

Information for File # 2014-03355-MMJ; Nelson Wetland Restoration Project, Orono, MN

Applicant: Dr. Glen Nelson

Corps Contact: Melissa Jenny

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Phone: (651) 290-5363

Primary County: Hennepin

Location: SW ¼ Sec. 5, T. 117, R. 23 W.

Information Complete On: 9/29/14

Posting Expires On: 10/8/2014

Authorization Type: MN-LOP-05

This application is being reviewed in accordance with the practices for documenting Corps jurisdiction under Sections 9 & 10 of the Rivers and Harbor Act of 1899 and Section 404 of the Clean Water Act identified in Regulatory Guidance Letter 07-01. We have made a preliminary determination that the aquatic resources that would be impacted by the proposed project are regulated by the Corps of Engineers under Section 404 of the Clean Water Act. Our jurisdictional review and final jurisdictional determination could result in modifications to the scope of the project's regulated waterbody/wetland impacts and compensatory mitigation requirements identified above. An approved jurisdictional determination will be made prior to reaching a permit decision, and will be posted on the St. Paul District web page at <http://www.mvp.usace.army.mil/>.

PROJECT DESCRIPTION AND PURPOSE: The proposed project includes the ecological restoration/enhancement of approximately 3 acres of degraded wetland currently consisting of invasive cattails, purple loosestrife, and reed canary grass. The applicant proposes to remove invasive vegetation throughout the wetland using herbicide treatment, followed by a prescribed burn and a second herbicide treatment. Under frozen conditions an excavator would be used to excavate approximately 2,588 cubic yards of soil (~4 ft deep) from an approximately 0.50 acre portion of the wetland to create an area of deep marsh habitat and to control invasive vegetation. The upper foot of soil would be removed from the site. The remaining excavated material would be thin-spread (~1 ft thick) over lower portions of the wetland to a maximum elevation of 964.5 feet to maintain wetland conditions. In order to maintain existing intermittent flows in the wetland, two meandering channels would be constructed between the proposed deep

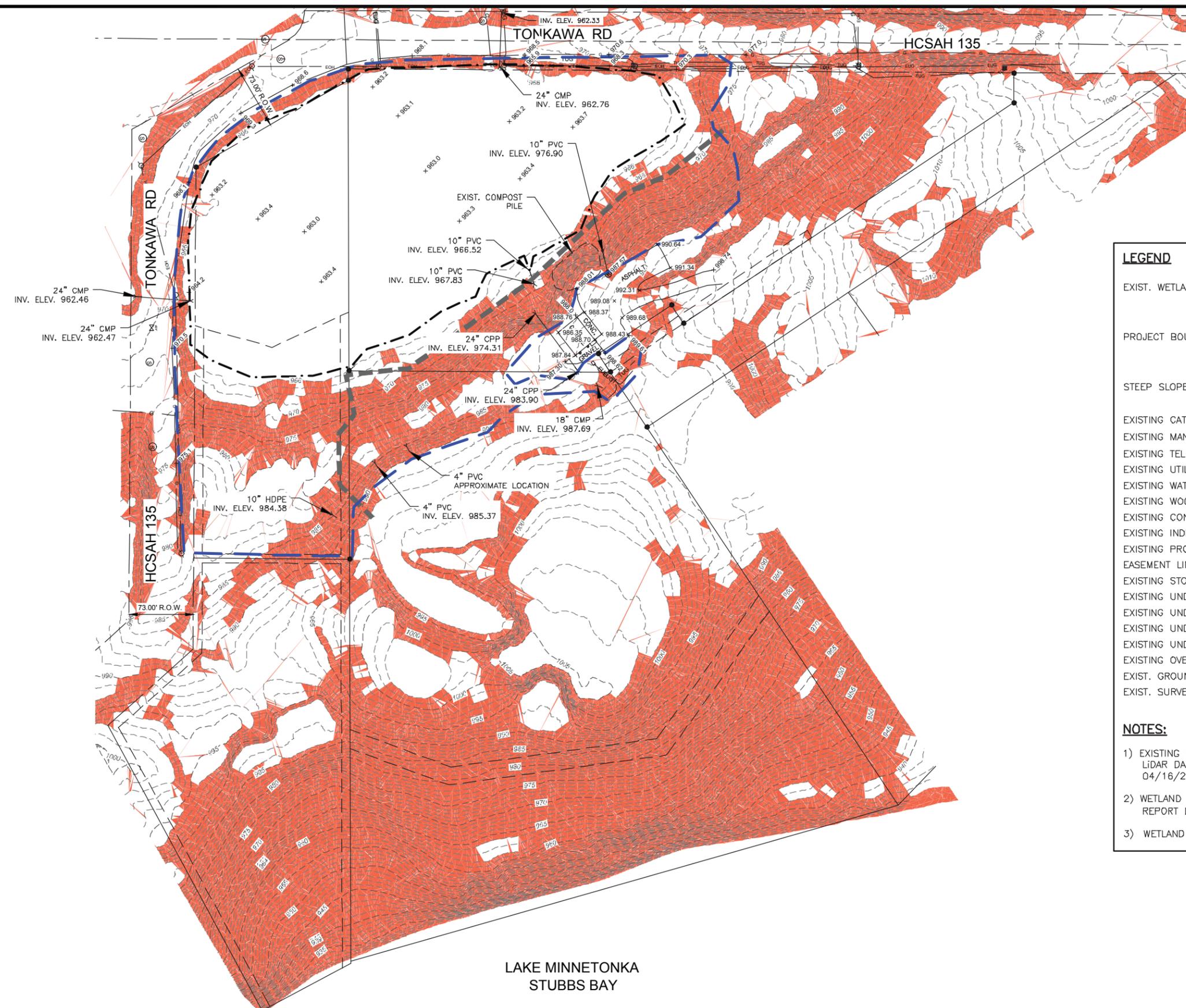
marsh area and two existing culverts beneath Tonkawa Road, located on the south and west edge of the wetland. These actions would restore the wetland to a diverse habitat complex of native wet meadow, deep marsh, and lowland hardwood swamp wetland communities. Surrounding upland buffer areas are currently being restored through invasive plant removal (e.g., buckthorn, garlic mustard) and installation of native seed and plants. Two proposed rain gardens (designed separately) would manage and treat 1.42 acres of runoff prior to entering the wetland. The attached plan sheet illustrates all elements of the proposed restoration/enhancement project.

