contractor shall provide all wire and cable not indicated as government furnished equipment. Wire and cable components shall be able to withstand the jobsite environment for a minimum of 20 years.

2.3.1 Insulated Cable

Cable shall be type USE conforming to UL 854, with copper conductors and type RHW or XHHW insulation conforming to UL 44, and shall include green ground conductor. Cable shall be Type UF-B conforming to UL 83 and UL 493, with copper conductors. Cable shall be provided with insulation of a thickness not less than that given in column A B of TABLE 15.1 of UL 854. Cable shall be rated 600 volts. Parts of the cable system such as splices and terminations shall be rated not less than 600 volts. The size and number of conductors and the number of cables shall be as indicated. Conductors larger than No. 8 AWG shall be stranded.

2.3.2 Bare Copper Conductors

Medium-hard-drawn copper conductors shall conform to ASTM B 2 and ASTM B 8.

2.4 CABLE SPLICES AND CONNECTORS

Cable splices and connectors shall conform to UL 486A. Underground splices and connectors shall also conform to the requirements of ANSI C119.1.

2.4.1 Twist-On Sealed Waterproof Connectors

Provide twist-on sealed waterproof connectors where indicated on the drawing schedule. Connectos shall meet NEC Article 100-11 for use in all NEMA enclosures and shall be UL 50 tested and raintight/watertight. Connectors shall come prefilled with custom sealant which shall act to lock out moisture and air. Connectors shall have an infinite shelf life and include color coding to indicate acceptable wire sizes. Connectors shall have a voltage rating of 600 volts ac, a temperature rating of 221 degrees F, a sealant temperature rating range of -45 degrees F to 400 degrees F, and suitable for copper-to-copper wire combinations. Connectors shall be taped with electrical tape.

2.4.2 Low Voltage Waterproof Mechanical Connector Kit

Provide mechanical bolted connectors where indicated on the drawing schedule. Connectors shall be comprised of a connector and an outer closure, prefilled with a waterproofing gel material. Connectors shall accept up to 4 properly sized conductors per connector. Connectors shall be rated for 600 volts ac and suitable for copper-to-copper and copper-to-aluminum conductor combinations. Outer hinged closure shall contain a prefilled waterproofing get and 2 locking snaps to secure closure when fully closed.

2.5 CONDUIT, DUCTS AND FITTINGS

2.5.1 Conduit, Rigid Steel

Rigid steel conduit shall conform to ANSI C80.1 and UL 6.

2.5.2 Conduit Coatings

Underground metallic conduit and fittings shall be coated with a plastic resin system conforming to NEMA RN 1, Type 40. Epoxy systems may also be used.

2.5.3 Conduit Fittings and Outlets

2.5.3.1 Boxes, Metallic Outlets

NEMA OS 1 and UL 514A.

2.5.3.2 Boxes, Nonmetallic, Outlet and Flush-Device Boxes and Covers

NEMA OS 2 and UL 514C.

2.5.3.3 Boxes, Switch (Enclosed), Surface Mounted

UL 98.

2.5.3.4 Fittings for Conduit and Outlet Boxes

UL 514B.

2.5.3.5 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing

UL 514B.

2.5.4 Non-Metallic Duct

Non-metallic duct lines and fittings utilized for underground installation shall be suitable for the application. Duct shall be thick-wall, single, round-bore type. Material of one type shall be used. Acrylonitrile-butadiene-styrene (ABS) duct shall conform to NEMA TC 6 and NEMA TC 9. High-density conduit shall conform to UL 651A. Schedule 40 polyvinyl chloride (PVC) shall conform to UL 651. Plastic utility duct and fittings manufactured without a UL label or listing shall be provided with a certification as follows: "The materials are suitable for use with 167 degree F wiring. No reduction of properties in excess of that specified for materials with a UL label or listing will be experienced if samples of the finished product are operated continuously under the normal conditions that produce the highest temperature in the duct."

2.6 GROUND RODS

Ground rods shall be of copper clad steel conforming to UL 467 not less than 5/8 inch in diameter by 8 feet in length of the sectional type driven full length into earth.

2.7 POLES

Metal and concrete poles shall be the pole manufacturer's standard design for supporting the number of fixtures indicated. Poles shall be designed for a wind velocity of 80 mph at the base of the pole, for a wind gust factor of 1.3, and for the height and drag factors recommended by AASHTO LTS-3. The effective projected area of luminaires and other pole-mounted devices shall be taken into account in pole design. Poles shall have grounding provisions. The type of pole shaft material provided shall not be mixed on any project. Grounding connection shall be provided near the bottom of each metal pole and at each concrete pole anchor base. Scratched, stained, chipped, or dented poles shall not be installed.

2.7.1 Decorative Street Light Pole for Single Decorative Luminaires

The lighting pole shall consist of a decorative fluted base, a 5 inch diameter fluted shaft with a tenon for luminaire mounting. Accessories include a duplex GFCI receptacle with weatherproof cover for festoon lighting and 2 banner arms with breakaway couplings designed to fail at 85 mph wind speeds. The pole base material shall be heavy-wall cast aluminum (356.1 alloy) formed true to pattern. The shaft material shall be fluted aluminum extrusion (6061-T6). Banner arms shall be aluminum pipe construction. All hardware shall be tamper resistant, stainless steel. The post shall be 16 feet in height with a 44 inch tall x 16 inch diameter base. The fluted shaft shall have a 5 inch outside diameter and a 0.228 inch nominal wall thickness, with a 3 inch diameter x 2-5/8 inch tall tenon for luminaire mounting. Banner arms shall be 1 inch pipe (1-5/16 inch diameter) and measure 24 inches in length. Poles shall be provided with four 3/4 inch diameter x 24 inch L-type anchor bolts. A door shall be located in the base for anchorage and wiring access. A grounding screw shall be provided inside the base, opposite the door, for easy access. The pole shall be finish with a black powder coat finish. The pole shall match existing downtown street light poles for make and model.

Existing downtown street light pole is Holophane Charleson Series Cast Aluminum, Catalog #CH16F5/16-CA/BK-RS/GFI/WPC-BBA242/1/BO/CA/BK-NP28-CA/BK. Contact Holophane Representative, John Wethern, Holophane 3403 South 12th Street, Moorhead, MN 56560, Telephone 218-291-9499 to confirm catalog # of existing pole.

2.7.2 Decorative Street Light Pole for Single Residential Area Luminaire

The lighting pole shall consist of a decorative fluted base, a 5 inch diameter fluted shaft with a tenon for luminaire mounting. The pole base material shall be heavy-wall cast aluminum (356.1 alloy) formed true to pattern. The shaft material shall be fluted aluminum extrusion (6061-T6). All hardware shall be tamper resistant, stainless steel. The post shall be 14 feet in height with a 44 inch tall x 16 inch diameter base. The fluted shaft shall have a 5 inch outside diameter and a 0.228 inch nominal wall thickness, with a 3 inch diameter x 2-5/8 inch tall tenon for luminaire mounting. Poles shall be provided with four 3/4 inch diameter x 24 inch L-type anchor bolts. A door shall be located in the base for anchorage and wiring access. A grounding screw shall be provided inside the base, opposite the door, for easy access. The pole shall be finish with a black powder coat finish. The pole shall match existing downtown street light poles for make and model with the exception they shall have no banner arms or festoon outlet receptacle.

Existing downtown street light pole without banner arms and gestoon outlet receptacle is Holophane Charleson Series Cast Aluminum, Catalog #CH14F5/16-CA/BK. Contact Holophane Representative, John Wethern, Holophane 3403 South 12th Street, Moorhead, MN 56560, Telephone 218-291-9499 to confirm catalog # of existing pole without banner arms and festoon outlet receptacle.

2.7.3 Steel Poles

Steel poles shall be hot-dip galvanized in accordance with ASTM A 123/A 123M and shall not be painted. Poles shall have tapered tubular members, either round in cross-section or polygonal. Pole shafts shall be one piece. Poles shall be welded construction with no bolts, rivets, or other means of fastening except as specifically approved. Pole markings shall be approximately 3 to 4 feet above grade and shall include manufacturer, year of manufacture, top and bottom diameters, length, and a loading tree. Attachment requirements shall be provided as indicated, including grounding provisions. Climbing facilities are not required. Bases shall be of the anchor bolt-mounted type.

2.7.4 Anchor Bolts

Anchor bolts shall be the pole manufacturer's standard, but not less than necessary to meet the pole wind and ice loading, herein and other specified design requirements.

2.8 POLE LINE HARDWARE

Zinc coated hardware shall conform to ANSI C135.1 and ANSI C135.14, and steel hardware material shall conform to ASTM A 575 and ASTM A 576. Hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M.

2.9 ELECTRICAL ENCLOSURES

The Contractor shall provide metallic enclosures as needed to house the lighting equipment. Enclosures shall conform to NEMA ICS 6 and NEMA 250.

Enclosures shall be provided with lockable or padlock handles. Keys for lockable enclosures shall be delivered to the Contracting Officer. The enclosures shall be as specified or as shown on the drawings.

2.9.1 Interior Enclosures

Enclosures to house lighting equipment in an interior environment shall meet the requirements of a NEMA 12 enclosure as defined in NEMA 250.

2.9.2 Exposed-to-Weather Enclosures

Enclosures to house lighting equipment in an outdoor environment shall meet the requirements of a NEMA 4 enclosure as defined in NEMA 250.

2.9.3 Corrosion Resistant Enclosures

Enclosures to house lighting equipment in a corrosive environment shall meet the requirements of a NEMA 4X enclosure as defined in NEMA 250.

2.9.4 Street Light Control Center

Provide lighting service cabinet(s) for the purpose of distributing electrical power, providing overcurrent protection and providing a means to disconnect and control power to all or part of lighting system.

2.9.4.1 Cabinet Enclosure

Lighting service cabinet enclosure shall be constructed of a minimum of 3/32 inch thick steel and shall be deadfront type with a hinged door for access to the contactor(s). The cabinet shall have a weathertight door capable of being securely latched at 3 points and released by an easy turning handle. The handle and three point locking mechanism shall lock with a standard Owner-furnished padlock. Hinges shall be fabricated from stainless steel. Hinges may be welded on or fastened with stainless steel tamperproof bolts.

All surfaces of the cabinet shall be thoroughly cleaned and painted with at least one coat of rust resistant primer and two coats of high grade oil resistant enamel. Cabinet exterior finish color shall be industrial green and interior finish color shall be gloss white including interior deadfront hinged panel.

2.9.4.2 Circuit Breakers

Circuit breakers shall be thermo-magnetic type. Main circuit breakers shall be located on the line side of the lighting contactor(s). The lighting contactor(s) shall be located on the line side of the branch circuit breakers. Each branch circuit breaker shall be bolted onto a copper bus and shall be labeled indicating the lighting load(s) that it serves. Labels shall be pressure sensitive vinyl embossed label-maker tape 3/8 inch high with 5/32 inch high letters. Spacers shall cover empty circuit breaker spaces for circuits that are not used.

2.9.4.3 Lighting Contactors

Lighting contactor(s) shall be the amperage rating and number of poles as required, normally open, electrically held, open type, and shall be rated for tungsten filament and ballast lighting loads. The control coil shall be actuated by photocell or timeclock or both and shall be protected by a

properly sized circuit breaker on the line side of the photocell/timeclock and test switch.

2.9.4.4 Test Switches

Test switch(es) shall be a heavy duty, 2-position, rotary switch. One switch position shall be labeled "AUTOMATIC" and the other switch position shall be labeled "TEST". In the "AUTOMATIC" position, the test switch(es) shall connect the coil of the lighting contactor to the AC+ (switched) from the photocell or timeclock control, providing control of the lighting circuit. In the "TEST" position, the test switch(es) shall connect the coil of the lighting contactor to the AC+ (unswitched) from the photocell or timeclock control, providing power to the circuit regardless of the state of the lighting control(s).

2.9.4.5 Terminal Blocks

Provide terminal blocks in cabinets for termination and connection of power and control wiring. Terminal blocks shall be strap screw type rated 600 volts and have white marking strips.

2.9.4.6 Electronic Time Switches

Provide 24-hour programmable electronic time switch(es) where indicated on the drawings. Time switch(es) shall include a 1/4 inch high LCD display which shall show the current time of day with A.M. or P.M. indication and "ON" or "OFF" during programming or the current status of the load control contacts in the automatic mode. Switch(es) shall include a minimum of 8 points or events (4 "ON" / 4 "OFF") which can be preset to automatically repeat on a daily basis. It shall be possible to override the programming at any time by placing a selector switch into a manual position.

Switch(es) shall be equipped with large teeter type terminal screws and saddle clamps to securely fasten a range of No. 18 AWG to No. 10 AWG wire for both input power and output switching.

Switch(es) shall be furnished with a SPST contact configuration and shall be sized for loads up to 30 amps at 120 or 240 volts ac. Clock voltage shall be 120 VAC, 60 Hertz. Maximum switch power consumption shall be approximately 3 watts.

Switch(es) shall be furnished with factory-installed industrial-grade standard alkaline batteries to provide automatic carryover for a minimum of 3 years.

Switch(es) shall be housed in a grey finished lockable steel enclosure to protect components from vandalism and unauthorized tampering. Switch shall be capable of operating in a temperature range of -40 degrees F to 122 degrees F and a humidity range of 0 percent to 95 percent noncondensing.

2.9.4.7 Photocell Controls

Photocell control for control of exterior lighting circuits shall be fixed mounting thermal type unit with inherent delay action to prevent false switching due to momentary flashes of light. Control shall be weatherproof, mounted on stainless steel cover plate, and mounted on the side of the control cabinet. The photocell shall be rated at 1000 watts (tungsten), 120 volts ac.

2.9.4.8 Electrical Equipment and Wiring

Lighting control cabinet(s) components shall be arranged and wired as indicated on the Drawings. The lighting control cabinet shall be a pad-mounted cabinet properly sized to accommodate the components required. The cabinet shall have provisions for being secured to a fiberglass ground slevee by means of 4 properly sized bolts. The cabinet shall be provided with one 2-pole main circuit breaker (service entrance rated); with the number and size lighting contactors noted on the drawings; with the number and size single-pole branch circuit breakers for street lighting and festoon circuits noted on the drawings; one 15 ampere single-pole branch circuit breaker for the control circuit; 2 heavy-duty, 2-position rotary test switches; one 24-hour timeclock with adjustable settings, and 1 photocell control mounted in the side of the cabinet. Properly sized termination lugs shall be provided for 1 incoming single-phase 120/240 volts ac 3-wire circuit (No. 4/0 AWG Str. CU), the number and size of outgoing single-phase 120 volts ac 2-wire street light circuits (No. 2 AWG Str. CU) and outgoing single-phase 120 volts ac 2-wire festoon circuits (No. 2 AWG Str. CU) as noted on the drawings.

Light control cabinet shall be furnished with 31 inches wide x 19 inches long x 18 inches high, preformed fiberglass ground sleeve. Ground sleeve shall have an an appropriately sized opening in the top to allow cable entrance to the cabinet. The specified ground sleeve width and length dimensions are to be considered minimums and the ground sleeve provided shall fit the design of the cabinet.

All cabinet neutral/ground bonding bars and bus bars shall be copper. All connectors shall be UL listed for copper conductors. All wiring inside the cabinet shall be of sufficient length to allow for contraction.

2.10 ILLUMINATION

2.10.1 General Lighting

Luminaires, ballasts, lamps, and control devices required for general area, parking lot, and streetlighting , including floodlighting shall be in accordance with the drawings.

2.10.1.1 Downtown Single Decorative Street Light Luminaire

Luminaire shall be one-piece, heat resistant, borosilicate glass prismatic refractor, acorn style with cast aluminum decorative finial, fluted cast aluminum tenon fitting, and double fixture with cast aluminum bracket style as shown on the drawings and shall match the existing luminires in the downtown area. Lamps shall be 150 watt HPS with mogul base. Ballast shall be HPF CWA Type, 120 volt. Fixture shall be Type III light distribution.

Existing downtown street light luminaires and crossarms are Holophane Granville Series luminaire fixture, Catalog #GVU15AHPXX-B3NFG. Contact Holophane Representative, John Wethern, Holophane 3403 South 12th Street, Moorhead, MN 56560, Telephone 218-291-9499 to confirm catalog # of existing fixtures and crossarms.

2.10.1.2 Single Residential Area Street Light Luminaire

Luminaire shall be an 18 foot high Century English colonial lantern style. The optical assembly shall be enclosed by 4 tempered glass panels mechanically held to a cast aluminum window frame housing topped with a

decorative gasketed cover, hinged and latched to the window frame housing. The optical assembly shall be a molded thermal resistant borosilicate glass refractor mechanically attached to the socket assembly. Light distribution shall be Type V. The ballast shall be a high power factor autotransformer type, 120 volt. Lamp shall be 150 Watt HPS. The cast aluminum fitter assembly shall be designed to mount on 3 inches high by 3 inches diameter tenon secured by 8 stainless steel allen head set screws. The fixture shall include decorative ladder rests. Luminaire shall be finished with a polyester powder paint in a black color.

2.11 LAMPS AND BALLASTS, HIGH INTENSITY DISCHARGE (HID) SOURCES

2.11.1 High-Pressure Sodium

Lamps shall conform to ANSI C78.1350 or ANSI C78.1351 or ANSI C78.1352 or ANSI C78.1355. Ballasts shall conform to ANSI C82.4, or UL 1029. High-pressure sodium lamps shall be clear.

2.11.2 Mercury Vapor

Lamps shall conform to ANSI C78.40. Ballasts shall conform to ANSI C82.4.

2.11.3 Metal-Halide

Lamps shall be made by a manufacturer with not less than 5 years experience in making metal-halide lamps. Metal-halide lamps shall conform to ANSI C78.1375 or ANSI C78.1376. Ballasts shall conform to ANSI C82.4 or UL 1029.

2.12 LAMPS, FLUORESCENT

Fluorescent lamps shall have standard cool-white color characteristics and shall not require starter switches. The lamps shall be of the rapid-start type.

2.13 LUMINAIRE COMPONENTS

Luminaire components shall conform to the following: attachments, ANSI C136.3; voltage classification, ANSI C136.2; field identification marking, ANSI C136.15; interchangeability, ANSI C136.6 and ANSI C136.9; and sockets, ANSI C136.11.

2.14 LIGHTING CONTROL EQUIPMENT

2.14.1 Photo-Control Devices

Photo-control devices shall conform to ANSI C136.10. Each photo-control element shall be a replaceable, weatherproof, plug-in or twist-lock assembly adjustable operation range of approximately 0.5 to 5.0 foot-candles. Luminaires shall be equipped with weatherproof plug-in or twist-lock receptacle to receive the photo-control element.

2.14.2 Timer Control Switches

Astronomic dial type arranged to turn "ON" at sunset, and turn "OFF" at a pre-determined time between 2030 hours hours and 2400 hours, automatically changing the settings each day in accordance with seasonal changes of sunset and sunrise shall be provided. A switch rated 240 volts, having automatically wound spring mechanism to maintain accurate time for a minimum of 7 hours following a power failure shall be provided. A time

switch with a manual on-off bypass switch shall be provided. Housing for the time switch shall be a surface mounted, NEMA 1 (indoor) enclosure conforming to NEMA ICS 6.

2.14.3 Safety Switches

Switches shall be the heavy-duty type with NEMA ICS 6 Type 1 enclosures and shall be suitable for operation on a 240 volt, 60 Hz, single-phase system. Switch construction shall be such that a screwdriver will be required to open the switch door when the switch is on. Blades shall be visible with door open and shall be of the quick-make, quick-break type. Terminal lugs shall be coordinated with the wire size. Switches shall conform to UL 98.

2.14.4 Magnetic Contactor

Magnetic contactors shall be mechanically held, electrically operated, and shall conform to NEMA ICS 1 and NEMA ICS 2. The contactor shall be suitable for 240 volts, single-phase, 60 Hz. Coil voltage shall be 120 volts. Maximum continuous ampere rating and number of poles shall be as indicated on drawings. Enclosures for contactors mounted indoors shall be NEMA ICS 6, Type 1. Each contactor shall be provided with a spare, normally open auxiliary contact. Terminal lugs shall be coordinated with the wire size.

2.15 PHOTOMETRIC DISTRIBUTION CLASSIFICATION

Photometrics shall conform to IESNA RP-8.

2.16 LUMINAIRES, FLOODLIGHTING

2.16.1 HID and Incandescent

HID lighting fixtures shall conform to UL 1572. Incandescent lighting fixtures shall conform to UL 1571.

2.16.2 Fluorescent

Fluorescent lamps shall conform to ANSI C78.1.

2.17 FIXTURES

Standard fixtures shall be as detailed on drawings. Illustrations shown on these sheets or on the drawings are indicative of the general type desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar design, equivalent light distribution and brightness characteristics, equal finish and quality will be acceptable as approved. However, fixtures so noted to match existing must match exact make, model, and manufacturer in order to provide for interchangable parts and materials for maintenance purposes, inventory control, and uniformity in application.

2.17.1 Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.

2.17.2 Special Fixtures

The types of special fixtures are designated by letters and numbers. For

example, SP-1 denotes special Type 1.

2.17.3 In-Line Fuse

An in-line fuse shall be provided for each fixture, and shall consist of a fuse and a UL approved waterproof breakaway fuse holder rated at 30 amperes, 600 volts, with insulated boots. Fuse rating shall be 600 volts.

Fuseholders shall be single-pole, in-line, watertight breakaway type designed to be attached to solid or stranded copper or aluminum wire. Fuseholders shall accommodate 1-1/2 inches x 13/32 inch midget and Class CC fuses. Fuseholders shall incorporate a built-in breakaway feature which shall isolate the load should the connecting wire come under tension. Fuseholders shall use internal O-rings to provide a water-resistant compartment for the fuse. Fuseholders shall have a 600 volt ac; 30 ampere minimum rating, be UL-listed and meet National Electric Code requirements for branch circuit protection.

Provide fuses of the type, class, and rating as stated below for the type of lamp specified or indicated on the drawing schedule. Fuses shall be manufacturer's premium grade.

Lamp Wattage	Fuse Size
150	6 ampere
250	8 ampere
400	8 ampere

Provide 15 ampere fuese for all festoon circuit fuseholders.

Fuses for lighting loads shall be fast-acting, nondelay, current limiting type fuses sized as required for the fuseholders being supplied. Fuses shall be rated for 600 volts ac or less and shall have an interrupting rating of 100,000 amperes rms symmetrical.

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall install all system components, including government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, IEEE C2, and contract documents, and shall furnish necessary hardware, fixtures, cables, wire, connectors, interconnections, services, and adjustments required for a complete and operable system.

3.1.1 Current Site Conditions

The Contractor shall verify that site conditions are in agreement with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Government. The Contractor shall not take any corrective action without written permission from the Government.

3.1.2 Existing Equipment

The Contractor shall connect to and utilize existing lighting equipment and devices as shown. Lighting equipment that is usable in their original configuration without modification may be reused with Government approval.

The Contractor shall perform a field survey, including testing and inspection of existing lighting equipment and control lines intended to be incorporated into the lighting system, and furnish a report to the Government. For those items considered nonfunctioning, specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency shall be provided with the report. As part of the report, the Contractor shall include the scheduled need date for connection to all existing equipment. The Contractor shall make written requests and obtain approval prior to disconnecting any control lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving Government approval of these requests. If any device fails after the Contractor has commenced work on that device, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment. The Government is responsible for maintenance and repair of Government equipment. The Contractor shall be held responsible for repair costs due to Contractor negligence or abuse of Government equipment.

3.2 ENCLOSURE PENETRATIONS

Enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer, and in such a manner that the cable is not damaged.

3.3 PREVENTION OF CORROSION

3.3.1 Aluminum

Aluminum shall not be used in contact with earth or concrete, and where connected to dissimilar metal, shall be protected by approved fittings and treatment.

3.3.2 Steel Conduits

Steel conduits shall not be installed within concrete slabs-on-grade. Steel conduits installed underground or under slabs-on-grade, or penetrating slabs-on-grade, shall be field wrapped with 0.010 inch thick pipe-wrapping plastic tape applied with a 50 percent overlap, or shall have a factory-applied plastic resin, epoxy coating. Zinc coating may be omitted from steel conduit which has a factory-applied epoxy coating.

3.3.3 Cold Galvanizing

Field welds and/or brazing on factory galvanized boxes, enclosures, conduits, etc. shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

3.4 CABLE INSTALLATION

Cable and all parts of the cable system such as splices and terminations shall be rated not less than 600 volts. The size and number of conductors and the number of cables shall be as indicated. Conductors larger than No. 8 AWG shall be stranded. Each circuit shall be identified by means of fiber or nonferrous metal tags, or approved equal, in each handhole, and at each terminal.

3.4.1 Splices

Splices below grade shall be made with nonpressure-filled resin systems using transparent, interlocking, self-venting, longitudinally split plastic molds. Splices above grade shall be made with sealed insulated pressure connectors and shall provide insulation and jacket equal to that of the cable. In order to prevent moisture from entering the splice, jackets shall be cut back to expose the required length of insulation between the jacket and the tapered end of the insulation.

3.4.2 Direct Burial

Minimum cover from top of cable to finished grade shall be 30 inches for direct buried cable.

3.4.2.1 Trenching

Trenches shall be excavated to the depths required to provide the minimum cable cover. The bottom of the trench shall be smooth and free of stones and sharp objects. Where the bottom of the trench consists of material other than sand or earth, an additional 3 inch layer shall be removed and replaced by a 3 inch layer of sand or stone-free earth compacted to the approximate density of the surrounding firm soil. The cables shall be unreeled in place along the side of or in the trench and carefully placed on the sand or earth bottom. Pulling cables into a direct-burial trench from a fixed reel position will not be permitted. Where cables cross, a separation of at least 3 inches shall be provided, unless the cables are protected by nonmetallic conduit sleeves at the crossing. The radius of bends in cables shall be not less than 12 times the diameter of the cable. Cables shall not be left under longitudinal tension. The first layer of backfill shall be 6 inches thick and shall consist of sand or stone-free earth. A 5 mil, bright red colored plastic tape not less than 3 inchesin width and suitably inscribed at not more than 10 feet on centers, or other approved dig-in warning indication, shall be placed approximately 12 inches below finished grade levels of trenches. Selected backfill of sand or stone-free earth shall be provided to a minimum depth of 3 inches above cables.

3.4.2.2 Boring

All boring depths shall match connecting trench or plowing depths as measured from the finished grade to the top surface of the cable. The routing shall be as indicated on the drawings, unless conditions encountered are such that changes are necessary to accomplish the work. If obstructions or difficulties in boring are encountered, the Contractor shall determine the nature and extent of the difficulty and the Contracting Officer will determine if rerouting or other changes are necessary. Boring hole dimensions specified are minimum and may be increased as required to complete the work.

Where bores require conduit, the boring excavation shall not exceed the outside diameter of the pipe. Furnish and install conduit of the type and size as specified or as indicated on the drawings.

Boring pits shall be as required for the number of and dimensional size of the bore. Bore pits shall be braced and protected as necessary to provide for a safe working environment. Construction shall be arranged so that bore pits will be left open for the shortest practicable time to avoid

creating a hazard to the public and to minimize the likelihood of collapse due to other construction activity, rain, accumulation of water in the pit, etc.

3.4.2.3 Requirements for Installation in Duct

Where indicated on drawing, cable shall be installed in duct lines. Ground and neutral conductors shall be installed in duct with the associated phase conductors. The segments of direct-burial cable that cross under new railroad tracks, roads, or paving exceeding 5 feet in width, shall be installed in plastic, or rubber duct encased in concrete in accordance with paragraph DUCT LINES. Pulling of cable into conduit from a fixed reel position will be permitted. At interfaces with direct-burial cable, the direct-burial cable shall be centered in the entrance to the duct, using an approved waterproof, nonhardening mastic compound to facilitate the centering.

3.4.2.4 Location of Cable Splices

Splices in direct-burial cable will not be permitted in runs of 500 feet or less or at intervals of less than 500 feet in longer runs except as required for taps. Where cable splices in shorter intervals are required to avoid obstructions or damage to the cable, the location shall be as approved. Cable splices shall be installed in cable boxes or concrete handholes.

3.4.2.5 Warning Tape

Direct burial cable shall be placed below a plastic warning tape buried in the same trench or slot. A 5 mil bright red colored plastic tape, not less than 3 inches in width and suitably inscribed at not more than 10 feet on centers with a continuous metallic backing and a corrosion-resistant 1 mil metallic foil core to permit easy location of the buried cable, shall be placed approximately 12 inches below finished grade.

3.5 CONNECTIONS TO BUILDINGS

Cables shall be extended into the various buildings as indicated and shall be properly connected to the indicated equipment. Empty conduits to the indicated equipment from a point 5 feet outside the building wall and 2 feet below finished grade are specified in Section 16415 ELECTRICAL WORK, INTERIOR. After installation of cables, conduits shall be sealed to prevent moisture or gases from entering the building.

3.6 DUCT LINES

3.6.1 Requirements

Numbers and size of ducts shall be as indicated. Duct lines shall be laid with a minimum slope of 4 inches per 100 feet. Depending on the contour of the finished grade, the high point may be at a terminal, a manhole, a handhole, or between manholes or handholes. Short radius manufactured 90 degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius shall be 18 inches for ducts of less than 3 inches in diameter, and 36 inches for duct 3 inches or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the

maximum curve used shall be 30 degrees and manufactured bends shall be used. Ducts shall be provided with end bells when duct lines terminate.

3.6.2 Treatment

Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and shall match factory tapers. A coupling recommended by the duct manufacturer shall be used when an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

3.6.3 Nonencased Direct-Burial

Top of duct lines shall be not less than 30 inches below finished grade and shall be installed with a minimum of 3 inches of earth around each duct, except that between adjacent electric power and communication ducts, 12 inches of earth is required. Bottom of trenches shall be graded toward manholes or handholes and shall be smooth and free of stones, soft spots, and sharp objects. Where bottoms of trenches comprise materials other than sand, a 3 inch layer of sand shall be laid first and compacted to approximate densities of surrounding firm soil before installing ducts. Joints in adjacent tiers of duct shall be vertically staggered at least 6 inches. The first 6 inch layer of backfill cover shall be sand compacted as previously specified. The rest of the excavation shall be backfilled and compacted in 3 to 6 inch layers. Duct banks may be held in alignment with earth. However, high tiered banks shall use a wooden frame or equivalent form to hold ducts in alignment prior to backfilling.

3.6.4 Installation of Couplings

Joints in each type of duct shall be made up in accordance with the manufacturer's recommendation for the particular type of duct and coupling selected and as approved.

3.6.4.1 Plastic Duct

Duct joints shall be made by brushing a plastic solvent on insides of plastic coupling fittings and on outsides of duct ends. Each duct and fitting shall then be slipped together with a quick 1/4 turn to set the joint tightly.

3.6.5 Concrete

Concrete work shall be as specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.6.6 Duct Line Markers

A 5 mil red colored plastic tape, not less than 3 inches in width and suitably inscribed at not more than 10 feet on centers with a continuous metallic backing and a corrosion-resistant 1 mil metallic foil core to permit easy location of the duct line, shall be placed approximately 12 inches below finished grade levels of buried lines.

3.7 HANDHOLES

The exact locations shall be determined after carefully considering the locations of other utilities, grading, and paving. Exact locations shall be approved before construction is started.

3.7.1 Construction

Handholes shall be constructed as indicated on drawings, including appurtenances. Top, walls, and bottom shall consist of reinforced concrete. Walls and bottom shall be of monolithic construction. Concrete shall be 3000 psi at 28 days. Precast concrete handholes having the same strength and inside dimensions as cast-in-place concrete handholes may be used. In paved areas, the top of entrance covers shall be flush with the finished surface of the paving. In unpaved areas, the top of entrance covers shall be approximately 1/2 inch above the finished grade. Where finished grades are in cut areas, unmortared brick shall be installed between the top of handhole and entrance frame to temporarily elevate the entrance cover to existing grade level. Where duct lines enter walls, the sections of duct may be cast in the concrete or may enter the wall through a suitable opening. The openings around entering duct lines shall be caulked tight with lead wool or other approved material.

3.7.2 Appurtenances

The following appurtenances shall be provided for each handhole.

3.7.3 Ground Rods

In each handhole, at a convenient point close to the wall, a ground rod conforming to paragraph GROUNDING shall be driven into the earth before the floor is poured; approximately 4 inches of the ground rod shall extend above the floor after pouring. When precast concrete units are used, the top of the ground rod may be below the floor; a No. 1/0 AWG copper ground conductor shall be brought inside through a watertight sleeve in the wall.

3.8 POLE INSTALLATION

Pole lengths shall provide a luminaire mounting height as indicated on the drawings. Electrical cabling shall be provided to the light pole as specified in Section 16120 INSULATED WIRE AND CABLE. The mount interfaces shall have ac power connected, and the pole wiring harness shall be connected to the luminaire. Light poles shall not be installed outside the site or inside the perimeter zone. Pole installation shall conform to the manufacturer's recommendations, NFPA 70, and IEEE C2. Poles shall be set straight and plumb.

3.8.1 Pole Brackets

Brackets shall be installed as specified by the manufacturer and as shown on drawings. Mounting hardware shall be sized appropriately to secure the mount, luminaire, and housing with wind and ice loading normally encountered at the site. Pole brackets for floodlights shall have the number of tenons indicated, arranged to provide the indicated spread between each tenon. Where indicated on drawings, adjustable heads shall be installed on the brackets to position the luminaires. Identical brackets shall be used with one type of luminaire.