NAME, AREA AND TYPES OF WATERS (INCLUDING WETLANDS) SUBJECT TO LOSS: The project would involve excavation activities within the existing wetland basin resulting in the conversion of approximately 0.50 acre of shallow marsh type wetland to deep marsh type wetland. Excavated material would be thin-spread over the remaining portion of the wetland basin resulting in the conversion of approximately 1.60 acres of shallow marsh type wetland to wet meadow type wetland.

ALTERNATIVES CONSIDERED: The applicant considered the no build option, but determined that it was not feasible because it would not meet the overall purpose of the project; to enhance/restore approximately 3 acres of degraded wetland. The applicant also considered deepening a larger portion of the wetland basin but determined that restoring a larger wet meadow type wetland community would better meet the project purpose because it would result in a greater functional lift to the wetland basin.

COMPENSATORY MITIGATION: The applicant has not proposed compensatory wetland mitigation for this project. The project is intended to improve the resource and would not result in the loss of any wetland area, functions or services.

DRAWINGS: See attached.

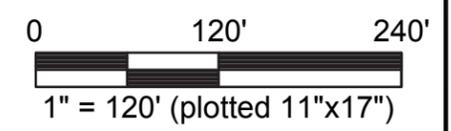


LEGEND

- EXIST. WETLAND A (2.98 ACRES)
- PROJECT BOUNDARY (5.65 ACRES)
- STEEP SLOPE (>12%)
- EXISTING CATCH BASINS
- EXISTING MANHOLE (SAN)
- EXISTING TELEPHONE PEDESTAL
- EXISTING UTILITY POLE
- EXISTING WATER VALVE
- EXISTING WOODCHIP TRAIL
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- EXISTING PROPERTY LINE
- EASEMENT LINE
- EXISTING STORM CULVERT
- EXISTING UNDERGROUND WATER
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND TELEPHONE
- EXISTING OVERHEAD ELECTRIC
- EXIST. GROUND SPOT ELEVATION
- EXIST. SURVEY MONUMENT FOUND

NOTES:

- 1) EXISTING GROUND CONTOUR LINES FROM HENNEPIN COUNTY LIDAR DATA. SPOT ELEVATIONS SHOT BY HR GREEN, 04/16/2014.
- 2) WETLAND DELINEATION PERFORMED BY AES, 05/23/2013 (FINAL REPORT DATED 12/23/2013).
- 3) WETLAND A CONTRIBUTING DRAINAGE AREA: ≈16.5 ACRES.



DRAWN BY: EMK
 APPROVED: DMM, DM
 CAD DATE: 8/13/14
 CAD FILE: 120975cst20140813-Topo.dwg

NO.	DATE	BY	REVISION DESCRIPTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

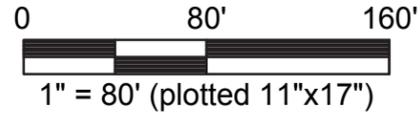
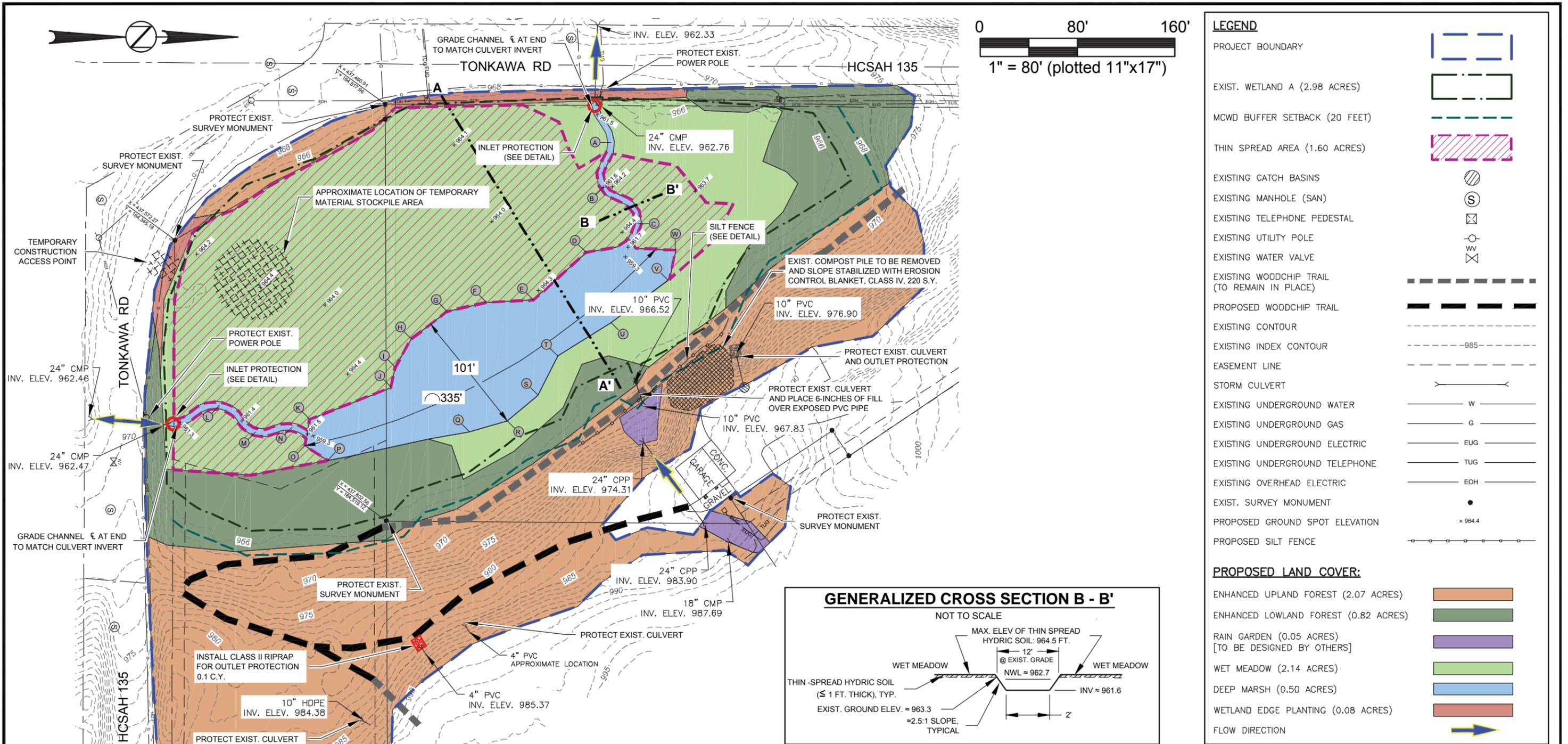
SIGNATURE:
 DATE: 8/15/2014 Daniel Mielke REG. NO. 50925