3.8.2 Concrete Foundations

Concrete foundations shall have anchor bolts accurately set in the foundation using a template supplied by the pole manufacturer. Once the concrete has cured, the pole shall be set on the foundation, leveled on the foundation bolts, and secured with the holding nuts. The space between the foundation and the pole base shall be grouted. Concrete and grout work shall conform to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.8.3 Rigid Conduit Ells

Rigid conduit ells shall be provided where specified or indicated on drawings.

3.8.4 Aluminum and Steel Pole Installation

Poles shall be mounted on cast-in-place foundations. Conduit elbows shall be provided for cable entrances into pole interiors.

3.8.4.1 Cast-In-Place Foundations

Concrete foundations, sized as indicated, shall have anchor bolts accurately set in foundations using templates supplied by the pole manufacturer. Concrete work and grouting is specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. After the concrete has cured, pole anchor bases shall be set on foundations and leveled by shimming between anchor bases and foundations or by setting anchor bases on leveling nuts and grouting. Poles shall be set plumb. Anchor bolts shall be the manufacturer's standard, and not less than necessary to meet the pole wind loading and other specified design requirements.

3.9 LIGHTING

3.9.1 Lamps

Lamps of the proper type, wattage, and voltage rating shall be delivered to the project in the original containers and installed in the fixtures just before completion of the project.

3.9.2 Fixture Installation

Standard fixtures shall be installed as detailed on drawings. Illustrations shown on these sheets or on the drawings are indicative of the general type desired and are not intended to restrict selection of fixtures to any particular manufacturer. Fixtures of similar design, equivalent light-distribution and brightness characteristics, and equal finish and quality will be acceptable as approved. However, fixtures so noted to match existing must match exact make, model, and manufacturer in order to provide for interchangable parts and materials for maintenance purposes, inventory control, and uniformity in application.

3.9.2.1 Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be installed as required for proper installation.

3.9.2.2 In-Line Fuses

An in-line fuse shall be provided for each luminaire and outlet.

3.9.2.3 Special Fixtures

The types of special fixtures are designated by letters and numbers. For example, SP-1 denotes special type 1.

3.10 LIGHTING CONTROL SYSTEM

3.10.1 Photo-Control

Lighting luminaires shall be controlled in banks by a single photo-control element mounted within each bank or individually controlled by photo-control elements mounted on the heads of the luminaires.

3.10.2 Time Control Switches

Switches shall be installed with not less than four 1/4 inch bolts. The use of sheet metal screws will not be allowed.

3.10.3 Magnetic Contactors

Terminal lugs shall be coordinated with the wire size. Switches shall be securely fastened to the supporting structure or wall using not less than four 1/4 inch bolts. The use of sheet metal screws will not be allowed.

3.11 GROUNDING

Grounding shall be in conformance with NFPA 70, the contract drawings, and the following. Grounding conductors shall be soft-drawn, stranded copper. Ground rods shall be driven into the earth so that after the installation is complete, the top of the ground rod will be approximately 1 foot below finished grade, except in handholes.

3.11.1 Ground Rods

The resistance to ground shall be measured using the fall-of-potential method described in IEEE Std 81. The maximum resistance of a driven ground rod shall not exceed 25 ohms under normally dry conditions. Whenever the required ground resistance is not met, additional electrodes shall be provided interconnected with grounding conductors, to achieve the specified ground resistance. The additional electrodes shall be 8 feet long rods spaced a minimum of 10 feet apart, 5/8 inch in diameter, up to 30 feet long, driven perpendicular to grade. In high ground resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately. Connections below grade shall be fusion welded. Connections above grade shall be fusion welded or shall use UL 467 approved connectors.

3.11.2 Items to be Grounded

Ground conductors, metallic conduits, junction boxes, and noncurrent-carrying metallic parts of equipment shall be grounded. Connections above grade shall be made with solderless connectors, and those below grade shall be made by a fusion-welding process.

3.11.3 Lighting Pole

One ground rod shall be provided at each pole. Bases of metal or concrete lighting poles shall be connected to ground rods by means of a minimum No. 8 AWG bare copper wire.

3.12 TESTS

3.12.1 Operating Test

After the installation is completed and at such time as the Contracting Officer may direct, the Contractor shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements specified. The test shall be performed in the presence of the Contracting Officer. The Contractor shall furnish instruments and personnel required for the test, and the Government will furnish the necessary electric power.

3.12.2 Ground Resistance Measurements

The resistance to ground shall be measured by the fall-of-potential method described in IEEE Std 81.

The contractor shall maintain a separate set of drawings, elementary diagrams and wiring diagrams of the lighting to be used for "as-built" drawings. This set shall be accurately kept up to date by the Contractor with all changes and additions to the lighting system. In addition to being complete and accurate, this set of drawings shall be kept neat and shall not be used for installation purposes. Upon completion of the as-built drawings, a representative of the Government will review the as-built work with the Contractor. If the as-built work is not complete, the Contractor will be so advised and shall complete the work as required.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16920

PUMP STATION CONTROL

PART 1 GENERAL

1.1 SCOPE OF WORK
1.2 REFERENCES
1.3 COORDINATION
1.3.1 General
1.3.2 Electrical Design Changes
1.3.3 City of Wahpeton Utility Department
1.4 SCOPE OF SERVICES
1.4.1 General
1.4.2 Existing System Compatibility
1.4.3 Master Monitoring and Control Station
1.4.3.1 System Integration Services
1.4.4 Pump Station Equipment
1.4.4.1 Sump Pump Starters
1.4.4.2 Storm Water Pump Starters
1.4.4.3 Supervisory Pump Controller (SCP)
1.4.4.4 Level Control
1.4.4.5 SCADA Equipment
1.4.5 Support Engineering Services
1.4.5.1 On-Site Meetings
1.4.5.2 Resident Engineer Support
1.4.5.3 On-site Inspections
1.4.5.4 Telephone Support
1.4.5.5 Start-up Service
1.4.5.6 Station Startup
1.4.5.7 Configuration and Adjustments
1.4.5.8 Master Control System Startup
1.4.5.9 Point-by-Point Verification
1.4.5.10 Startup Difficulties
1.5 ENVIRONMENTAL CONDITIONS
1.5.1 Location: Wahpeton, North Dakota
1.5.2 Heating Degree Days: 9226
1.5.3 Winter Design Temperatures
1.5.4 Cooling Degree Days: 540
1.5.5 Summer Design Temperatures
1.5.6 Inside Air Temperature: 95 degrees F
1.5.7 Contaminants: Dust, Dirt, Hazardous Environment (Wet Well)
1.6 SUBMITTALS
1.6.1 Materials and Equipment
1.7 QUALITY ASSURANCE
1.7.1 Rules
1.7.2 UL Certified Facility
1.7.3 Fabrication Requirements
1.7.4 Functional Testing

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS
2.2 ENCLOSURES
2.2.1 Panel Enclosures Located Indoors
2.2.2 Panel Enclosures Located Outdoors
2.2.2.1 Cabinet Construction
2.2.2.2 Equipment Mounting
2.2.2.3 Enclosure Finish
2.2.2.4 Enclosure Mounting
2.3 MOLDED CASE CIRCUIT BREAKERS
2.3.1 Trip Units
2.3.2 Mechanical Interlock
2.3.3 480-Volt AC Circuits
2.3.4 120/240-Volt AC Circuits
2.3.5 125-Volt DC Circuits
2.4 COMBINATION STARTERS
2.4.1 Enclosures
2.4.2 Magnetic Contactors
2.4.3 Reduced Voltage Starters
2.4.4 Auxiliary Contacts
2.4.5 Overload Relays
2.4.6 Individual Control Transformers
2.4.7 Voltage Fault Protection
2.5 PROGRAMMABLE LOGIC CONTROLLER (PLC)
2.5.1 PLC General Requirements
2.5.2 Modular PLC
2.5.3 Central Processing Unit (CPU) Module
2.5.4 Communications Module
2.5.5 Power Supply Module
2.5.6 Input/Output (I/O) Modules
2.5.7 Program Storage/Memory Requirements
2.5.8 Input/Output Characteristics
2.5.9 Wiring Connections
2.5.10 On-Off Switch
2.5.11 Diagnostics
2.5.12 Accuracy
2.6 PLC SOFTWARE
2.6.1 Operating System
2.6.2 Startup
2.6.3 Failure Mode
2.6.4 Functions
2.6.5 Analog Monitoring
2.6.6 Logic (Virtual)
2.6.7 State Variables
2.6.8 Analog Totalization
2.6.9 Alarm Processing
2.6.10 Digital Alarms
2.6.11 Analog Alarms
2.6.12 Pulse Accumulator (PA) Alarms
2.6.13 Constraints
2.6.13.1 Equipment Constraints Definitions
2.6.13.2 Constraints Checks
2.6.13.3 Command Priorities
2.6.14 Resident Application Software
2.6.15 Program Inputs and Outputs
2.6.16 Failure Mode
2.7 HUMAN MACHINE INTERFACE PANEL (HMI)
2.7.1 Security

2.7.2 Software
2.7.3 Parameter Requirements
2.7.4 Data Display
2.7.5 HMI Preprogrammed Function Keys
2.7.6 Displayed Units
2.7.7 LEDS
2.7.8 Communications
2.7.9 Environment
2.7.10 Enclosure
2.7.11 Power Supply
2.7.12 Fault Diagnostics
2.8 COMMUNICATIONS
2.8.1 SCADA Host Controller
2.8.2 SCADA RTU(Existing)
2.8.3 Radio
2.8.4 Antenna System
2.8.5 Grounding Conductors
2.8.6 Coaxial Cable
2.9 UNINTERRUPTIBLE POWER SUPPLY (UPS)
2.9.1 General
2.9.2 Electrical Input
2.9.3 Electrical Output
2.9.4 Communications
2.9.5 Battery
2.9.6 Environmental
2.10 POWER SUPPLIES
2.11 TRANSIENT PROTECTION
2.11.1 Power Line Surge Protection
2.11.2 Controller Input/Output Protection
2.12 RELAYS
2.12.1 Plug-in Relays
2.12.2 Time Delay Relays
2.13 PUSH BUTTONS
2.14 SELECTOR SWITCHES
2.15 INDICATOR LIGHTS
2.16 ELAPSED TIME METER
2.17 CONDENSATION HEATER
2.18 TERMINAL BLOCKS
2.19 LEVEL SENSORS
2.19.1 Braided Steel Jacket
2.19.2 Float Switches
2.19.3 Float Chain/Weight
2.19.4 Submersible Analog Level Transmitters
2.20 INTRINSICALLY SAFE RELAYS
2.20.1 Intrinsically Safe Repeater Barriers (analog)
2.20.2 Intrinsically Safe Relays (discrete)
2.21 SPECIAL-PURPOSE OR HEAVY-DUTY RECEPTACLES
2.22 INTRUSTION DETECTION - BALANCED MAGNETIC SWITCH (BMS)
2.22.1 BMS Subassemblies
2.22.2 Remote Test

PART 3 EXECUTION

3.1 CONTROL SYSTEM DESCRIPTION
3.1.1 Master monitoring and Control Station
3.1.1.1 Existing Telemetry Equipment
3.1.1.2 New Telemetry Equipment
3.1.1.3 Operator Workstation
3.1.2 Supervisory Control Panels, (SCP), Pumping Stations

3.1.2.1 Pump Station 1
3.1.2.2 Pump Stations 2 and 3
3.1.2.3 Pump Stations 4 and 5
3.1.2.4 Pump Station 6
3.1.2.5 Pump Station 1A and 7
3.1.2.6 Alarm & Telemetry(SCADA) System
3.1.2.7 Control System I/O Points
3.1.3 Description of Operation
3.1.3.1 Pump Controller
3.1.3.2 Backup Controls
3.1.3.3 Pump Motor Starter Controls
3.2 PANEL FABRICTATION REQUIREMENTS
3.2.1 Separately Mounted Combination Starters
3.2.2 Supervisory Control Panels (SCP)
3.2.2.1 SCP Assembly
3.2.2.2 Electrical Requirements
3.2.2.3 Convenience Outlet
3.2.2.4 SCP Interior Light
3.2.2.5 Intrusion switch (Outdoor Panels only)
3.2.2.6 Ventilation System
3.2.2.7 Heating System
3.2.2.8 Identification
3.3 SPARE PARTS
3.4 EQUIPMENT INSTALLATION REQUIREMENTS
3.5 WIRE, CABLE AND CONNECTING HARDWARE
3.5.1 Metering and Sensor Wiring
3.6 SOFTWARE INSTALLATION AND REQUIREMENTS
3.6.1 Software Installation
3.7 CONTROL SYSTEM OPERATING INSTRUCTIONS
3.8 FACTORY TEST
3.8.1 Factory Test Setup
3.8.2 Factory Test Procedure
3.8.3 Factory Test Report
3.9 DELIVERY AND STORAGE
3.10 FIELD TESTING AND ADJUSTING EQUIPMENT
3.10.1 Personnel, Equipment, Instrumentation, and Supplies
3.10.2 Testing, Adjusting and Commissioning
3.10.3 Performance Verification Test (PVT)
3.10.4 Government Acceptance of Performance Verification Test
3.11 TRAINING
3.11.1 Operator Training
3.11.2 Equipment Maintenance Training
3.11.3 Training Documentation
3.11.4 Familiarization Training
3.11.5 Training Videotape
3.12 ACCEPTANCE
3.13 WARRANTY
3.13.1 Commercial Warranties
3.13.2 Warranty Assignments
3.13.3 Continuity of Service

-- End of Section Table of Contents --

SECTION 16920

PUMP STATION CONTROL

PART 1 GENERAL

1.1 SCOPE OF WORK

This document provides specification requirements for the supply of multiple pump controller packages with integrated supervisory control and data acquisition systems, expanded master monitoring and control station, and associated engineering services for the city of Wahpeton, ND. The packages will be used to operate the pumping stations associated with this flood control project. The city has unique standards and operating systems that must be incorporated into the project. The Contractor shall factory assemble, test, install, and field adjust all equipment for satisfactory operation. He shall make hardware and software changes to the city's master monitoring and control system. The completed project shall provide the city with a standardized automatic monitoring, and control system that is compatible and interchangeable with their existing pumping system infrastructure. The pump controller packages and its components, including programmable logic controller (PLC), human/machine interface (HMI), motor starters (FVNR/RVNR as required), and associated electrical control components shall be from the same manufacturer, and shall be of current model in production. Prototypes, special configurations, and discontinued models, or proprietary configurations are not allowed. Equipment shall be furnished as necessary to meet the requirements of this document, and shall include all items required to provide complete and functional systems, even though individual components may not be specifically described.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.1 (1995)	Code for Electricity Metering

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA ANSI/TIA/EIA-222-F	(1996) Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.90	(1989; R 1994) Relays and Relay Systems Associated with Electric Power Apparatus

IEEE C37.90.1	(1989; R 1994) IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
IEEE C62.11	(1987; R 1993) IEEE Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits
IEEE C62.41	(1991; R 1995) IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
IEEE C62.45	(1987; R 1992) IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits
IEEE Std 100	(1997) IEEE Standard Dictionary of Electrical and Electronic Terms
IEEE Std 142	(1991) IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 60529	Degrees of protection provided by enclosures (IP Code) CONSOLIDATED EDITION
IEC 61131-2 (1995)	Programmable Controllers - Part 2: Equipment Requirements and Tests
IEC 61131-3 (1993)	Programmable Controllers - Part 3: Programming Languages

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1 (1993)	Industrial Control and Systems
NEMA ICS 2 (1993)	Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC
NEMA ICS 3 (1993)	Industrial Control and Systems Factory Built Assemblies
NEMA ICS 4 (1997)	Industrial Control and Systems Terminal Blocks
NEMA 250 (1997)	Enclosures for Electrical Equipment (100 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1999)	National Electrical Code
NFPA 780.	(2000) Standard for the Installation of Lightning Protection Systems, 2000 Edition

UNDERWRITERS LABORATORIES (UL)

UL 94	(1996; R Jul 1998) Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
UL 508A	(2001) Industrial Control Equipment
UL 1059	(2001) 4th Edition) Terminal Blocks
UL 1449	(R 2002) Transient Voltage Surge Suppressors
UL 1950	(1995) Information Technology Equipment

1.3 COORDINATION

1.3.1 General

The Contractor shall be responsible for coordinating the control system design, fabrication, delivery, and support efforts with others as necessary to ensure that the final control system fulfills the requirements of this contract. The Contractor shall schedule work to minimize impact to ongoing city operations. All work shall be coordinated and scheduled in advance with the Contracting Officer and City representatives. Provide 72 hour advanced notification for any work that could impact City operations.

1.3.2 Electrical Design Changes.

The Contractor shall make all changes to the electrical design at no additional cost to the government if the pumps or other equipment supplied have electrical ratings and characteristics different from the pumps and other equipment specified or shown. Provide the calculations used to make revised component selections. Revised selections shall comply with the specifications.

1.3.3 City of Wahpeton Utility Department

The Contractor is responsible for ensuring that the control systems designed, delivered and installed are completely compatible with, standardized to, and configured like the system already in use.

1.4 SCOPE OF SERVICES

1.4.1 General

The Contractor shall furnish and install a complete pump controller packages with integrated supervisory control and data acquisition system (SCADA) at each pump station as indicated. The Contractor shall provide a radio path study, a new PLC based SCADA host control panel with radio, and modify the existing Control System equipment and software at the city's central monitoring facility to include the stations in this contract. The Contractor shall be responsible for ensuring that all components of the master monitoring and control system are correctly programmed, and operate consistently with the City's existing system.

1.4.2 Existing System Compatibility

The Contractor shall be responsible for reviewing the city's existing pump station control system, and shall assure that equipment provided is

compatible with, configured like, and able to interface with equipment that is already in use in the present systems. In-Control Incorporated, 10350 Jamestown Street Northeast, Minneapolis, MN 55449, ph:(763)783-9500 is responsible for the city's existing master monitoring and control system. Changes to the equipment, operating system, software, or programming required to incorporate the new pumping stations into the master monitoring and control system shall be coordinated through them.

1.4.3 Master Monitoring and Control Station

The existing master monitoring and control facility is located in the Wahpeton Public Works Maintenance Facility.

1.4.3.1 System Integration Services

The Contractor shall provide all services necessary to configure each new pump station control system, and integrate it into the master monitoring and control system. Pump stations will be added to master system as they are completed. The work shall include:

1) Programming, and engineering services as required, to ensure that all parts of the overall pumping stations and master monitoring and control system function as a single integrated unit.

2) The Contractor shall perform a complete point-by-point verification of all reported data.

3) Provide all component assembly drawings, program listings, and documentation required to define the complete automated control and monitoring systems.

4) Provide two operation and maintenance manuals, for each pump station, and the master monitoring and control system.

1.4.4 Pump Station Equipment

1.4.4.1 Sump Pump Starters

Provide each new sump pump with a properly sized full-voltage combination motor starter.

1.4.4.2 Storm Water Pump Starters

Provide each new storm water pump with a properly sized autotransformer reduced voltage combination motor starter. The equipment shall be furnished with assembly and installation instructions, and drawings showing all inter-connections with other control components.

1.4.4.3 Supervisory Pump Controller (SCP)

Supply properly configured pump control and monitoring systems for each pump station. Depending on station configuration provide simplex, or duplex alternating pump controllers and alarm systems. The pump controllers shall permit remote monitoring and control of all pumps including sump pumps at each station. The systems shall utilize programmable logic controllers (PLCs), and relays for control. Equipment shall include assembly, and installation instructions, and drawings showing all necessary inter-connections including field connections to other control components, storm water pumps, sump pumps, the radio telemetry, and

the emergency generator manual transfer switch and system.

1.4.4.4 Level Control

Supply liquid level control systems for storm water and sump pump control systems. The systems shall include submersible level transducers and liquid level floats arranged to provide redundant operation.

1.4.4.5 SCADA Equipment

Supply the master monitoring and control facility with a new "add-on" PLC based SCADA Control Panel. Supply each pump station with a complete, coordinated SCADA wireless data-link to the city's expanded master monitoring and control facility. The systems shall permit remote monitoring and control of each pump station. The Contractor shall perform radio path studies to determine antenna location and configurations, and include radio relay stations if required. Supply poles and anchor bolts for antenna mounting. The Contractor shall provide radio frequency licenses for the new equipment. The frequency shall be selected to avoid conflict with the city's 453.525-MHz frequency.

Supply all equipment with lightning and surge suppression devices.

1.4.5 Support Engineering Services

During the construction contract that includes pump station construction, the Contractor shall be available to support the Government's Resident Engineer and the Construction Contractor, with information and assistance to ensure that the pump station controls are correctly installed in each pump station.

1.4.5.1 On-Site Meetings

Provide one on-site meeting at the start of the construction contract, with the Construction Contractor's electrical sub and the Contracting Officer, to review and clarify controller installation procedures and instructions.

1.4.5.2 Resident Engineer Support

Support the Resident Engineer to ensure the supplied equipment is installed as intended. This may involve telephone support, clarification of drawings and instructions, and finding solutions to problems that may arise during the control installation.

1.4.5.3 On-site Inspections

Perform on-site reviews and inspections as requested. The Contractor shall provide at least one site visit to inspect the full installation of the control system before the system is energized, in addition to the on-site startup services described below.

1.4.5.4 Telephone Support

Provide telephone support to the Construction Contractor for interpretations of the engineering intent.

1.4.5.5 Start-up Service

Provide start-up services to configure the equipment and software installed

at each pump station and the central control facility. Add new pump stations to master control and monitoring system as construction is completed.

1.4.5.6 Station Startup

For each flood control pump station allow a minimum total of 2 workdays for on-site services to prepare for, activate, and test the operation of the pump station control system.

1.4.5.7 Configuration and Adjustments

Before or during the start up procedure, the Contractor shall properly configure and adjust each pump station control system, and adjust the liquid level on-off settings as directed.

1.4.5.8 Master Control System Startup

At the time of start up for each pump station, the Contractor shall make whatever modifications are necessary at the master monitoring and control facility to bring the new station "on line".

1.4.5.9 Point-by-Point Verification

The Contactor shall perform a complete point-by-point verification of all reported data at each pump station and the master monitoring and control stations.

1.4.5.10 Startup Difficulties

If startup for a required pump station fails Contracting Officer acceptance, the Contractor shall be responsible for furnishing, at no additional cost, to the Government, all additional field site services during re-startup until the Contracting Officer has determined such re-startup work has been acceptably completed.

1.5 ENVIRONMENTAL CONDITIONS

Capacity and design of the equipment and accessories shall be suitable for 24-hour full load service in the following environmental conditions.

1.5.1 Location: Wahpeton, North Dakota

Latitude:	46.265° N
Longitude:	96.606° W
Altitude (above MSL):	963 ft.

1.5.2 Heating Degree Days: 9226

1.5.3 Winter Design Temperatures

Outside Air (Ventilation)	-22 (99%).
Outside Air (Heat Loss)	-18 (97.5%)
Inside Air Temperature	40 degrees F.

1.5.4 Cooling Degree Days: 540

1.5.5 Summer Design Temperatures

Outside Air (Ventilation)	92 DB (1%)
Outside Air (Ventilation)	73 MCWB (1%)
Outside Air (Heat Minimum)	89 DB (2.5%)
Outside Air (Heat Minimum)	71 (2.5%)

1.5.6 Inside Air Temperature: 95 degrees F

1.5.7 Contaminants: Dust, Dirt, Hazardous Environment (Wet Well)

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings:

Installation; G, EE

Wiring; G, EE.

Six submittal packages including detail drawings shall be furnished for Engineers' approval prior to factory assembly of the complete pump control system packages. These packages shall consist of elementary power and control wiring and ladder diagrams in Autocad, Autocad-DXF, or Microstation 11" X 17" format and include enclosure outline drawings as well as the complete Bill Of Material (BOM). Interconnection drawings shall be included for use in field installation work. Drawings shall be prepared using industry recognized device symbols, clearly defined with describing designations to define the service and materials. The enclosure drawings shall include front and side views of the enclosures with overall dimensions, and general component arrangement of the subplate. Standard catalog specification sheets as specified in SD-02 Product Data shall be furnished as part of the submittal package.

SD-03 Product Data

Instrumentation and Pump Control Systems; G, EE

Manufacturer's descriptive and technical literature, performance charts and installation instructions. Product specific catalog cuts shall be in booklet form, indexed to the unique identifiers, and shall consist of data sheets that document compliance with the specification. Where multiple components are shown on a catalog cut, the application specific component shall be marked.

Meters and Sensors; G, EE

Manufacturer's descriptive and technical literature, catalog cuts, performance charts and installation instructions.

Training Manuals; G, EE

Instruction manuals within 45 days of Notice to Proceed.

Performance Verification Test (PVT); G, EE

The performance verification test procedure; it shall refer to the actions and expected results to demonstrate that the control system performs in accordance with the sequence of control. A list of the equipment to be used during the testing shall be included. The list shall also include manufacturer's name, model number, equipment function, the date of the latest calibration and the results of the latest calibration.

Factory Test Procedure; G, EE.

Documentation containing factory test methods and procedures.

SD-06 Test Reports

Radio Path Study Reports; G, EE

Factory Test Report; G, EE.

Testing, Adjusting and Commissioning; G, EE.

Performance Verification Test(PVT); G, EE.

Endurance Test; G, EE.

Test results in report format.

SD-07 Certificates

Sensor and Control Wiring; G, EE

Certified test results for surge protection.

Testing of Ground Rods; G, EE

Certification stating that the test was performed in accordance with IEEE Std 142.

UL 508A Certification; G, EE

Submit documentation that fabrication is performed in a UL 508A certified facility and the assembled equipment meets UL 508A certification requirements.

SD-07 Certificates

Software, program licenses and documentation; G, EE

Submit licenses, original disks, and documentation manuals for all Software packages purchased for this project.

FCC radio licenses and documentation; G, EE

Submit copies of licenses, and documentation for each pump station radio purchased for this project.

SD-10 Operation and Maintenance Data

Control System; G, EE

Six complete copies of operating instructions outlining the step-by-step procedures required for system startup, operation and shutdown. The instructions shall include layout, wiring and control diagrams of the system as installed. The instructions shall include paper, and CDROM copies of the PLC program listing, Man-Machine interface panel program listing, and operator workstation program listing. The instructions shall include the manufacturer's name, model number, service manual, parts list and a brief description of all equipment and their basic operating features. Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs and trouble shooting guides.

1.6.1 Materials and Equipment

Materials and equipment shall be standard unmodified products of a manufacturer regularly engaged in the manufacturing of such products. Units of the same type of equipment shall be products of a single manufacturer. Items of the same type and purpose shall be identical and supplied by the same manufacturer, unless replaced by a new version approved by the Government.

1.7 QUALITY ASSURANCE

1.7.1 Rules

Unless otherwise specified all work shall comply with the National Electrical Code, NFPA 70.

1.7.2 UL Certified Facility

The manufacturer of all equipment packages shall be performed in a UL 508A Certified facility

1.7.3 Fabrication Requirements

The pump controller packages shall be designed, fabricated and tested in accordance with NEMA, NEC, IEC and UL 508A standards.

1.7.4 Functional Testing

The pump controller packages shall be functionally tested at the factory as an assembled unit to ensure proper sequencing and operation. All pilot devices and controls shall be tested to verify proper operation. Documentation shall be furnished at the engineer's request.

PART 2 PRODUCTS

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Equipment located outdoors, not provided with climate controlled enclosures, shall be capable of operating in the ambient temperature range indicated in paragraph ENVIRONMENTAL CONDITIONS, unless otherwise specified. Equipment and wiring shall be in accordance with NFPA 70, with proper consideration given to environmental conditions such as moisture, dirt, corrosive agents, and hazardous area classification.

2.2 ENCLOSURES

2.2.1 Panel Enclosures Located Indoors

The enclosure for each control panel shall conform to the requirements of NEMA 250 for the types specified. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish. Enclosures installed at the city's master monitoring and control facility shall be NEMA Type 1. Enclosures for installation in pumping stations 1A and 7 shall be NEMA Type 12. Enclosures shall be provided with a single, continuously hinged exterior door with print pocket, 3-point latching mechanism and key lock and a single, continuously hinged interior door.

2.2.2 Panel Enclosures Located Outdoors

The salient features for the enclosure listed below are based on single and double door equipment enclosures with inner dead-front doors, catalog series HPD, as manufactured by Hennessy Products Inc, P.O. Box 509, Chambersburg, PA, 17201, (717) 264-7146. "Or-equal" substitution of this enclosure is permitted.

2.2.2.1 Cabinet Construction

1) Material. The cabinet, panels and doors shall be fabricated from 5052-H32 sheet aluminum alloy which has a thickness of .125-inch, or 12 gauge type 304 or type 316L stainless steel.

2) Welds. Use Heliarc welding methods for external welds, and wire welding methods for internal welds. All welds shall be continuous, neatly formed and free of cracks, blow-holes and other irregularities.

3) Edges. All inside and outside edges of the cabinet shall be free of burrs.

4) Slope Top. The cabinet shall be designed with a sloped top to prevent the accumulation of water on its top surface.

5) Door flanges. The door openings shall be double flanged on all four sides to increase strength around openings, and shall prevent dirt and liquids from entering the enclosure when doors are opened.

6) Center Post. Provide a removable center post for double-doors for increased security and environmental protection.

7) Door Restraints. Provide a door restraint to prevent door movement in windy conditions.

8) Door/Hardware

(1) General. Provide a single door or double door design with overlapping weather doors, and hinged inner dead-front swing

panels. The inner panels shall permit operator access to circuit breakers and switches without exposure to dangerous voltages. The cabinet weather doors shall be a minimum of 80% of the front surface area. The Weather doors shall be furnished with a gasket that satisfies the physical properties as found in UL508 table 21.1 and shall form a weather tight seal between the cabinet and door.

(2) Hinges. The Weather door, and inner dead-front swing panel hinges shall be continuous and bolted to the cabinet and door utilizing 1/4-20 stainless steel carriage bolts and ny-lock nuts. The hinges shall be made of .093-inch thick aluminum and shall have a 3" open width with a .250-inch diameter stainless steel hinge pin. The hinge pin shall be capped top and bottom by weld to render it tamper proof. Bolt-holes shall be gasketed.

(3) Latching Mechanism. The door handle and latching mechanism shall be a 3-point draw roller type. The center catch and pushrods shall be cadmium plated, Type II Class 1 or equal. Pushrods shall be turned edgewise at the outward supports and shall be .250-inch by .750-inch steel minimum. Rollers shall have a minimum diameter of .875-inch and shall be made of nylon. The center catch shall be fabricated from .140-inch steel, minimum.

(4) Operating Handle. The door operating handle shall be stainless steel with a 3/4 inch diameter shank. The handle shall have a provision for padlocking in the closed position.

9) Light Fixture Bracket. An interior fluorescent light fixture with mounting bracket and door switch shall be provided.

10) Cabinet Ventilation

(1) General. Cabinets shall be provided with screened louvered vents with a removable air filters in the front door. The ventilation system shall be deigned to handle a minimum of 100 cubic feet of air per minute.

(2) Louvers. Louvers shall satisfy the NEMA rod entry test for 3R ventilated enclosures. All louvers shall include insect screens.

(3) Filters. The filters shall cover the vents and shall be held firmly in place with bottom and top brackets and a spring-loaded upper clamp.

(4) Air Exhaust. Exhaust air shall be vented out between the top of the cabinet and door. The exhaust area shall be screened with a material having a maximum hole diameter of .125-inch.

(5) Fan. Enclosure shall include a forced air fan system with adjustable thermostatic control and screened air exhaust under a roof overhang. The fan plenum area shall have a removable fan plate.

11) Cabinet Heater. Provide a Thermostat controlled fan-driven heater unit in accordance with paragraph "CONDENSATION HEATER."

2.2.2.2 Equipment Mounting

The enclosure shall be equipped with two adjustable "C" mounting channels

on both sidewalls and back wall of the enclosure to permit versatile positioning of shelves or panels.

1) Mounting Channels. The mounting channels shall provide infinite vertical and horizontal adjustment and not limit the positioning of shelves or panels. All mounting hardware shall be furnished.

2) Shelves. If equipment is to be shelf mounted, the enclosure shall be provided with shelves fabricated from 5052-H32 aluminum having a thickness of .125-inch or 12 gauge type 304 or 316L stainless steel. The shelf depth shall be a minimum of 10.5-inches. The enclosure shall have provision for positioning shelves or panels to within 4-inches of the bottom and to within 8-inches of the top of the enclosure.

3) Back Panel. If the equipment is panel mounted, the enclosure shall be provided with an 5052-H32 aluminum back panel having a thickness of .125-inch or 10 gauge steel panel finished white. All mounting hardware shall be furnished.

2.2.2.3 Enclosure Finish

Unless otherwise specified, the outside surface of the cabinet shall have a smooth, uniform, natural aluminum or stainless steel finish.

2.2.2.4 Enclosure Mounting

Enclosures shall be designed for pad mounting and shall include:

1) An internal removable bottom plate to seal the cabinet.

2) A separate 12-inch high base with removable front and rear access panels. Base and access panels shall be fabricated from the same material as the cabinet with stiffeners as required.

2.3 MOLDED CASE CIRCUIT BREAKERS

Molded case circuit breakers shall conform to the applicable requirements of NEMA AB 1 and UL 489. The circuit breakers shall be manually operated, shall be quick-make, quick-break, common trip type, and shall be of automatic-trip type unless otherwise specified or indicated on the drawings. All poles of each breaker shall be operated simultaneously by means of a common handle. The operating handles shall clearly indicate whether the breakers are in "On," "Off," or "Tripped" position and shall have provisions for padlocking in the "Off" position. Personnel safety line terminal shields shall be provided for each breaker. The circuit breakers shall be products of only one manufacturer, and shall be interchangeable when of the same frame size.