NELSON RESTORATION
 ORDNO, MINNESOTA

FINAL DESIGN SUBMITTAL
 EXISTING TOPOGRAPHIC MAP

SHEET NO.
 2.0

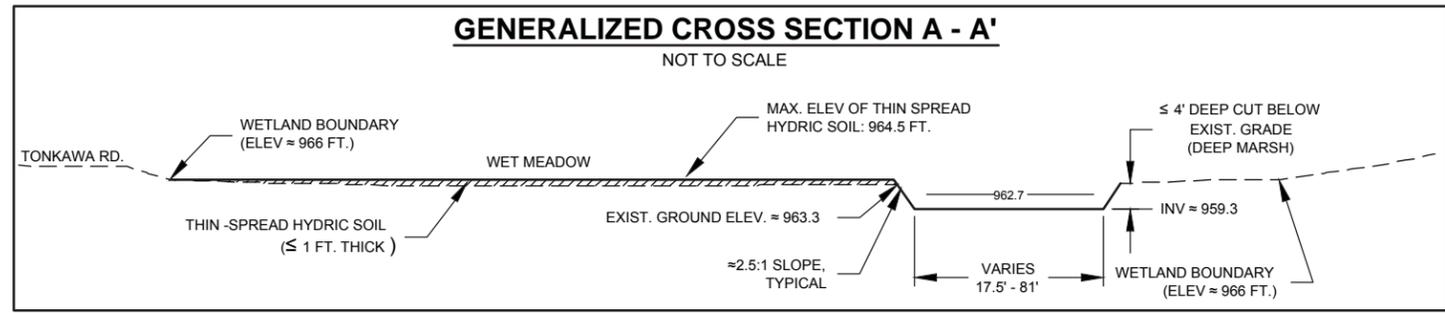
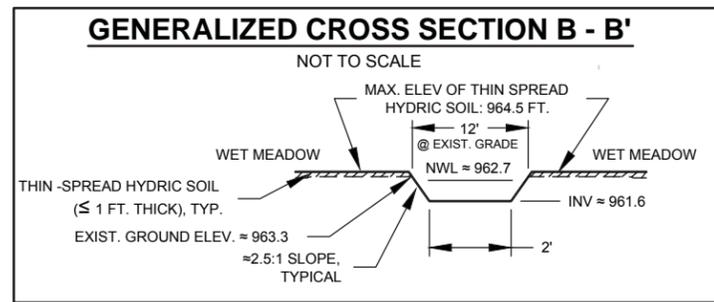


LEGEND

PROJECT BOUNDARY	
EXIST. WETLAND A (2.98 ACRES)	
MCWD BUFFER SETBACK (20 FEET)	
THIN SPREAD AREA (1.60 ACRES)	
EXISTING CATCH BASINS	
EXISTING MANHOLE (SAN)	
EXISTING TELEPHONE PEDESTAL	
EXISTING UTILITY POLE	
EXISTING WATER VALVE	
EXISTING WOODCHIP TRAIL (TO REMAIN IN PLACE)	
PROPOSED WOODCHIP TRAIL	
EXISTING CONTOUR	
EXISTING INDEX CONTOUR	
EASEMENT LINE	
STORM CULVERT	
EXISTING UNDERGROUND WATER	
EXISTING UNDERGROUND GAS	
EXISTING UNDERGROUND ELECTRIC	
EXISTING UNDERGROUND TELEPHONE	
EXISTING OVERHEAD ELECTRIC	
EXIST. SURVEY MONUMENT	
PROPOSED GROUND SPOT ELEVATION	
PROPOSED SILT FENCE	

PROPOSED LAND COVER:

ENHANCED UPLAND FOREST (2.07 ACRES)	
ENHANCED LOWLAND FOREST (0.82 ACRES)	
RAIN GARDEN (0.05 ACRES) [TO BE DESIGNED BY OTHERS]	
WET MEADOW (2.14 ACRES)	
DEEP MARSH (0.50 ACRES)	
WETLAND EDGE PLANTING (0.08 ACRES)	
FLOW DIRECTION	



DEEP MARSH AND SWALE POINT TABLE

PNT	X	Y	PNT	X	Y	PNT	X	Y
A	437492.06	164703.73	I	437676.50	164526.34	Q	437729.24	164587.18
B	437529.81	164698.49	J	437692.94	164522.82	R	437720.41	164618.41
C	437559.14	164725.90	K	437719.10	164456.01	S	437699.44	164643.49
D	437582.18	164683.33	L	437707.93	164381.50	T	437667.24	164659.84
E	437621.41	164639.84	M	437729.50	164411.42	U	437640.11	164704.00
F	437623.30	164601.43	N	437725.72	164441.44	V	437605.15	164750.73
G	437630.66	164568.97	O	437740.80	164451.96	W	437580.50	164756.88
H	437653.15	164539.54	P	437752.84	164470.76			