2.3.1 Trip Units

Except as otherwise noted, the circuit breakers, of frame sizes and the trip unit ratings as shown on the drawings, shall be provided with combination thermal and instantaneous magnetic or solid state trip units. The Government reserves the right to change the indicated trip ratings, within frame limits, of the trip devices at the time the shop drawings are submitted for approval. The breaker trip units shall be interchangeable and the instantaneous magnetic trip units shall be adjustable on frame sizes larger than 150 amperes. Nonadjustable instantaneous magnetic trip units

shall be set at approximately 10 times the continuous current ratings of the circuit breakers.

2.3.2 Mechanical Interlock

Mechanically-interlocked breakers shall be UL listed assemblies which use a "walking beam" assembly to prevent simultaneous energization of both circuit breakers. Sliding bar type assemblies are not permitted.

2.3.3 480-Volt AC Circuits

Circuit breakers for 480-volt or 277/480-volt ac circuits shall be rated 600 volts ac, and shall have an UL listed minimum interrupting capacity of 25,000 symmetrical amperes at 600 volts ac.

2.3.4 120/240-Volt AC Circuits

Circuit breakers for 120-volt ac circuits shall be rated not less than 120/240 or 240 volts ac, and shall have a UL listed minimum interrupting capacity of 10,000 symmetrical amperes.

2.3.5 125-Volt DC Circuits

Circuit breakers for 125-volt dc circuits shall be two-pole rated 125/250 or 250 volts dc, and shall have an UL listed minimum interrupting capacity of 5,000 amperes dc.

2.4 COMBINATION STARTERS

Combination motor controllers shall include molded-case circuit breakers, auxiliary and pilot devices, and magnetic contactor(s) with thermal overload relays. Autotransformer type reduced voltage starters are required on all motors 15 hp and larger. The ratings of air circuit breakers, contactors, motor controllers and other devices shall be as selected by the Contractor and approved by the government to suit the motors supplied. All combination motor controllers shall have short circuit ratings equal to 25,000 AIC or greater. Molded case circuit breakers for use in combination starters shall meet the requirements of paragraph MOLDED CASE CIRCUIT BREAKERS. Individually mounted motor controllers shall include flange mounted green NORMAL\POWER ON, red RUNNING, and amber VOLTAGE FAULT LED push-to-test pilot lights.

2.4.1 Enclosures

The enclosures for each combination motor controller installed in pump stations 1A and 7 shall conform to the requirements of NEMA 250 for NEMA Type 12. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish. Enclosures shall be provided with a single, continuously hinged exterior door with print pocket, 3-point latching mechanism with lockable disconnect switch.

2.4.2 Magnetic Contactors

Magnetic contactors shall be of the NEMA type. IEC Contactors are not permitted. Reduced voltage starters are required for all motors rated 15 hp and larger. The rating, performance and service characteristics shall conform to the requirements of NEMA ICS 2 for contactors with continuous current ratings for the duty indicated. Contactors for motor control shall

be rated for full-voltage starting (Class A controllers). Contactors shall be suitable for at least 200,000 complete operations under rated load without more than routine maintenance. The interruption of arc and flame shall be minimized by suitable arc chutes or other means so that no damage will be done to other portions of the device. The arc chutes, if provided, shall be easily removable without removing or dismantling other parts. The contacts shall be easily removable. All current-carrying contact surfaces shall be silver-surfaced or of other approved material to prevent the formation of high resistance oxides. The contactor shall operate without chatter or perceptible hum while energized. Coils shall be suitable for continuous operation on 120-volt ac circuits. Alternating-current contactors shall be three-pole, except where otherwise noted, and shall be insulated for 600 volts ac and of the electrically operated, magnetically held type.

2.4.3 Reduced Voltage Starters

Autotransformer type starters shall be used. Autotransformers shall be rated for medium duty and have taps according to NEMA ICS 2. For thermal over load protection, the autotransformer shall have normally closed thermostat wired in series with the normally closed thermal overload contact of the starter. Initial connection shall be to the 65 percent tap.

2.4.4 Auxiliary Contacts

Each controller shall be provided with a minimum of three auxiliary contacts that can be easily changed from normally open to normally closed. Where required, a fourth auxiliary contact shall be provided.

2.4.5 Overload Relays

Except as otherwise indicated, each controller shall be provided three NEMA Class 10 or 20 thermal overload relays with external manual reset. The Contractor shall determine the ratings required for the overload relays and size and install the heater elements in the relays.

2.4.6 Individual Control Transformers

Combination motor controllers installed in pump stations 1A and 7 shall include individual control transformers. The control transformers shall be rated 480-120 volts and shall conform to the requirements for control transformers in NEMA ST 1. Control transformers shall have adequate volt-ampere capacity for the control functions indicated. Transformers shall be installed with primary fuses and secondary fuses. Fuses shall be Class J.

2.4.7 Voltage Fault Protection

Starters shall be provided with protection against voltage faults, phase unbalance, phase loss, phase reversal, undervoltage, and overvoltage. Upon sensing one of these faults, the protector shall de-energize the starter. The protector shall use a combination of voltage and phase-angle sensing to detect phase loss even when regenerated voltages are present. The protector shall be connected to the load side of the motor circuit disconnect. The protector shall have an adjustable line voltage trip level, adjustable trip delay, automatic reset, and Double Pull Double Throw (DPDT) output contacts. Protector operation shall have repeatability of +1 percent of set point, maximum, and a dead band of 2 percent maximum. Protector shall have green indicator to show normal\power on status and amber indicator to show

tripped status. Indicators will be on the compartment door. Lamps shall have nameplates and be grouped with other indicating lights.

2.5 PROGRAMMABLE LOGIC CONTROLLER (PLC)

2.5.1 PLC General Requirements

PLCs shall be micro-processor based, capable of receiving discrete and analog inputs and, through programming, shall be able to control discrete and analog output functions, perform data handling operations and communicate with external devices. PLCs shall meet the requirements of Class A computing devices, and shall be labeled as set forth in 47 CFR 15 and shall be able to withstand conducted susceptibility test as outlined in NEMA ICS 1, NEMA ICS 2, NEMA ICS 3, and IEEE C37.90.1. PLCs shall function properly at temperatures between 0 and 50 degrees C (32 and 122 degrees F) at 5 to 95 percent relative humidity non-condensing and shall tolerate storage temperatures between minus 40 and plus 60 degrees C 40 and plus 140 degrees F at 5 to 95 percent relative humidity non-condensing.

2.5.2 Modular PLC

PLCs shall be based on a modular, field expandable design allowing the system to be tailored to the process control application. The system shall be expandable through the use of additional hardware and/or user software. As a minimum, the PLC shall include a mounting back plane, power supply module, central processing unit (CPU) module, communications module, and input/output (I/O) modules. The modules shall be grouped together in a mounting rack or cabinet. The mounting rack back plane shall provide the communications mechanism to fully integrate the individual modules located within the rack. Modules shall plug directly into the back plane. The use of wire connectors between modules will not be allowed. The rack size shall be as needed to hold the equipment necessary while performing the required control functions. The system configuration shall allow for the removal and/or installation of modules under power.

2.5.3 Central Processing Unit (CPU) Module

The CPU module shall be a self contained, microprocessor based unit that provides time of day, scanning, application (ladder rung logic) program execution, storage of application programs, storage of numerical values related to the application process and logic, I/O bus traffic control, peripheral and external device communications and self diagnostics.

2.5.4 Communications Module

The communications module shall allow peer-to-peer communication with other PLCs and shall allow the PLC to communicate with the Master monitoring and Control Station, or workstation. The communication module shall utilize the manufacturer's standard communication architecture and protocol, ethernet architecture and protocol or a combination of these. The communication module shall allow programming of the PLC to be done locally through the use of a laptop computer.

2.5.5 Power Supply Module

One or more power supply modules shall be provided as necessary to power other modules installed in the same cabinet. Power supply modules shall plug directly into the back plane. Auxiliary power supplies may be used to supply power to remote cabinets or modules.

Power supply modules shall use AC power with a nominal voltage of 120 vAc plus or minus 5 percent. The power supply module shall monitor the incoming line voltage level and shall provide over current and over voltage protection. If the voltage level is detected as being out of range the power supply module shall continue to provide power for an adequate amount of time to allow for a safe and orderly shutdown. Power supply modules shall be capable of withstanding a power loss for a minimum of 20 milliseconds while still remaining in operation and providing adequate power to all connected modules.

Power supply modules shall be provided with an indicating light that shall be lit when the module is operating properly.

2.5.6 Input/Output (I/O) Modules

Modules shall be self contained, microprocessor based units that provide an interface to field devices. The module shall be located in the same mounting rack as the other PLC components. The unit shall plug directly into the back plane of the mounting rack. Each module shall contain visual indication to display the on-off status of individual inputs or outputs.

2.5.7 Program Storage/Memory Requirements

The CPU shall utilize the manufacturer's standard non-volatile memory for the operating system. The controller shall have electronically erasable, programmable, read only memory (EEPROM) for storage of user programs and battery backed RAM for application memory. The EEPROM shall be loaded through the controller keypad, Master monitoring and Control Station or through the use of a laptop computer. The CPU memory capacity shall be based on the system's control requirements. The memory capacity shall be sized such that, when the system is completely programmed and functional, no more than 50 percent of the memory allocated for these purposes is used.

2.5.8 Input/Output Characteristics

Each controller shall allow for analog input, analog output, discrete input and discrete output. The number and type of inputs and outputs for the system shall be as required and shall comply with the sequence of control. The system capacity shall include a minimum of 20 percent spare input and output points (no less than two points) for each point type provided. During normal operation, a malfunction in any input/output channel shall affect the operation of that channel only and shall not affect the operation of the CPU or any other channel. Analog input circuits shall be available in +/-10V, +/-5V, 0-10V, 0-5V, or 4-20 mA. Discrete input circuits shall be available in 5 volt TTL, 10-30 vDc, 18-26 vDc, or 79-132 vAc. All input circuits shall have a minimum optical isolation of 1500 VRMS and shall be filtered to guard against high voltage transients from the externally connected devices. Analog output circuits shall be available in +/-10V, or 4-20 mA. Discrete output circuits shall be available in 5 volt TTL, 10-30 vDc, 18-26 vDc, 79-132 vAc. All output circuits shall have a minimum optical isolation of 1500 VRMS and shall be filtered to guard against high voltage transients from the externally connected devices.

2.5.9 Wiring Connections

Wiring connections shall be heavy duty, self-lifting, pressure-type screw terminals to provide easy wire insertion and secure connections. The terminals shall accept two #14 AWG wires. A hinged protective cover shall

be provided over the wiring connections. The cover shall have write-on areas for identification of the external circuits.

2.5.10 On-Off Switch

Each controller shall be provided with an integral on-off power switch. If the controller is not provided with a manufacturer's standard on-off switch, a miniature toggle type switch shall be installed in the control panel near the controller and shall be clearly labeled as to its function.

2.5.11 Diagnostics

Each PLC shall have diagnostic routines implemented in firmware. The CPU shall continuously perform self-diagnostic routines that will provide information on the configuration and status of the CPU, memory, communications and input/output. The diagnostic routines shall be regularly performed during normal system operation. A portion of the scan time of the controller shall be dedicated to performing these housekeeping functions. In addition, a more extensive diagnostic routine shall be performed at power up and during normal system shutdown. The CPU shall log input/output and system faults in fault tables that shall be accessible for display. When a fault affects input/output or communications modules the CPU shall shut down only the hardware affected and continue operation by utilizing the healthy system components. All faults shall be annunciated at the PLC and the Master monitoring and Control Station. Diagnostic software shall be useable in conjunction with the portable tester.

2.5.12 Accuracy

Controllers shall have an accuracy of plus or minus 0.25 percent of input span.

2.6 PLC SOFTWARE

All PLC software described in this specification shall be furnished as part of the complete control system.

2.6.1 Operating System

Each PLC shall be provided with the manufacturer's standard operating system software package. The PLC shall maintain a point database in its memory that includes all parameters, constraints and the latest value or status of all points connected to the PLC. Execution of the PLC application programs shall use the data in memory resident files. The operating system shall support a full compliment of process control functions. It shall be possible to define these functions using a mix of function blocks, ladder logic diagrams, sequential function charts and text programming. Programming methods and interactions shall be based on IEC 61131-3. A combination of the programming methods shall be possible within a single controller. The operating system shall allow loading of software locally or data files from a portable tester. It shall also support data entry and diagnostics using an operator interface panel attached directly to the PLC. Each PLC shall be capable of operating in standalone mode.

2.6.2 Startup

The PLC shall have startup software that causes automatic commencement of operation without human intervention, including startup of all connected I/O functions. A PLC restart program based on detection of power failure

at the PLC shall be included in the PLC software. The restart program shall include start time delays between successive commands to prevent demand surges or overload trips.

2.6.3 Failure Mode

Upon failure for any reason, each PLC shall perform an orderly shutdown and force all PLC outputs to a predetermined (failure mode) state, consistent with the failure modes shown and the associated control device.

2.6.4 Functions

The controller operating system shall be able to scan inputs, control outputs, and read and write to its internal memory in order to perform the required control as indicated in the sequence of control on the drawings. The controller shall periodically perform self-diagnostics to verify that it is functioning properly.

2.6.5 Analog Monitoring

The system shall measure and transmit all analog values including calculated analog points.

2.6.6 Logic (Virtual)

Logic (virtual) points shall be software points entered in the point database which are not directly associated with a physical I/O function. Logic (virtual) points shall be analog or digital points created by calculation from any combination of digital and analog points, or other data having all the properties of real points, including alarms, without the associated hardware. Logic (virtual) points shall be defined or calculated and entered into the database by the Contractor. The calculated analog point shall have point identification in the same format as any other analog point.

2.6.7 State Variables

If an analog point represents more than two (up to 8) specific states, each state shall be nameable. For example, a level sensor shall be displayed at its measured engineering units plus a state variable with named states usable in programs or for display such as low alarm/low/normal/pump 1 required/pump 2 required/high/high alarm.

2.6.8 Analog Totalization

Any analog point shall be operator assignable to a totalization program. Is shall be possible to totalize up to eight analog values within a selectable time period.

2.6.9 Alarm Processing

If required for compatibility with the cities existing system each PLC shall have alarm processing software for AI, DI, and PA alarms for all real and virtual points connected to that PLC.

2.6.10 Digital Alarms

Digital alarms are those abnormal conditions indicated by DIs as specified and shown. The system shall automatically suppress analog alarm reporting

associated with a digital point when that point is turned off.

2.6.11 Analog Alarms

Analog alarms are those conditions higher or lower than a defined value, as measured by an AI. Analog readings shall be compared to predefined high and low limits, and alarmed each time a value enters or returns from a limit condition. Unique high and low limits shall be assigned to each analog point in the system. In control point adjustment (CPA) applications, key the limit to a finite deviation traveling with the set point. The system shall automatically suppress analog alarm reporting associated with an analog point when that analog point is turned off.

2.6.12 Pulse Accumulator (PA) Alarms

Pulse accumulator alarms are those conditions calculated from totalized values of accumulator inputs or PA input rates that are outside defined limits as specified and shown. PA totalized values shall be compared to predefined limits and alarmed each time a value enters a limit condition. Unique limits shall be assigned to each PA point in the system.

2.6.13 Constraints

2.6.13.1 Equipment Constraints Definitions

Each control point in the database shall have PLC resident constraints defined and entered by the Contractor, including as applicable: maximum starts (cycles) per hour; minimum off time; minimum on time; high limit (value in engineering units); and low limit (value in engineering units).

2.6.13.2 Constraints Checks

All control devices connected to the system shall have the PLC constraints checked and passed before each command is issued. Each command point shall have unique constraints assigned. High and low "reasonableness" values or one differential "rate-of-change" value shall be assigned to each AI. Each individual point shall be capable of being selectively disabled by the operator from the Master monitoring and Control Station.

2.6.13.3 Command Priorities

A scheme of priority levels shall be provided to prevent interaction of a command of low priority with a command of higher priority. Override commands entered by the operator shall have higher priority than those emanating from applications programs.

2.6.14 Resident Application Software

The Contractor shall provide resident applications programs developed to achieve the sequences of operation, parameters, constraints, and interlocks necessary to provide control of the equipment connected to the control system. All application programs shall be resident in the PLC and shall execute in the PLC, and shall coordinate with each other, to insure that no conflicts or contentions remain unresolved.

2.6.15 Program Inputs and Outputs

The Contractor shall use program inputs listed for each application program to calculate the required program outputs. Where specific program inputs

are not available, a "default" value or virtual point appropriate for the equipment being controlled and the proposed sequence of operation shall be provided to replace the missing input, thus allowing the application program to operate.

2.6.16 Failure Mode

In the event of a PLC failure, the controlled equipment shall continue to function in the failure mode shown on the drawings submitted by the Contractor.