NOTE: POINTS A - C & L - N ARE CENTERLINE OF CHANNEL COORDINATES

SUMMARY OF EXCAVATION

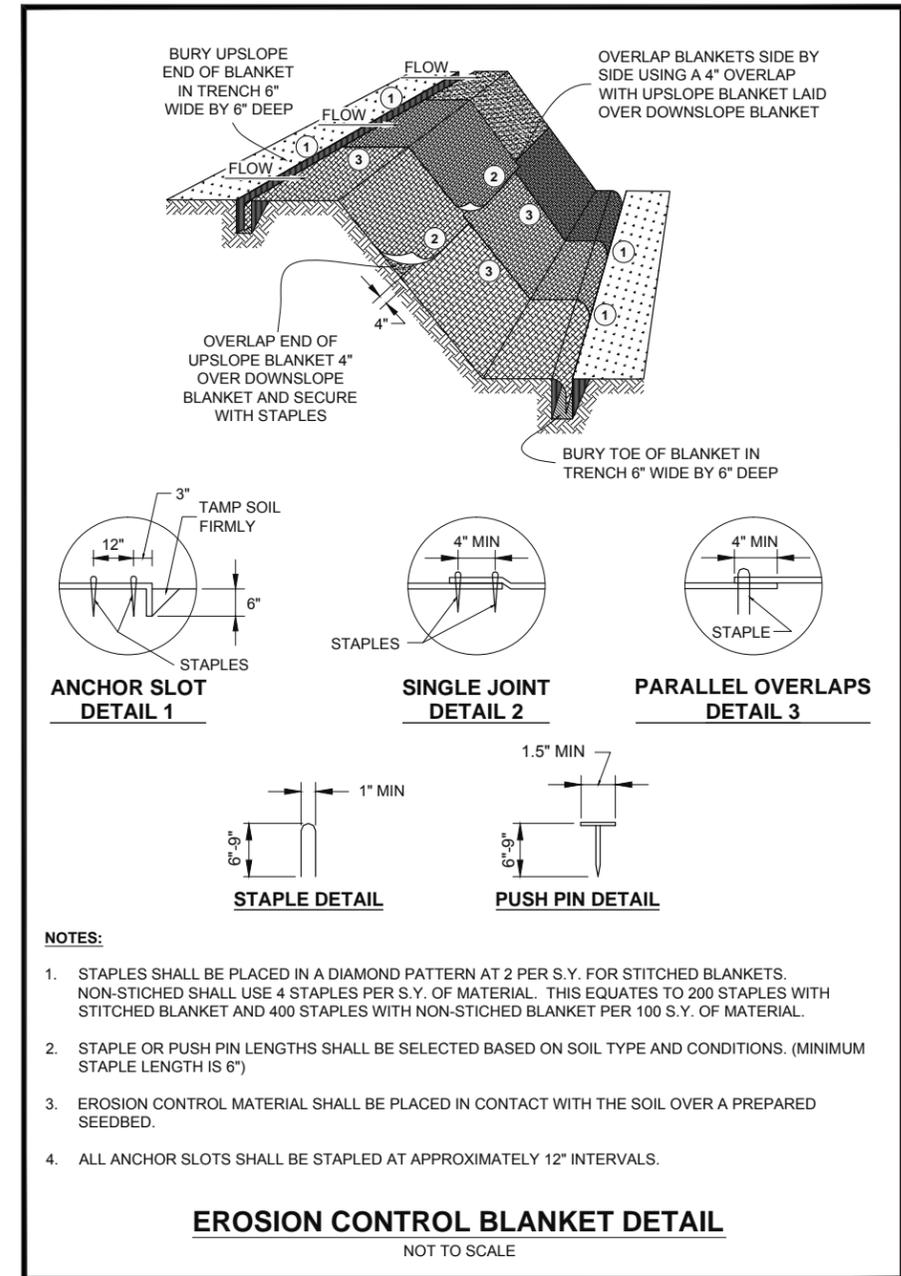
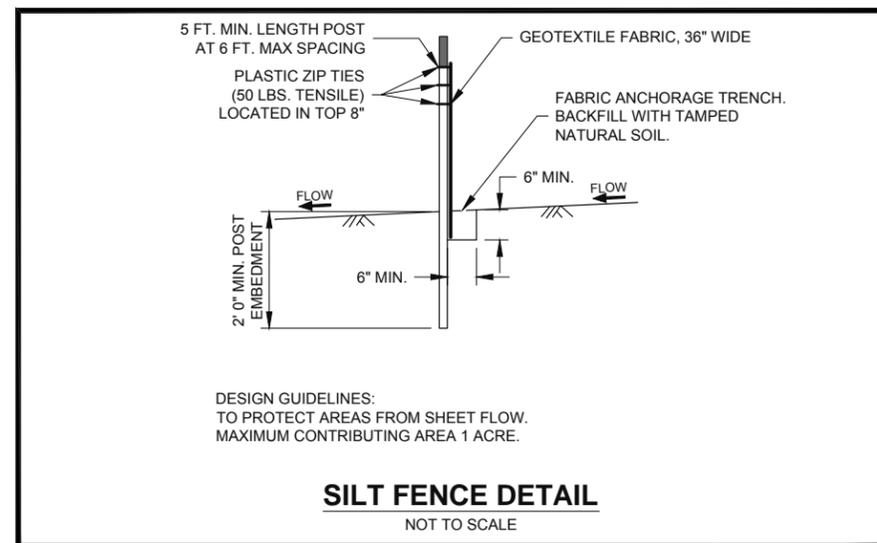
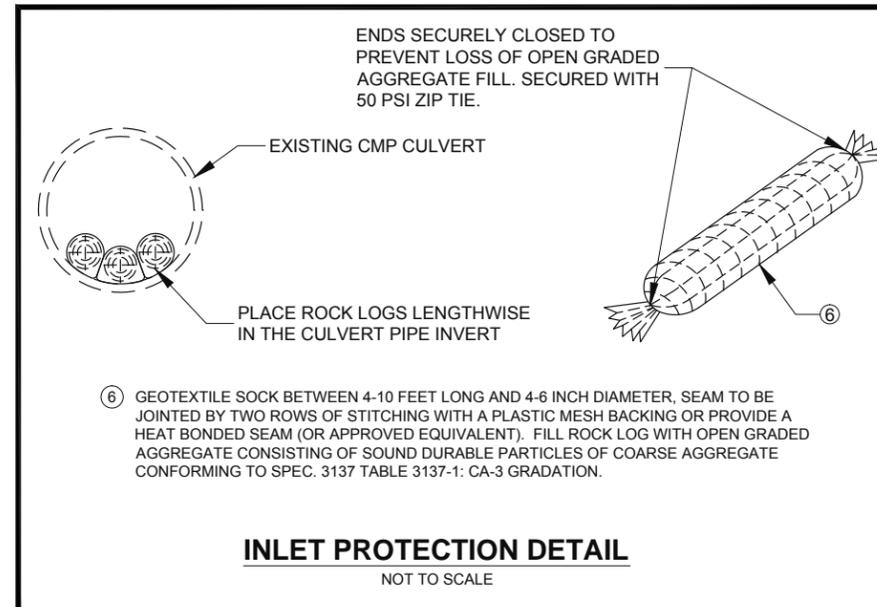
1. TOTAL EXCAVATION	2,588 CY
2. HAUL OFF-SITE	807 CY
3. THIN RE-SPREAD MATERIAL	2,048 CY
W/ ASSUMED 15% EXPANSION	