2.7 HUMAN MACHINE INTERFACE PANEL (HMI)

The HMI display shall be a backlit monochrome LCD display measuring 4.75" x 2.38" with 128 touch cells, 10 function keys, and 240K flash application memory. The City has used Allen-Bradly, PanelView 550 HMI panels.

2.7.1 Security

Access to any HMI function shall be restricted to the current user's security level.

2.7.2 Software

HMI configuration software shall be WindowsTM-based.

2.7.3 Parameter Requirements

The HMI shall be programmed to accept set point level parameters, pump sequence data, and Alarm or Fault information. The parameters shall be defined at the HMI during system set-up or as needed during system operation.

2.7.4 Data Display

During system operation, the following data shall be displayed at the HMI in plain English:

1) Process control data

(1) System setpoint (in Eng. units)
(2) Process input or output data (in Eng. units)

2) Fault diagnostics and acknowledgment

(1) Pump Fault status
(2) Process status
(3) Troubleshooting information
(4) Field device status
(5) High level alarms
(6) Low level alarms

3) System messages

(1) PLC CPU fault status
(2) PLC I/0 fault status

(3) Time and Date information

2.7.5 HMI Preprogrammed Function Keys

The pump package HMI shall include the function key, alarm status, and fault message programming. An example of the function key configuration is as follows:

1) F1 - System setpoint
2) F2 - Process Input value
3) F3 - Pump Sequence Auto
4) F4 - Pump Sequence 1-2
5) F5 - Pump Sequence 2-1
6) F6 - Manual Mode
7) F7 - Transducer Backup Mode

2.7.6 Displayed Units

All inputs and displayed values shall be presented in real-world units. (ie., PSI, RPM, etc..)

2.7.7 LEDS

The HMI shall provide the following signaling LEDs.

1) Communication 1
2) Firmware/hardware Fault 1

2.7.8 Communications

1) The HMI shall be connected to PLC through the DH485 port on the CPU.
2) The HMI shall include an RS232 asynchronous serial link port.
3) The HMI shall have access to all data registers and CPU system data as well as the PLC time-of-day clock.

2.7.9 Environment

The HMI shall be designed to operate under the following conditions:

1) Temperature 0 degrees C to 50 degrees C (32 degrees F to 122 degrees F)
2) Degree of Protection UL Type 4, NEMA type 4 and IP 65 conforming to UL 508 and IEC 60529
3) Electromagnetic Disturbance Conforming to IEC 61131-2

2.7.10 Enclosure

The HMI enclosure shall be constructed to meet NEMA type 12/13 and 4X.

2.7.11 Power Supply

HMI power supply requirements shall be as follows: 24VDC voltage, 18 to 30V voltage limits, with 25% maximum ripple. Power consumption shall be 10 W.

2.7.12 Fault Diagnostics

Automatic fault diagnostics shall allow plain language, self-troubleshooting procedures to be displayed at the HMI when a fault is detected. The operator presses the down arrow key for instructions on possible causes/fixes of faults.

2.8 COMMUNICATIONS

2.8.1 SCADA Host Controller

The City's master monitoring and control system includes a Zetron Model 1700 SCADA system controller configured for MODBUS communications protocol. The device is manufactured by Zetron, Inc. PO Box 97004, Redmond WA 98073-9704 USA, Ph: (425) 820-6363 Fax: (425) 820-7031 Email: Zetron@zetron.com. The master monitoring and control system shall be modified to add another control panel and a PLC that shall interface to the existing SCADA system controller. The master PLC shall interface to the existing radio by use of an external modem and interface logic. The new master PLC shall reuse the existing radio, coax cable, and antenna. The serial port on the new master PLC shall connect to the new external modem and the Ethernet port shall connect to the existing SCADA computer. Provide a new Ethernet hub for the PLC and SCADA computer. Provide a NEMA 1 wall mount enclosure with all of the circuit breakers, relay logic, dc power supplies, and UPS as required.

2.8.2 SCADA RTU(Existing)

The RTU units provided shall be compatible with the Zetron SCADA system controller. The equipment shall utilize standard Modbus communication protocols for communication throughout the pump controller package and shall allow Modbus messages to be sent to and from the PLC, the HMI, and any other Modbus-compatible network device. RTU functionality shall enable issuing commands, receiving commands, and gathering data either to or from Remote pump stations or main plant SCADA systems.

(1) The communication device and associated power supply units shall be contained in the main PLC enclosure of the pumping control system.

(2) The RTU shall enable polling over local area network/wide area network (LAN/WAN) devices functioning in a master/slave mode. The RTU option shall function in the following types of network structures: single-master/multi-slave network, multi-master/multi-slave network, variable time slot multi-master/multi-slave network.

(3) The RTU shall enable point-to-point communication between remote LAN/WAN RTUs and point-multipoint communication with master supervisory control and data acquisition (SCADA) systems.

(4) Any RTU in the network shall be able to function as a full master RTU. Each RTU shall provide unsolicited reporting capability, which allows any RTU to initiate communications in the event of an alarm condition or when a field device status changes. Unsolicited reporting shall be supported simultaneously with full integrity polling. Additionally, all RTUs shall support report by exception.

(5) The RTU shall communicate using Modbus ASCII or Modbus RTU protocol. When required, the RTU option shall include protocol conversion packages to ensure the ability to interface with proprietary

communications networks.

(6) The RTU shall be capable of sending Modbus messages from the PLC to. The RTU shall be capable of sending ASCII messages to modems for modem connectivity and to other ASCII devices (such as printers and displays) for visual display of process information. The RTU package shall support communication baud rates from 300 to 19,200 baud.

(7) The RTU shall incorporate an industry-standard communication interface that is capable of supporting various communication mediums. Supported communication mediums shall include spread spectrum and licensed frequency radios, dial-up or leased line modems, and fiber optics. All communications must be provided using Modbus industry-standard protocol.

(8) RTU diagnostics shall be accessible either at the RTU or (remotely) from the host. Battery health, I/O health, and other field device status data shall be available by means of LED indicators on the components themselves.

2.8.3 Radio

Provide radio with UHF Range/Scale 450 - 474 MHz tuned to operate at licensed frequency selected to avoid interference with 453.525-MHz. The City has currently standardized on Motorola M1225 UHF radios:

(1) Operational Modes:

a) Async. - Simplex, half-duplex.
b) Channels: 4 or 20 as required.

(2) Data Interface: (with the use of an external modem)

a) RS-232, DB-25 Female Connector Supports: TXD, RXD, RTS, CTS, DCD, RUS, AUX POWER, DSR, and GND.

(3) Transmitter:

a) Carrier Power: 25 to 40 Watts Programmable.
b) Duty Cycle: Continuous.
c) Output Impedance: 50 Ohms.
d) Channel Spacing: 12.5 kHz, 20/25 kHz selectable.

(4) Receiver:

a) Sensitivity (12dB SINAD): <0.35mV @ 12.5 kHz, and <0.30mV @ 20/25 kHz.
b) Adjacent Channel (EIA SINAD): 60 dB nominal @ 12.5 kHz, 70 db nominal @ 20/25 kHz.

(5) Power:

a) Audio Output (internal Speaker): 7.5 Watts @ 5%, Distortion 4.0 W Nominal.

2.8.4 Antenna System

The antenna system shall utilize vertical polarization antennas, communication links between transmitters/receivers and antennas, and matching networks as needed for the proper coverage. The antenna system shall be either omni-directional or shaped-coverage as selected by the Contractor based on the topography. The antenna system and cabling shall be furnished to provide adequate system gain. The antennas shall be capable of withstanding the environmental conditions of 125 mph wind and 1/2 inch radial ice without failure. Lightning protection shall comply with NFPA 780. Antenna supporting structures shall comply with EIA ANSI/TIA/EIA-222-F.

2.8.5 Grounding Conductors

Antenna grounding conductors shall be minimum 7-strand, No. 6 AWG copper.

2.8.6 Coaxial Cable

Transmission line between the transmitter/receiver and the antenna shall be 50-ohm impedance rated for the transmitter output power. As a minimum, cable shall exhibit an attenuation not exceeding 2.8 dB per 100 feet at 450 mHz.

2.9 UNINTERRUPTIBLE POWER SUPPLY (UPS)

2.9.1 General

The following requirements for UPS equipment is based on an Invensys, Model PW9120-0700. Invensys Powerware Division, 8609 Six Forks Road, Raleigh, NC 27615, Tel: 1.800.356.5794 or equal substitution is allowed:

1) Capacity: 700/490 VA/Watts
2) Input Connection: NEMA 5-15P.
3) Output Receptacles: 4 x NEMA 5-15R.
4) Topology: True Online, double-conversion.
5) Diagnostics: Full system self-test on power up.
6) UPS Bypass: Automatic on overload or UPS failure < 4ms.
7) Transfer Time to Battery: 0ms.
8) Overload Capacity: 125% for 10 minutes before transfer to bypass; 150% for 10 seconds before transfer to bypass

2.9.2 Electrical Input

1) Nominal Input Voltage: 120 VAC.
2) Input Voltage Range (for on-line operation): 80 to 140 VAC.
3) Operating Frequency (on-line) 50/60Hz ± 5Hz, auto sensing.
4) Input Protection: Fuse or Circuit Breaker.

2.9.3 Electrical Output

1) On Utility Voltage Regulation: ± 2% of nominal.
2) On Battery Voltage Regulation: ± 3% selected nominal voltage.
3) Nominal Output Voltage: Same as selected input voltage.
4) Output Voltage Waveform: Sine wave.
5) Output Voltage Distortion: <3% THD.

6) Output Protection: Electronic overload sensing, and circuit breaker protection.
7) Efficiency: Online Mode

2.9.4 Communications

1) User Interface: LCD status screen.
2) Audible Alarms: UPS alarm conditions, including On-Battery, Low Battery, Overload UPS Fault. Protection:
3) Network Transient Protector: In and out jack for all models tested to UL497A.
4) REPO Port: Meets NEC code 645-11 intent and UL requirements.
5) Communications: One RS232 Serial Port, One Communications Slot, One USB port.
6) Power Management Software: Powerware Software Suite CD.

2.9.5 Battery

1) Battery Type: Sealed, Lead-acid, Maintenance free.
2) Battery Runtime:

(1) Full load 7 minutes.
(2) Half load 18 minutes.

3) Recharge Time <4 hours to 90% capacity.
4) Start-On-Battery: Allows start of UPS without utility input.

2.9.6 Environmental

1) Safety Certifications: UL1778, cUL22.2 No. 107.1.
2) EMI Compliance: FCC Part 12, Class B.
3) Operating Temperature: 32 to 104°F.
4) Relative Humidity: 0% to 95% non-condensing.
5) Immunity: IEE C62.41, IEC 61000-4, -2, -3, -4, -5.
6) Network Transient Protector: UL497A.

(1) Audible Noise at 1 meter: <45dB.
(2) Altitude: 10,000 ft. without derating.

2.10 POWER SUPPLIES

Provide for relays and control equipment when required. Power supplies shall be rack or rail-mounted and sized for a capacity equal to 200 percent of the as-built control system, and shall operate at 24 Vdc or as required. Input and output shall be protected to permit Class 2 wiring in accordance with NFPA 70.

2.11 TRANSIENT PROTECTION

2.11.1 Power Line Surge Protection

Surge suppressors shall be installed on all incoming AC power. Surge suppressor shall be rated by UL 1449, have a fault indicating light, and have clamping voltage ratings below the following levels:

1) Unit is a transient voltage surge suppressor 120 VAC/1 phase/2 wire plus ground, hard wire individual equipment protector.
2) Unit must react within 5 nanoseconds and automatically reset.
3) Voltage protection threshold, line to neutral, starts at no more than 211 volts peak on the 120 VAC line.
4) The transient voltage surge suppressor must have an independent secondary stage equal to or greater than the primary stage joule rating.
5) The primary suppression system components must be pure Silicon Avalanche Diodes.
6) Silicon Avalanche Diodes or Metal Oxide Varistors are acceptable in the independent secondary suppression system.
7) The Transient Suppression System shall incorporate an indication light which denotes whether the primary and/or secondary transient protection components is/are functioning.
8) All system functions of the Transient Suppression System must be individually fused and not short circuit the AC power line at any time.
9) The Transient Suppression System shall incorporate an EMI/RFI noise filter with a minimum attenuation of 13 dB at 10 kHz to 300 MHz.
10) Meet ANSI/IEEE C62.11-1987
11) The system must comply with IEEE C62.41, Class "B" requirements and be tested according to IEEE C62.45.
12) The system shall operate at -20 degrees C to +50 degrees C.

2.11.2 Controller Input/Output Protection

Controller input/output points shall surge protection with optical isolation, metal oxide varistors (MOV), or silicon avalanche devices. Fuses are not permitted for surge protection.

2.12 RELAYS

2.12.1 Plug-in Relays

Relays shall comply with IEEE C37.90. Relays shall include three-pole, double-throw (3PDT) pure silver contacts rated 10-A up to 240-VAC. Relay coils shall be available in voltages from 6 to 240-vAC and 6 to 110-vDC. Relays shall include polycarbonate dust covers and LED indicators. Terminals shall be available in two styles, 8 or 11 pin tubular (octal) or .187" solder/quick-connect. Power consumption shall not be greater than 3 watts.

2.12.2 Time Delay Relays

Adjustable time delay relay basic requirements shall be similar to plug-in relays, but include double-pole, double-throw (DPDT) contacts. Selection of the time delay shall be accomplished using a 5 position rotary switch to select one of five time ranges to 999 minutes. A 3-digit pushbutton switch shall be used to select the amount of time delay required within each range.

2.13 PUSH BUTTONS

Push buttons shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Push buttons shall be NEMA type 4/4X heavy duty, round and shall mount in a 30.5 mm mounting hole. The number and type of contacts shall be as required by the Sequence of Control. Push buttons shall be rated for 600 volts, 10 amperes continuous operation. Push buttons shall be provided with a legend plate labeled as shown on the approved Contactor drawings.

2.14 SELECTOR SWITCHES

Selector switches shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Selector switches shall be NEMA type 4/4X, heavy duty, round and shall mount in a 30.5 mm mounting hole. The number of positions shall be as required by the Sequence of Control. Switches shall be non-illuminated. Switches shall be rated for 600 volts, 10 amperes continuous. Selector switches shall be provided with a legend plate labeled as shown on the approved Contactor drawings. When required, contacts shall be provided for the "AUTOMATIC" position to provide position sensing at the Master monitoring and Control Station, or workstation.

2.15 INDICATOR LIGHTS

Indicator lights shall comply with NEMA ICS 1, NEMA ICS 2 and UL 508. Lights shall be NEMA type 4/4X, heavy duty, round and shall mount in a 30.5 mm mounting hole. Indicator lights shall be LED type and shall operate at 120 vAC or 24 vDC, as required. Indicator light shall be provided with a legend plate labeled as shown on approved Contractor drawings. Lens color shall be as indicated on the drawings. All indicator lights shall be push to test (lamp) type.

2.16 ELAPSED TIME METER

Elapsed time meters shall be self-powered, 7 digit LCD type:

1) 24 to 240 volt AC Count input.
2) Seven digit LCD type, time range 0 to 3999d23,9h .
3) Key-protect switch to prevent front resetting.
4) Selectable time range: 999999.9h or 3999d23.9h and 999h59m59s or 99h59.9m.
5) NEMA 4/IP66 front.
6) Replaceable battery.

Similar to Omron Series H7ET, Omron electronics LLC, One East Commerce Drive, Schaumburg, IL 60173, el: 847-843-7900, FAX: 847-843-8081, Customer Service - Tel: 800-56-6766.

2.17 CONDENSATION HEATER

Provide a Thermostat controlled fan-driven heater unit. Anodized aluminum housing, 0 to 100 degrees F. adjustable thermostat, ball bearing fan, and terminal block. Size unit in accordance with manufacturers recommendations to maintain a temperature rise 20 degrees F. above ambient. Hoffman Bulletin D-85 or equal.

2.18 TERMINAL BLOCKS

Terminal blocks shall comply with NEMA ICS 4 and UL 1059. Terminal blocks for conductors exiting control panels shall be two-way type with double terminals, one for internal wiring connections and the other for external wiring connections. Terminal block features shall include nickel-plated high copper content copper-alloy terminals; stainless steel screws for superior corrosion resistance; Four-sided wire funnel guides for easy wire insertion; Finger-safe housings to prevent accidental contact with live circuits; DIN Rail (199-DR1) mountability allowing terminal blocks to be placed on the same channel as contactors, starters, relays, and other DIN Rail-mounted control devices; Self-extinguishing, polyamide 6.6 housing material with UL 94-V2 flammability rating. A terminal identification strip shall form part of the terminal block and each terminal shall be

identified in accordance with the numbering scheme on the approved wiring diagrams.