CONSTRUCTION NOTES:

- ALL IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
- WORK DESCRIBED HEREIN CONSISTS OF FURNISHING AND TRANSPORTING ALL MATERIALS AND EQUIPMENT REQUIRED TO: APPLY HERBICIDE/BURN WETLAND, INSTALL EROSION CONTROL, EXCAVATE WETLAND AREAS, HAUL APPROXIMATE FIRST 12-INCHES OF EXCAVATED MATERIAL, PLACE THIN SPREAD OF EXCAVATED MATERIAL, APPLY HERBICIDE/BURN, PREPARE SOILS, AND PLANT NATIVE VEGETATION. DURING THE EXCAVATION PHASE BOTH THE WESTERN OUTLET AND THE SOUTHERN CONNECTOR CHANNELS SHALL BE EXCAVATED LAST. THE CONTRACTOR SHALL FURNISH, TRANSPORT, AND INSTALL ALL SEED, AND PLANT PLUGS AND PERFORM ALL SOIL PREPARATION AND SUCH AUXILIARY WORK AS MAY BE NECESSARY TO COMPLETE WORK IN ACCORDANCE WITH THE SPECIFICATIONS AND PLANS. THE CONTRACTOR SHALL FURNISH ALL REQUIRED MATERIALS, EQUIPMENT, TOOLS, LABOR, AND INCIDENTALS, UNLESS OTHERWISE PROVIDED IN THE SPECIFICATIONS OR PLANS.
- EXCEPT AS SPECIFICALLY DESCRIBED IN THE PLANS AND SPECIFICATIONS, THE FOLLOWING DOCUMENTS SHALL PREVAIL:
 - ALL PERTINENT CODES, STANDARDS, ORDINANCES OF THE CITY OF ORONO, AND MINNEHAHA CREEK WATERSHED DISTRICT WHERE APPLICABLE.
 - STANDARD SPECIFICATIONS FOR CONSTRUCTION (MnDOT SPECIFICATIONS) 2014 EDITION BY THE MINNESOTA DEPARTMENT OF TRANSPORTATION;
 - MINNESOTA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2014 EDITION AND THE TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS FIELD MANUAL, 2014 EDITION BY MnDOT;
 - OSHA AND ALL OTHER APPLICABLE SAFETY STANDARDS.
- UNLESS SPECIFIED OTHERWISE WITHIN THIS PLAN SET, THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S SPECIFICATIONS FOR ALL MATERIALS. IN THE EVENT OF ANY INCONSISTENCIES BETWEEN THE MANUFACTURER'S SPECIFICATIONS AND THESE SPECIFICATIONS, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE OWNER'S REPRESENTATIVE IMMEDIATELY BEFORE CONTINUING WORK SO THAT THE INCONSISTENCIES MAY BE RESOLVED. THE EROSION CONTROL BLANKET SHALL BE SUBMITTED FOR REVIEW BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS FOR CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF EROSION CONTROL AND ADEQUATE TRAFFIC CONTROL SIGNAGE AND WARNING DEVICES TO INFORM AND PROTECT THE PUBLIC AND PUBLIC WATERS.
- CONTRACTOR IS RESPONSIBLE FOR PREPARING HIS OR HER OWN ESTIMATE OF MATERIAL QUANTITIES.
- EARTHWORK QUANTITIES SHOWN ON THE PROPOSED PLANS ARE NOT TO BE TAKEN AS DEFINING OR LIMITING THE AMOUNT OF WORK TO BE DONE UNDER THE CONTRACT, HOWEVER EARTHWORK QUANTITIES SHOWN WILL BE CONSIDERED PLAN QUANTITIES USED FOR CHECKING PLANT AND MATERIAL QUANTITIES TO ENSURE QUANTITIES ON THE DRAWINGS AND PLANT OR MATERIAL LISTS ARE THE SAME. IN THE EVENT OF ANY DISCREPANCIES, THE QUANTITIES ON THE DRAWINGS SHALL PREVAIL.
- DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE OWNER'S REPRESENTATIVE.
- CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL ALONG TONKAWA RD. DURING EXCAVATION AND HAULING. THIS SHALL INCLUDE, BUT NOT LIMITED TO, APPROPRIATE BARRICADES, SIGNAGE, AND FLAGGERS. ACCESS TO EMERGENCY VEHICLES SHALL BE MAINTAINED AT ALL TIMES.
- ANY EROSION CONTROL MEASURES, IN ADDITION TO THOSE OUTLINED IN THE PLANS AND WHICH ARE DEEMED NECESSARY BY THE OWNER AND/OR OWNER'S REPRESENTATIVE SHALL BE IMPLEMENTED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER INSTALLATION AND MAINTENANCE OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES. THE CONTRACTOR SHALL INSPECT, MAINTAIN, AND DOCUMENT EROSION CONTROL MEASURES.
- CONTRACTOR SHALL KEEP TONKAWA RD. CLEAN AT ALL TIMES, SWEEPING EXCESS MATERIALS WHEN NECESSARY.
- THE TEMPORARY EROSION CONTROL MEASURES SHALL BE PLACE EFFECTIVELY UNTIL ALL THE PERMANENT EROSION CONTROL ITEMS ARE FULLY FUNCTIONAL.

- ALL DISTURBED AREAS SHALL BE SEEDED, OR PLANTED, AS NOTED ON THE PLAN.
- CONTRACTOR SHALL FURNISH AN AFFIDAVIT CERTIFIED BY CONTRACTOR AND SEED AND PLANT SUPPLIERS PER THE SPECIFICATIONS PRIOR TO COMMENCING SEEDING AND PLANTING WORK.
- CONTRACTOR SHALL CEASE EXCAVATION AND CONSULT WITH OWNER'S REPRESENTATIVE IF CONFINING LAYER ENCOUNTERED DURING EXCAVATION OF DEEP MARSH.
- TO MINIMIZE DISTURBANCE AND COMPACTION WITHIN THE WETLAND THE CONTRACTOR SHALL LOAD HAUL TRUCKS ALONG THE TONKAWA RD. SHOULDER AREA. SOIL LIFTS SHALL NOT EXCEED A DEPTH OF 12-INCHES.
- FOR WINTER CONSTRUCTION CONTRACTOR SHALL NOT PLACE FROZEN BACKFILL MATERIALS WITHIN THE WETLAND AREA. IT IS ANTICIPATED THAT THE FIRST 12-INCHES OF EXCAVATED MATERIAL BELOW EXISTING GRADE WILL BE DIRECTLY HAULED OFF-SITE AND BE THE RESPONSIBILITY OF THE CONTRACTOR.

- ALL EXISTING SURVEY MONUMENTS, UTILITIES, INFRASTRUCTURE, LANDSCAPING SHALL BE PROTECTED DURING CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPLACING OR REPAIRING ANY DAMAGES AT NO ADDITIONAL COST AND SHALL MEET THE SATISFACTION OF THE OWNER AND THE OWNER'S REPRESENTATIVE.
- FINAL ALIGNMENT OF PROPOSED WOODCHIP TRAIL SHALL BE DETERMINED IN THE FIELD BY THE OWNER'S REPRESENTATIVE.
- WHILE NOT ANTICIPATED, DEWATERING WILL BE CONSIDERED INCIDENTAL TO EXCAVATION AT NO ADDITIONAL COST AND WILL ADHERE TO REGULATORY STANDARDS OF THE STATE OF MINNESOTA. IF DEWATERING IS NECESSARY, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE PRIOR TO OPERATION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY NECESSARY DEWATERING PERMITS.



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APPROVED: DMM, DM
CAD DATE: 8/15/14
CAD FILE: 120975cst20140813-Rest.dwg

NO.	DATE	BY	REVISION DESCRIPTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE: Daniel Mielke
DATE: 8/15/2014
REG. NO. 59925



NELSON RESTORATION DESIGN
ORONO, MINNESOTA

FINAL DESIGN SUBMITTAL
PROPOSED RESTORATION NOTES
AND DETAILS

SHEET NO.
3.1

SEED SCHEDULE

ENHANCED UPLAND FOREST OVERSEED

SCIENTIFIC NAME	COMMON NAME	Rate (lb/ac)
GRAMINOIDS		
<i>Bromus pubescens</i>	Hairy woodland brome	0.30
<i>Carex sprengelii</i>	Long-beaked sedge	0.10
<i>Elymus hystrix</i>	Bottlebrush grass	0.20
<i>Elymus virginicus</i>	Virginia wild rye	3.40
Total Graminoids		4.00

SCIENTIFIC NAME	COMMON NAME	Rate (lb/ac)
FORBS		
<i>Allium tricoccum</i>	Wild leek	0.25
<i>Aquilegia canadensis</i>	Canada columbine	0.25
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	0.25
<i>Eurybia macrophylla</i>	Large-leaved aster	0.05
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	0.10
<i>Phlox divaricata</i>	Blue phlox	0.10
<i>Smilacina racemosa</i>	Common false Solomon's seal	0.25
<i>Solidago flexicaulis</i>	Zig zag goldenrod	0.05
<i>Symphoricaricum cordifolium</i>	Heart-leaved aster	0.05
<i>Thalictrum dioicum</i>	Early meadow rue	0.05
<i>Uvularia grandiflora</i>	Bellwort	0.10
Total Forbs		1.50

TRAIL VERGE OVERSEED

SCIENTIFIC NAME	COMMON NAME	Rate (total lbs)
FORBS		
<i>Asclepias syriaca</i>	Common milkweed	0.05
Total Forbs		0.05

ENHANCED LOWLAND FOREST OVERSEED (halve all rates shown)