2.19 LEVEL SENSORS

2.19.1 Braided Steel Jacket

Provide a tubular braided stainless steel jacket to protect each float and analog level transmitter control cable in the wet well from rodent chewing. The braided jacket shall be seamless, stainless steel and flexible to allow proper float operation. The braided jacket shall be sized to fit snug around the cable with a minimum of 95% coverage. the braided stainless steel shall be fabricated from 0.020 diameter stainless steel wire.

2.19.2 Float Switches

Provide direct acting float switch consisting of a normally-open NON-mercury switch enclosed in a float, quantity as required. Use float molded of rigid high-density polyurethane foam, color-coded and coated with a durable, water and corrosion-resistant jacket of clear urethane. Provide connecting cable rated 600 volts in length as required. Use stainless steel or polyproplylene cable clamps. Support floats with 1/8" stainless steel, nylon coated wire rope, and minimum 13 lb. anchor weight. Provide a cast aluminum NEMA Type 4 junction box to connect float assembly. Use box with a gasketed cover with tapped float fitting and conduit entrance pipe threaded opening. Mount floats at fixed elevations as shown or required. Use floats designed to tilt and operate their switches causing sequential turn-on turn-off of the pump, when the liquid level being sensed rises or falls past the float.

2.19.3 Float Chain/Weight

Provide a 316 SS cable and 15 lb. cast iron anchor for attachment to the float switches. Provide one 20 ft chain and weight for each pump panel. Provide stainless steel mounting brackets and fasteners for clamping each float cable to the chain. The method of mounting shall be in accordance with the float and cable manufacturer's requirements.

2.19.4 Submersible Analog Level Transmitters

Provide Solid-state semiconductor sensors with 316L stainless steel housings, non-clogging protected sensor heads, vented to atmosphere through surface end of electrical leads. Use sensors designed for use in submersible applications where top down accessibility is preferred. Sensors shall use piezoresistive Silicon sensor with Oil Isolation. Contractor shall select sensor ranges based on pump station wetwell requirements. The City uses Drexelbrook Series 700 transducers from Amtek/Drexelbrook Controls Inc, 205 Keith Valley Road Horsham, PA 19044

1) Ranges 3 to 300 PSIG (20 bar)

(1) Vented Gage.
(2) Overpressure 2X Full Scale.
(3) Burst Pressure 3X Full Scale.
(4) Accuracy +/-0.25% of range (BFSL) includes linearity, hysteresis and repeatability.
(5) Input 12 - 40VDC.

(6) Output, 4 - 20mADC, limited to 30mADC.
(7) Compensated Temperature Range: -0 to 50°C, Thermal Effect +/-1% URL per 25°C between 0 to 50°C.
(8) Stability +/-0.5% Span/6 Months.

2) Process Connection:

(1) Electrical Connection Polyurethane Cable. Minimum length 100-feet; longer length as required for connection to supervisory control panel. No splices permitted in any cable run.

3) Wetted Materials:

(1) 316L Stainless Steel: a) Viton® Seal and Polyurethane Cable.

4) Approvals CSA Intrinsically Safe.

2.20 INTRINSICALLY SAFE RELAYS

2.20.1 Intrinsically Safe Repeater Barriers (analog)

Repeater barriers protect all circuits with intrinsically safe 4-20mA transmitters.

1) Input:

(1) Signal Range: 4-20mA.
(2) Power Supply to Transmitter: 15VDC stabilized.

2) Output:

(1) Signal Range: 4-20 mA.
(2) Maximum Load: 1000 ohms.

3) Transmission Characteristics:

(1) Synchronization Accuracy: Less than or equal to 20 µA.
(2) Ramp-up Time: Less than or equal to 50µA.

4) Power Supply:

(1) Supply voltage: 24VDC, +/-15%.

5) Mounting: Modular snap-in construction for 35 mm DIN rail.

6) Entity Parameters:

(1) Class I, II, III, Div. 1, Groups A-G.
(2) Voc: 23.30 V Ca: 069µF.

(3) Isc: 91.32mA La: 17.87mH.

2.20.2 Intrinsically Safe Relays (discrete)

Provide device with four independent channels, LED indication of channel activation, and Removable terminal blocks. The City currently uses GemSensors's Series 67 barriers. Gems Sensors Inc., One Cowles Road, Plainville, CT 06062-1198:

1) Contact Ratings:

(1) 10 amp (style C).
(2) 5 amp (style A).

2) Contact Design:

(1) Standard Normally Open, N.O., Normally Closed, N.C.

3) Primary Voltage:
(1) 120, 240 VAC, +10%, -15%, 60Hz.

4) Secondary Voltage:

(1) 12 VAC @6ma RMS.

5) Sensitivity:

(1) 4,700-100,000 ohms max. Factory set specific resistance.

6) Listing:

(1) UL 913
a) Motor Control.
b) Intrinsically safe.

2.21 SPECIAL-PURPOSE OR HEAVY-DUTY RECEPTACLES

Special-purpose or heavy-duty receptacles and power inlets shall be of the type and of ratings and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle-type plug or connector shall be furnished with each size receptacle and power inlet. Locking type devices rated more than 50 amperes, shall utilize a locking ring.

2.22 INTRUSTION DETECTION - BALANCED MAGNETIC SWITCH (BMS)

The BMS shall detect 6 mm 1/4 inch of separating relative movement between the magnet and the switch housing. Upon detecting such movement, it shall transmit an alarm signal to the alarm annunciation system.

2.22.1 BMS Subassemblies

The BMS shall consist of a switch assembly and an actuating magnetic assembly. The switch mechanism shall be of the balanced magnetic type. Each

switch shall be provided with three feet of flex stainless steel armored cable, an overcurrent protective device, rated to limit current to 80 percent of the switch capacity. Switches shall be rated for a minimum lifetime of one million operations. The housings of surface mounted switches and magnets shall be made of nonferrous metal and shall be weatherproof. The housings of recess mounted switches and magnets shall be made of nonferrous metal or plastic. Right angle mounting brackets shall be furnished with contact. Each contact shall connect to three feet of flex stainless steel armored cable.

2.22.2 Remote Test

A remote test capability shall be provided. The remote test shall be initiated when commanded by the alarm annunciation system. The remote test shall activate the sensor's switch mechanism causing an alarm signal to be transmitted to the alarm annunciation system. The remote test shall simulate the movement of the actuating magnet relative to the switch subassembly.

PART 3 EXECUTION

3.1 CONTROL SYSTEM DESCRIPTION

3.1.1 Master monitoring and Control Station

The master monitoring and control facility is located in the Wahpeton's Public Works Maintenance Facility.

3.1.1.1 Existing Telemetry Equipment

The existing master monitoring and control system telemetry equipment includes:

1) An Antenex Omni-directional antenna with antenna mast.
2) Times Microwave Systems LMR-400 coaxial cable.
3) Lighting and surge suppressors.
4) Motorola Model M1225 radio data-link operating on 453.525-MHz.
5) Zetron Model 1700 series RTU Controller configured for "Report-by-Exception", Modbus protocol, half-duplex operation.
6) Invensys/Best Power Model PW9125 uninterruptible power supply.
7) NEMA enclosure.
8) power and control wire in conduit.

3.1.1.2 New Telemetry Equipment

The Contractor shall provide new master monitoring and control system telemetry equipment that includes:

1) Omni-directional antenna with mast
2) Antenna coaxial cable.
3) Lighting and surge suppression.
4) Radio/Modem transceiver with RS232 interface to master PLC.
5) Master PLC with input and output modules as required.
6) New radio frequency and license selected to avoid conflict with 453.525-MHz
7) Invensys/Best Power model PW9120 uninterruptible power supply.
8) Ethernet interface to SCADA computer with Hub.
9) Circuit breaker for incoming power.

10) DC power supplies as required.
11) NEMA 1 enclosure.

Interface power and signal wires and conduit between existing master and new master PLC enclosures.

3.1.1.3 Operator Workstation

The existing operator workstation includes a personal computer with:

1) Windows NT operating system.
2) Allen-Bradley RSView32 graphical monitoring and control software.
3) Printer.
4) Uninterruptible power supply.

The Government will furnish the Contractor, upon request, a downloaded copy of the programmed interface from the existing master monitoring and control system. The Contractor shall use the existing interface program as a starting point for development of the expanded master monitoring and control interface. The Contractor shall coordinate the changes to the software with the City's automation Contractor. The Contractor shall be fully responsible for the proper documentation and operation of the delivered product, including any existing programming that is utilized.

The Contractor shall develop custom report printouts for the new pump stations that are equivalent to those presently in use on the existing master monitoring and control system.

The master monitoring and control system programming shall be installed and on-line within 90 days of start-up of the first pump station. Additional completed pump stations shall be incorporated into the master monitoring and control station within 30 days of successful start-up.

3.1.2 Supervisory Control Panels, (SCP), Pumping Stations

Provide new combination motor starters and supervisory(SCADA) controls for all new, and existing stormwater pumps, and sump pumps as indicated or required. The electrical service, and equipment requirements varies from station to station and is detailed on the contract drawings.

3.1.2.1 Pump Station 1

No requirements.

3.1.2.2 Pump Stations 2 and 3

Each station requires a new control panel, and SCADA system with new level and float control systems connected to operate an existing pump's combination motor starter. Reconfigure, and rewire existing equipment as required to provide a complete control system. Indicating lights and operators for the pump shall be installed on the new control panel deadfront. Electric service requirements shall be as indicated.

3.1.2.3 Pump Stations 4 and 5

Each station requires a new control panel, and SCADA system with new level and float control systems connected to operate one new sump pump, one new, and one existing storm water pump. Provide new combination motor starters for the new storm water and sump pumps. Locate the new combination starters

in the new control panel. Reconfigure, and rewire the existing combination motor starter equipment as required to provide a complete Control system. Indicating lights and operators for all pumps shall be installed on the new control panel deadfront. Electric service requirements shall be as indicated.

3.1.2.4 Pump Station 6

The station requires a new control panel, and SCADA system with new level and float systems connected to operate one new sump pump, and two existing storm water pumps. Provide a new combination motor starter for the new sump pump. Locate the sump pumps combination starter in the new control panel. Reconfigure and rewire the combination motor starters for the two existing pump's required for a complete Control system. Abandon the old pump control system in the existing panel. Indicating lights and operators for all pumps shall be installed on the new control panel deadfront. Electric service requirements shall be as indicated.

3.1.2.5 Pump Station 1A and 7

Each station is new and requires completely new control system consisting of a new control panel, and SCADA system with new level and float systems connected to operate one new sump pump, and two new storm water pumps. Provide new wall mounted combination motor starters for the new stormwater pumps and the new sump pump. Electric service requirements shall be as indicated.

3.1.2.6 Alarm & Telemetry(SCADA) System

Provide a new Telemetry System to report pump station alarms and status via FM radio to the master monitoring and control facility in the Wahpeton City Maintenance Department.

1) Reported Conditions:

Alarmed Conditions

Condition	Alarm Level
1. Pump Station	
a. Intrusion	A
b. High Temperature (Control Room/Enclosure)	B, C @ T = 36 hrs
c. Low Temperature (Control Room/Enclosure)	B, C @ T = 36 hrs
3. Wet Well	
a. Analog Level in ft. & in.	A, B, D
b. High Level	B, C @ T = 15 min
c. Low Level	B, C @ T = 15 min
4. Control	
a. Telemetry Failure	B, C @ T = 1 min
b. Programmable Controller(PLC) Power Fail	B, C @ T = 1 min
c. Phase Failure (Electric Service)	A, C @ T = 5 min
5. Pump Motor Controllers	
a. Pump Running	A
b. Pump Run Hours (Elapsed Time)	A
c. Excess Starts per Hour	A
d. Thermal Overload	C @ T = 5 min, D

Alarm levels are shown for information only.

Level A Display, Print & Store.
Level B Display, Print, Store & Note for next day service.

Level C Display, Print, Store & Alarm for immediate or emergency service. T = Time Delay. All time delays shall be adjustable through control program.
Level D Display.

3.1.2.7 Control System I/O Points

The Contractor shall prepare a control system Input/Output (I/O) Summary Table and submit it for approval. Each connected analog output (AO), analog input (AI), digital output (DO), digital input (DI), pulse accumulator (PA) input and other input or output device connected to the control system shall represent a "point" where referred to in this specification.
Symbols, Definitions, and Abbreviations Symbols, definitions, and engineering unit abbreviations shall conform to IEEE Std 100, as applicable.

3.1.3 Description of Operation

3.1.3.1 Pump Controller

Provide PLC controllers configured to operate 1 or 2 stormwater pumps, and 1 sump pump depending on station configuration. The PLC shall provide the following functions:

(1) The PLC shall monitor and alarm the building doors at Stations 1A and 7, and the opening of cabinet doors at each outdoor station. The alarm shall occur after 45 seconds. Provide a key switch on the SCP to acknowledge alarms. It shall be possible to schedule alarms based on the time of day. It shall be possible disable the alarm function. It shall be possible to set up the alarm system via the HMI or the remote workstation.

(2) The PLC shall monitor and report the status of Main and Standby power systems. Initiate alarm at the remote workstation to indicate emergency power operation.

(3) The PLC shall monitor and report the status of the phase failure, phase reversal relay.

(4) The system shall monitor and display the analog level in the wet well via the HMI, and remote workstation. All fluid level sensing and operator set-point inputs shall be directly entered and manipulated in feet and inches of water depth above mean sea level. Each Pump START and STOP elevation shall be user adjustable via HMI panel and the remote workstation. A four digit user level password is required to change settings.

(5) PLC shall provide level controlled automatic alternation of lead-lag pumps at duplex stations. Sump pumps shall be not be included in any alternation scheme.

(6) Auto, 1-2, 2-1 duplex pump alternation shall be selectable via the HMI and the remote workstation.

(7) Should a motor starter open during operation, start the next pump(s) in the sequence, stop the failed pump, and initiate the appropriate alarm.

(8) The control scheme shall include time delays to prevent simultaneous pump starts. Staged starting of pumps shall occur upon recovery from power failure or transfer to emergency power.

(9) Sump pumps shall be directly controlled dedicated ON and OFF floats. Sump pumps shall not run when the stormwater pump(s) are operating. The floats shall be adjusted to handle low-level seepage flows during flood events when storm water pumps have shut off, and maintain a "dry" wet well between flood events.

(10) It shall be possible to turn on any pump from the remote workstation provided enough water is in the wet well.

(11) Should a power monitoring system indicate problems during operations, the PLC shall initiate the appropriate alarm.

(12) PCL shall monitor and report to the remote workstation the following conditions for each pump.

a) HOA Selector switch in AUTO
b) Pump run time
c) Pump running
d) Pump Overload tripped

3.1.3.2 Backup Controls

All pumps including the sump pump shall include ON and OFF floats with intrinsic barriers. Duplex pumps stations shall have a relay based duplex pump alternator device with LEAD, LAG, and COMMON OFF floats. The alternator shall function upon analog level transducer, PLC failure, or when commanded via the HMI or remote workstation. The backup controls shall be initiated by a HIGH LEVEL alarm float. It shall start any non-operating pump and initiate alarm via telemetry. The system shall be reset With the ALARM RESET pushbutton on the SCP. It shall be possible to reset the system from the remote workstation. The High Level alarm float shall only trigger the high level alarm one time until the alarm reset pushbutton is activated. Each concurrent time that the High Level alarm float is activated to restart the backup float pumps the High Level alarm shall not be retriggered.

3.1.3.3 Pump Motor Starter Controls

1) Provide each pump with HAND-OFF-AUTOMATIC switches to control operation. HAND operation shall bypass all floats.

2) When pumps are running activate running time meters and run lights.

3) Each starter shall include TIMED DELAY ON OFF - BACKSPIN timer to prevent pump starts while the discharge pipes empty.

3.2 PANEL FABRICTATION REQUIREMENTS

3.2.1 Separately Mounted Combination Starters

Enclosures for separately mounted combination motor starters installed at stations 1A and 7 shall be fabricated in accordance with paragraph COMBINATION STARTERS.

3.2.2 Supervisory Control Panels (SCP)

Circuit breaker operating handles, and items 1) thru 14) shall be through mounted in enclosure doors, and through mounted in deadfront inner doors of outdoor enclosures. The supervisory control panels shall include the following as applicable:

1) HMI Flat-panel Operator interface module.
2) Lamp test pushbutton.
3) Intrustion alarm keyswitch.
4) Alarm reset push button.
5) Phase failure pilot light.
6) Processor running pilot light.
7) High wetwell pilot light.
8) Low wetwell pilot light.
9) Power on pilot light.
10) Run-time meter, for each pump including sump pump
11) Hand off automatic switches for each pump including sump pump.
12) Ready to run pilot light for each pump including sump pump.
13) Run pilot light for each pump including sump pump.
14) Pump failure pilot light for each pump including sump pump.
15) Transient Protection.
16) Uninterrupted Power Supply.
17) Power supply(s) as required.
18) Radio antenna and mast.
19) Radio/Modem transceiver.
20) Panel Interior Light.
21) Convenience Outlet.
22) Ventilation System.
23) Condensation Heater.
24) Programmable Logic Controller (PLC) with input/output and communications modules as required.
25) Relays and timers for control functions.
26) Outdoor Control Panels Only, and as required.