34-261 Riparian South & West		Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
American slough grass	<i>Beckmannia syzigachne</i>	1.52	1.36	4.30%	24.90
riverbank wild rye	<i>Elymus riparius</i>	0.56	0.50	1.58%	0.53
Virginia wild rye	<i>Elymus virginicus</i>	1.96	1.75	5.56%	2.70
tall manna grass	<i>Glyceria grandis</i>	0.28	0.25	0.80%	6.50
fowl manna grass	<i>Glyceria striata</i>	0.10	0.09	0.29%	3.00
rice cut grass	<i>Leersia oryzoides</i>	0.18	0.16	0.51%	2.00
fowl bluegrass	<i>Poa palustris</i>	0.94	0.84	2.60%	40.00
prairie cordgrass	<i>Spartina pectinata</i>	0.34	0.30	0.96%	0.74
Total Grasses		5.88	5.25	16.66%	80.37
tussock sedge	<i>Carex stricta</i>	0.04	0.04	0.13%	0.80
pointed broom sedge	<i>Carex scoparia</i>	0.07	0.06	0.21%	2.00
fox sedge	<i>Carex vulpinoidea</i>	0.22	0.20	0.65%	7.50
path rush	<i>Juncus tenuis</i>	0.03	0.03	0.09%	10.00
dark green bulrush	<i>Scirpus atrovirens</i>	0.13	0.12	0.38%	20.00
woolgrass	<i>Scirpus cyperinus</i>	0.06	0.05	0.15%	30.00
Total Sedges and Rushes		0.56	0.50	1.61%	70.30
marsh milkweed	<i>Asclepias incarnata</i>	0.13	0.12	0.38%	0.21
common boneset	<i>Eupatorium perfoliatum</i>	0.03	0.03	0.11%	2.00
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.07	0.06	0.18%	2.00
autumn sneezeweed	<i>Helenium autumnale</i>	0.06	0.05	0.17%	2.50
giant sunflower	<i>Helianthus giganteus</i>	0.08	0.07	0.22%	0.25
spotted touch-me-not	<i>Impatiens capensis</i>	0.06	0.05	0.17%	0.08
great lobelia	<i>Lobelia siphilitica</i>	0.03	0.03	0.09%	5.00
blue monkey flower	<i>Mimulus ringens</i>	0.01	0.01	0.02%	5.07
Virginia mountain mint	<i>Pycnanthemum virginianum</i>	0.06	0.05	0.16%	4.00
tall coneflower	<i>Rudbeckia laciniata</i>	0.06	0.05	0.15%	0.25
giant goldenrod	<i>Solidago gigantea</i>	0.02	0.02	0.07%	2.00
blue vervain	<i>Verbena hastata</i>	0.17	0.15	0.46%	5.00
bunched ironweed	<i>Veronica fasciculata</i>	0.07	0.06	0.18%	0.50
Total Forbs		0.84	0.75	2.36%	28.86
Oats or winter wheat (see note at beginning of list for recommended dates)		28.02	25.00	79.37%	11.14
Total Cover Crop		28.02	25.00	79.37%	11.14
Totals		35.31	31.50	100.00%	190.66
Purpose:	Native riparian and floodplain plantings for wetland mitigation, ecological restoration, or general permanent cover after culvert or bridge work. Tolerates partial shade.				
Planting Area:	Tailgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

WET MEADOW SEED & WETLAND EDGE PLANTING SEED (use both seed mixes for both areas, but halve all rates shown)

34-181 Emergent Wetland		Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
American slough grass	<i>Beckmannia syzigachne</i>	0.78	0.70	14.07%	12.92
tall manna grass	<i>Glyceria grandis</i>	0.28	0.25	4.98%	6.40
rice cut grass	<i>Leersia oryzoides</i>	0.34	0.30	5.93%	3.70
Total Grasses		1.40	1.25	24.98%	23.02
river bulrush	<i>Bolboschoenus fluviatilis</i>	0.85	0.76	15.20%	1.20
bristly sedge	<i>Carex comosa</i>	0.20	0.18	3.63%	2.00
lake sedge	<i>Carex lacustris</i>	0.07	0.06	1.19%	0.24
tussock sedge	<i>Carex stricta</i>	0.04	0.04	0.77%	0.75
least spikerush	<i>Eleocharis acicularis</i>	0.11	0.10	1.94%	2.50
marsh spikerush	<i>Eleocharis palustris</i>	0.11	0.10	2.03%	1.90
Torrey's rush	<i>Juncus torreyi</i>	0.04	0.04	0.85%	25.00
Three-square bulrush	<i>Schoenoplectus pungens</i>	0.26	0.23	4.54%	1.00
soft stem bulrush	<i>Schoenoplectus tabernaemontani</i>	0.49	0.44	8.78%	5.00
woolgrass	<i>Scirpus cyperinus</i>	0.06	0.05	1.02%	32.00
Total Sedges and Rushes		2.24	2.00	39.95%	71.59
Sweet flag	<i>Acorus americanus</i>	0.31	0.28	5.53%	0.67
common water plantain	<i>Alisma triviale</i>	0.45	0.40	8.00%	9.70
marsh milkweed	<i>Asclepias incarnata</i>	0.31	0.28	5.67%	0.50
broad-leaved arrowhead	<i>Sagittaria latifolia</i>	0.34	0.30	6.07%	6.80
giant bur reed	<i>Sparganium eurycarpum</i>	0.55	0.49	9.80%	0.09
Total Forbs		1.98	1.75	35.07%	17.76
Totals		5.60	5.00	100.00%	112.37
Purpose:	Emergent wetland restoration for use in wetland mitigation, shoreline restoration, wet stormwater ponds where emergent vegetation is desired.				
Planting Area:	Statewide				

34-271 Wet Meadow South & West		Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	<i>Bromus ciliatus</i>	1.23	1.10	9.19%	4.45
bluejoint	<i>Calamagrostis canadensis</i>	0.06	0.05	0.41%	5.00
Virginia wild rye	<i>Elymus virginicus</i>	1.12	1.00	8.37%	1.55
rice cut grass	<i>Leersia oryzoides</i>	0.28	0.25	2.07%	3.10
tall manna grass	<i>Glyceria grandis</i>	0.17	0.15	1.26%	3.90
fowl manna grass	<i>Glyceria striata</i>	0.11	0.10	0.83%	3.30
fowl bluegrass	<i>Poa palustris</i>	0.30	0.35	2.88%	16.50
Total Grasses		3.36	3.00	25.00%	37.80
bristly sedge	<i>Carex comosa</i>	0.24	0.21	1.78%	2.38
pointed broom sedge	<i>Carex scoparia</i>	0.06	0.05	0.43%	1.60
saw-toothed sedge	<i>Carex stipata</i>	0.19	0.17	1.40%	2.10
tussock sedge	<i>Carex stricta</i>	0.03	0.03	0.21%	0.50
fox sedge	<i>Carex vulpinoidea</i>	0.16	0.14	1.13%	5.00
path rush	<i>Juncus tenuis</i>	0.04	0.04	0.34%	15.00
dark green bulrush	<i>Scirpus atrovirens</i>	0.20	0.18	1.48%	30.00
woolgrass	<i>Scirpus cyperinus</i>	0.09	0.08	0.67%	50.00
Total Sedges and Rushes		1.01	0.90	7.44%	106.56
marsh milkweed	<i>Asclepias incarnata</i>	0.27	0.24	2.03%	0.43
common boneset	<i>Eupatorium perfoliatum</i>	0.02	0.02	0.16%	1.30
grass-leaved goldenrod	<i>Euthamia graminifolia</i>	0.01	0.01	0.08%	1.00
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.02	0.02	0.16%	0.75
autumn sneezeweed	<i>Helenium autumnale</i>	0.03	0.03	0.23%	1.30
sawtooth sunflower	<i>Helianthus grosseserratus</i>	0.04	0.04	0.30%	0.20
great lobelia	<i>Lobelia siphilitica</i>	0.02	0.02	0.13%	2.90
blue monkey flower	<i>Mimulus ringens</i>	0.01	0.01	0.07%	6.80
Virginia mountain mint	<i>Pycnanthemum virginianum</i>	0.07	0.06	0.53%	5.10
giant goldenrod	<i>Solidago gigantea</i>	0.02	0.02	0.14%	1.50
eastern panicled aster	<i>Symphoricaricum lanceolatum</i>	0.03	0.03	0.22%	1.50
red-stemmed aster	<i>Symphoricaricum panicum</i>	0.19	0.17	1.42%	5.00
tall meadow-rue	<i>Thalictrum dasycarpum</i>	0.01	0.01	0.12%	0.11
blue vervain	<i>Verbena hastata</i>	0.15	0.13	1.12%	4.81
bunched ironweed	<i>Veronica fasciculata</i>	0.03	0.03	0.28%	0.30
Culver's root	<i>Veronicastrum virginicum</i>	0.01	0.01	0.12%	4.20
golden alexanders	<i>Zizia aurea</i>	0.28	0.25	2.06%	1.00
Total Forbs		1.23	1.10	9.19%	38.00
Oats or winter wheat (see note at beginning of list for recommended dates)		7.85	7.00	58.37%	3.12
Total Cover Crop		7.85	7.00	58.37%	3.12
Totals		13.45	12.00	100.00%	185.48
Purpose:	Wet meadow / Sedge meadow reconstruction for wetland mitigation or ecological restoration projects				
Planting Area:	Tailgrass Aspen Parklands, Prairie Parkland, and Eastern Broadleaf Forest Provinces. Mn/DOT Districts 2(west), 3B, 4, Metro, 6, 7 & 8.				

DEEP MARSH - NO SEED

PLANT SCHEDULE

ENHANCED UPLAND FOREST PLANTS

SCIENTIFIC NAME	COMMON NAME	QTY
TREES		
<i>Betula nigra</i>	River birch	5
<i>Prunus serotina</i>	Black cherry	5
<i>Quercus rubra</i>	Red oak	8
<i>Tilia americana</i>	Basewood	7
Total Trees		25

SCIENTIFIC NAME	COMMON NAME	QTY
SHRUBS		
<i>Amelanchier laevis</i>	Allegheny serviceberry	20
<i>Prunus americana</i>	Wild plum	30
<i>Prunus virginiana</i>	Choke cherry	30
Total Shrubs		80

ENHANCED LOWLAND FOREST PLANTS

SCIENTIFIC NAME	COMMON NAME	QTY
TREES		
<i>Betula nigra</i>	River birch	4
<i>Larix laricina</i>	Tamarack	7
<i>Salix nigra</i>	Black willow	4
Total Trees		15

SCIENTIFIC NAME	COMMON NAME	QTY
SHRUBS		
<i>Cephalanthus occidentalis</i>	Buttonbush	15
<i>Cornus sericea</i>	Redosier dogwood	10
<i>Sambucus nigra</i> ssp. <i>canadensis</i>	Common elderberry	15
<i>Sambucus racemosa</i> var. <i>racemosa</i>	Red elderberry	10
<i>Viburnum lentago</i>	Nannyberry	20
Total Shrubs		70

WET MEADOW - NO LIVE PLANTS

DEEP MARSH PLANTS

SCIENTIFIC NAME	COMMON NAME	QTY
GRAMINOIDS		
<i>Carex lacustris</i>	Lake sedge	100
<i>Carex stricta</i>	Tussock sedge	100
<i>Eleocharis palustris</i>	A species of spike-rush	100
<i>Bolboschoenus fluviatilis</i>	River bulrush	100
<i>Schoenoplectus tabernaemontani</i>	Soft stem bulrush	100
Total Graminoids		500

SCIENTIFIC NAME	COMMON NAME	QTY
FORBS		
<i>Acorus calamus</i>	Sweet flag	50
<i>Alisma triviale</i>	Common water plantain	100
<i>Iris versicolor</i>	Blue flag	100
<i>Potamogeton nodosus</i>	Pickerelweed	100
<i>Sagittaria latifolia</i>	Broad-leaved arrowhead	100
<i>Sparganium eurycarpum</i>	Giant bur-reed	50
Total Forbs		500

WETLAND EDGE PLANTS

SCIENTIFIC NAME	COMMON NAME	QTY
TREES		
<i>Salix nigra</i>	Black willow	10
Total Trees		10

SCIENTIFIC NAME	COMMON NAME	QTY
SHRUBS		
<i>Cephalanthus occidentalis</i>	Buttonbush	15
<i>Cornus sericea</i>	Redosier dogwood	20
<i>Viburnum lentago</i>	Nannyberry	15
Total Shrubs		50

DRAWN BY: EMK JOB DATE: 8/13/2014
 APPROVED: DMM, DM JOB NUMBER: 12-0975
 CAD DATE: 8/15/14
 CAD FILE: 120975cst20140813--Rest.dwg

NO.	DATE	BY	REVISION	DESCRIPTION

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 SIGNATURE:  Daniel Mielke REG. NO. 50925
 DATE: 8/15/2014



**APPLIED
 ECOLOGICAL
 SERVICES, INC.**



NELSON RESTORATION DESIGN
 ORONO, MINNESOTA