(1) Power inlet receptacle for emergency generator set.
(2) Walking-beam type mechanically interlocked "MAIN" and "STANDBY" circuit beakers.
(3) UL SUSE listing.
(4) Circuit breaker protected combination motor starters for stormwater and sump pumps sized as required.
(5) Lighting circuit for pump station lighting standard.
(6) Panel intrusion switch.

3.2.2.1 SCP Assembly

All panels shall be factory assembled and shipped to the jobsite as a single unit. Organize the front panel space for an HMI flat screen Operator Interface Panel, HOA's, alarm lights, pushbuttons, circuit breaker handles etc. Provide all control panels installed outdoors with an outer locking weather door and inner "deadfront" door pump stations. Each panel shall be fabricated for bottom-entry connection of control system electrical power, grounding, control system wiring, and communications system wiring.

3.2.2.2 Electrical Requirements

1) Electric Service

Provide underground electric services rated, 277/480 Volts, three phase, four wire from the utility company transformer to the Supervisory Control Panel. Pump Stations 1A and 7 have differing requirements. See Contract Drawings for additional information.

2) Standby Power(Outdoor Panels)
Provide UL listed mechanically-interlocked, "walking-beam," circuit breakers for "Line" or "Standby" power. The both breakers shall be fully rated. Include a properly sized weatherproof power inlet receptacle and plug set mounted on the exterior of each pump panel enclosure.

3) UPS System
Each SCP include a UPS system as required in paragraph UNINTERRUPTIBLE POWER SUPPLY (UPS)

4) Field Connections (All Stations)
Power, control, and instrumentation field wiring connections shall terminate inside the panels on dedicated terminal blocks.

5) Grounding
SCP enclosures shall be equipped with a solid copper ground bus or equivalent. The ground bus shall be securely anchored to the enclosure so as to effectively ground the entire structure. Clamp-type terminals sized large enough to carry the maximum expected current shall be provided on the ground bus for grounding cables. Where a definite circuit ground is required, a single wire not less than #10 AWG shall run independently to the panel ground bus and shall be fastened to the ground bus with a bolted terminal lug. Cases of instruments, relays and other devices shall be effectively grounded through the enclosures steel structure unless otherwise indicated. Insulated wiring having a continuous rated current of not less than the circuit fuse rating shall be used for grounding. Grounding terminals of power receptacles shall be solidly grounded to the panel enclosure.

6) Power Line Surge Protection
SCP panels shall be protected from power line surges. Protection shall meet the requirements of IEEE C62.41. Fuses shall not be used for surge protection.

7) Sensor and Control Wiring Surge Protection
Digital and analog inputs shall be protected against surges induced on control and sensor wiring. Digital and analog outputs shall be protected against surges induced on control and sensor wiring installed outdoors and as shown. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both the normal and common mode using the following two waveforms: The first waveform shall be 10 microseconds by 000 microseconds with a peak voltage of 1500 volts and a peak current of 60 amperes. The second waveform shall be 8 microseconds by 20 microseconds with a peak voltage of 1000 volts and a peak current of 500 amperes.

3.2.2.3 Convenience Outlet

A 120 volt ac, 20 amp, ground fault interruption (GFI) type duplex convenience outlet shall be provided inside the panel, or through the deadfront inner panel. The outlet circuit shall be separate from the panel power circuit.

3.2.2.4 SCP Interior Light

Each SCP shall be provided with a 40 watt fluorescent light. The light shall be operated by a manual on-off switch mounted on the interior door of the enclosure. The light shall be powered by the same circuit as the convenience outlet.

3.2.2.5 Intrusion switch (Outdoor Panels only)

Provide an intrusion switch to report each door opening via the PLC, and telemetry system.

3.2.2.6 Ventilation System

Each SCP shall be provided with two single phase, 120 volt ac ventilation fans. Each fan shall supply a minimum of 50 L/s 100 cfm of ventilation air through the enclosure. Each fan shall be provided with a line voltage thermostat. Thermostat set points shall be adjustable in a range of 70 to 140 degrees F as a minimum. Each supply and exhaust grille shall contain a bug screen and filter that is easily removed for cleaning or replacement.

3.2.2.7 Heating System

Provide all indoor and outdoor SCPs with single or multiple thermostat controlled fan-driven heater units in accordance with paragraph "CONDENSATION HEATER."

3.2.2.8 Identification

1) Nameplates
Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place. Laminated plastic nameplates shall be provided for equipment, and panels furnished. Each nameplate shall identify the device, such as pump "P-1". Labels shall be coordinated with the schedules and the approved shop drawings. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 by 3 inches with minimum 1/4 inch high engraved block lettering. Nameplates for devices smaller than 1 by 3 inches shall be attached by a nonferrous metal chain. All other nameplates shall be attached on or adjacent to the device.

2) Component, Terminal and Wire Identification
Identify each wire and device as indicated on approved elementary drawings. Provide screw-applied, engraved, black, laminated plastic nameplates with white letters for control equipment mounted on the deadfront and backpanel. Label wire and cable 1/2" from each termination with properly sized and oriented computer printed self-laminating vinyl labels. For wire use Brady Catalog # WML-205-292-1 (Brady P/N 32408) or equal. For cable use Brady Catalog # WML-311-292 (Brady P/N 32405) or equal. Label all terminal blocks with computer printed vinyl-cloth markers. The use of "DYMO" type labels is not permitted anywhere.

3.3 SPARE PARTS

Spare indicator lamps, fuses, control relays (modules), transient protection devices, thumbwheels, digital operator terminal and time delay relays (modules) shall be provided in a quantity of not less than 10 percent (round quantity up to next whole number) of the quantity used, but at least three spare lamps and two spare fuses each type and size shall be provided.

Provide the following spare parts.

1) Relays - 5% or a minimum of 5 each type.
2) Plug-In Modules or Cards for PLC or telemetry, - 5% or a minimum of 1 each type.
3) Switches or rheostats - 5% or a minimum of 1 complete assembly, each type.
4) LED Indicator Lights and Lens Caps - 10% or a minimum of 2 complete assemblies, each type.
5) Elapsed time Meter - one.
6) Surge Arrester - one each type.
7) Intrusion Detector - one each type.
8) DC Power supply - one of each type.
9) Provide additional items as recommended by the manufacturer.

3.4 EQUIPMENT INSTALLATION REQUIREMENTS

The Contractor shall assure that system components and appurtenances have been installed in accordance with the installation instructions provided, and that necessary interconnections, services, and adjustments required for a complete and operable system are provided. The Contractor shall assure that instrumentation and communication equipment and cable grounding has been installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. The Contractor shall adjust or replace devices not conforming to the required accuracies. Factory sealed devices shall be replaced rather than adjusted.

3.5 WIRE, CABLE AND CONNECTING HARDWARE

3.5.1 Metering and Sensor Wiring

Metering and sensor wiring shall be installed in accordance with the requirements of ANSI C12.1, NFPA 70, and Section 16415 ELECTRICAL WORK, INTERIOR.

3.6 SOFTWARE INSTALLATION AND REQUIREMENTS

The Contractor shall furnish and install software, and equipment associated with the Master Monitoring and Control station, and it's Operator Workstation, as specified, as shown, or as required in the manufacturer's instructions for a complete and fully operational control system. The master control station shall be on-line within 90 days of start-up of the first pump station. Additional completed pump stations shall be incorporated into the master control station within 30 days of successful start-up of that station. Completion of the programming required to add pumping stations from later stages shall be scheduled to coincide with pump station construction contract completion schedules.

3.6.1 Software Installation

The Contractor shall load software required for an operational control system, including databases (for points specified, shown, or required), operational parameters, and system, command, and application programs. The Contractor shall adjust, tune, debug, and commission all software and parameters for controlled systems to assure proper operation in accordance with the sequences of operation and database tables.

3.7 CONTROL SYSTEM OPERATING INSTRUCTIONS

Provide non-fading half-size Control drawings in laminated plastic, and reproducibles, with corresponding CADD files for equipment furnished and for interfaces to equipment at each respective equipment location. Provide similarly protected condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation and procedures for safely starting and stopping the system manually. Instructions shall be prepared in typed form, and reproducible, with corresponding word processor files. The instructions shall be posted with the diagrams. Diagrams and instructions shall be submitted prior to posting.

3.8 FACTORY TEST

The control system shall be tested at the factory prior to shipment. Written notification of planned testing shall be given to the Government at least 21 days prior to testing, and in no case shall notice be given until after the Contractor has received written Government approval of the test procedures.

3.8.1 Factory Test Setup

The Contractor shall assemble and integrate the factory test setup as specified to prove that performance of the system satisfies all requirements of this project, including system communications requirements in accordance with the approved test procedures. The factory test shall take place during regular daytime working hours on weekdays. Equipment used shall be the same equipment that is to be delivered to the site. The factory test setup shall include the following:

	Factory Test
2) Test set	One of each type.
3) Portable tester	One of each type.
6) I/O functions	Sufficient to demonstrate the I/O capability and system normal operation.
7) Software	Required for proper operation of the proposed system including application programs and sequences of operation.

3.8.2 Factory Test Procedure

Test procedures shall define the tests required to ensure that the system meets technical, operational, and performance requirements. The test procedures shall define location of tests, milestones for the tests, and identify simulation programs, equipment, personnel, facilities, and supplies required. The test procedures shall provide for testing all control system capabilities and functions specified and shown. The procedures shall cover actual equipment and sequences to be used by the Contractor for the specified project and shall consist of detailed instructions for test setup, execution, and evaluation of test results. The test reports shall document results of the tests. Reports shall be delivered to the Government within 7 days after completion of each test. Surge testing need not be conducted if the Contractor can provide acceptable documented proof that such testing has been satisfactorily demonstrated to the Government with identical surge protection applied. The procedures shall include the following:

Test Procedure

1) Equipment	Block diagram.
2) Hardware and software	Descriptions.
3) Commands	Operator commands.
4) I/O functions	Test database points with failure modes.
5) Passwords	Required for each operator access level.
6) Each type of digital and analog point in the test database	Description.
7) Test equipment	List.
8) Surge protection	Circuit diagrams.
9) Inputs required (I/O values and status) and corresponding expected results of each set of input values	Point for each application program.
10) Default values	For the application program inputs not implemented or provided for in the contract documents for the application programs to be tested.

3.8.3 Factory Test Report

Original copies of data produced during the factory test, including results of each demonstration procedure, shall be delivered to the Government at the conclusion of the test, prior to Government approval of the factory test. The report shall be arranged so that commands, responses, and data acquired are correlated to allow logical interpretation of the data.

3.9 DELIVERY AND STORAGE

The Contractor shall coordinate the actual delivery location and schedule of items for each pump station with the Contracting Officer. The Contractor shall ensure that any interim storage facility utilized, before actual installation, provides acceptable protection for the equipment until they are installed.

3.10 FIELD TESTING AND ADJUSTING EQUIPMENT

3.10.1 Personnel, Equipment, Instrumentation, and Supplies

The Contractor shall provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Government will witness the Performance Verification Test (PVT), and written permission shall be obtained from the Government before proceeding with the testing. Original copies of data produced, including results of each test procedure, during PVT shall be turned over to the Government at the conclusion of each phase of testing before Government approval of the test. The test procedures shall cover actual equipment and functions specified for the project.

3.10.2 Testing, Adjusting and Commissioning

Once the installation has been completed, the Contractor shall test, adjust, and commission each system, and shall verify proper operation of each item in the sequences of operation, including hardware and software. The Contractor shall calibrate field equipment, including control devices, adjust control parameters and logic (virtual) points, and verify data communications before the system is placed online. Ground rods installed by the Contractor shall be tested as specified in IEEE Std 142. The Contractor shall calibrate each instrumentation device connected to the master control system control network by making a comparison between the reading at the device and the display at the workstation, using a standard at least twice as accurate as the device to be calibrated. The Contractor shall check each control point within the control system control network by making a comparison between the control command at the central station and field-controlled device. The Contractor shall verify operation of systems in the specified failure modes upon Control system network failure or loss of power, and verify that systems return to control system control automatically upon a resumption of control system network operation or return of power. The Contractor shall deliver a report describing results of functional tests, diagnostics, calibrations and commissioning procedures including written certification to the Government that the installed complete system has been calibrated, tested, adjusted and commissioned and is ready to begin the PVT. The report shall also include a copy of the approved PVT procedure.

3.10.3 Performance Verification Test (PVT)

The Contractor shall prepare test procedures for the PVT. The test procedure shall describe all tests to be performed and other pertinent information such as specialized test equipment required and the length of the PVT. The test procedures shall explain, in detail, step-by-step actions and the expected results, to demonstrate compliance with all the requirements of the drawings and this specification. The test procedure shall be site specific and based on the inputs and outputs, required calculated points and the sequence of control. The Contractor shall demonstrate that the installed control system complies with the contract requirements. All physical and functional requirements of the project including communication requirements shall be demonstrated and shown. The Contractor shall demonstrate that each system operates as required in the sequence of operation. The PVT as specified shall not be started until after receipt by the Contractor of written permission by the Government, based on the Contractor's written report including certification of successful completion of testing, adjusting and commissioning as specified, and upon successful completion of training as specified. Upon successful completion of the PVT, the Contractor shall deliver test reports and other documentation as specified to the Government.

3.10.4 Government Acceptance of Performance Verification Test

Acceptance of the PVT is contingent upon successful completion of a 14 day endurance test of the certified system. The system will be operated 24 hours per day, 7 days per week, for 14 consecutive calendar days, including holidays, and the system shall operate as specified. If any failure occurs during the test, the Contractor shall identify failures, determine causes of failures, repair failures, and deliver a written report to the Government. The report shall explain in detail the nature of each failure, corrective action taken, and the results of tests performed. Upon correction of the deficiencies, the 14 day endurance test shall be repeated. The PVT for each system will be accepted when the endurance test has been successfully completed.

3.11 TRAINING

The Contractor shall provide complete training for the operation and maintenance of all portions of the pump station control systems, for representatives of the city who will be responsible for system operation.

3.11.1 Operator Training

Systematic operator training shall be provided on the function, operation, and maintenance of each component within the control system, by trainers who have complete understanding of the system provided, and are certified to teach the required materials.

3.11.2 Equipment Maintenance Training

Provide maintenance training for equipment, and software systems that are different from the current in-place system. Training allowance shall cover materials, and manuals for a minimum of four maintenance persons to attend.

3.11.3 Training Documentation

Training shall make use of the supplied documentation for the systems, and shall familiarize the operators with the operations manual, system component assembly drawings, and other documents provided.

3.11.4 Familiarization Training

The Contractor shall provide training and familiarization sessions with representatives of the city for each pump station configuration as it is completed and brought 'on-line'. Similarities and differences between the new pump station configuration, and others already in operation shall be highlighted.

3.11.5 Training Videotape

The Contractor shall videotape all onsite training sessions.

3.12 ACCEPTANCE

Payment for each pump station control system shall be made upon acceptance of that station. The Contracting Officer will inspect the delivered equipment within five calendar days after delivery to the designated pump station. The inspection shall include an accounting of the items delivered and a visual inspection of each item in order to determine any visible damage occurred before delivery. If this inspection reveals any defects or deviations from contract requirements that could render the item unsuitable (as determined by the Contracting Officer) for the use intended, the Contractor shall either completely replace such identified item with a new acceptable item or, if approved by the Contracting Officer, perform repairs to remedy all identified deficiencies on the non-acceptable item. In the event deficiencies cannot be acceptably corrected, such supply items will be rejected.

3.13 WARRANTY

3.13.1 Commercial Warranties

In addition to any other warranties required by this contract, the Contractor shall provide the Government with any commercial warranties that

would be given to its customers in normal commercial practice. The Contractor shall also pass through to the Government any warranties provided to it by any subcontractor or supplier under this contract and take such actions as are necessary to make those warranties enforceable by the Government.

3.13.2 Warranty Assignments

Any warranties provided to the Government under this contract may be assigned, in whole or in part, to the City of Wahpeton, ND. The Government may assign those warranties by written notice to the Contactor and the assignee. The assignee may enforce the provisions of the warranties directly, or request that the Government enforce them under the terms of this contract, or both.

3.13.3 Continuity of Service

In addition to the warranties of supplies, materials and workmanship required elsewhere in this contract, the Contractor shall insure that the City of Wahpeton's master control system is at all times operable and compatible with the pump stations as they are added to the system. The term "pump stations" includes the controls, level sensors, and telemetry systems provided by the Contractor as well as the pumps, motors and equipment provided by others at each individual pumping site. The "master control system" is the centrally located telemetry and computer system in the city, which provides for monitoring and control of all pump stations. The new pump stations will be added to the master control systems (individually or in combination) over the period of the Contract. The Contractor is responsible for insuring that the master pump control system operates continuously as designed from the time that the first new pump station is added to the system until two years after the last pump station is accepted by the Government.

-- End of Section --