April 2019 – Wetland Banking Training
Moving from Prospectus to Mitigation Plan

BOARD OF WATER AND SOIL RESOURCES

Mitigation Plan Purpose/Overview – *Tim Smith*

Sponsor Responsibilities

Develop self-sustaining projects

8420.0522 Replacement Standards Subp. 5 – Ecological suitability and sustainability

C. Replacement projects **must** be located and designed, to the maximum extent practicable, to be **self-sustaining** once performance standards have been achieved.

Perpetual (forever) is a Long Time

Wetland Mitigation Proposal
Mitigation Plan

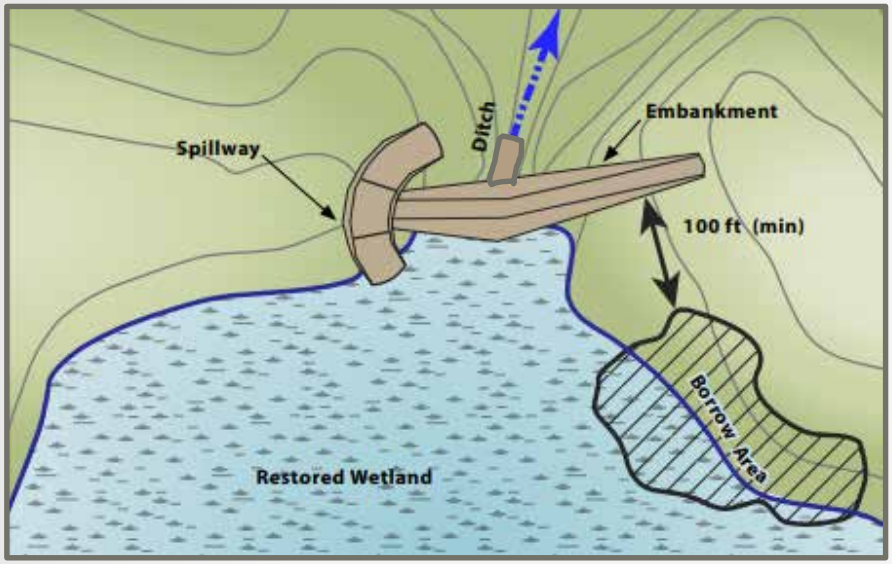
- **Design Analyses – What is Needed**
  - **Geotechnical**
  - **Hydrology/Hydraulics**
- **Off-Site Impacts**
  - **Off-Easement Construction**
  - **Hydrology/Flood Impacts**
  - **Drainage Impacts**
- **Construction Plan – What is Needed**

BOARD OF WATER AND SOIL RESOURCES

Design Analyses – What is Needed

Design Analyses - *Geotechnical*

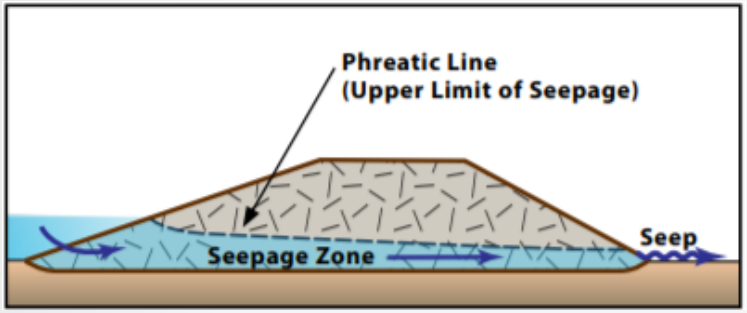
Design Analyses - *Geotechnical*

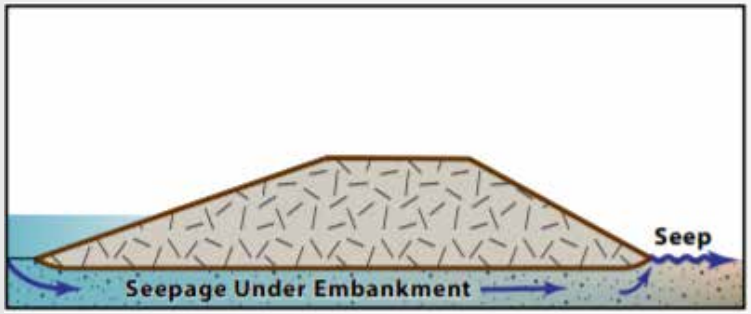


Identify Borrow Area(s)

Use Suitable Soils

Design Analyses - *Geotechnical*

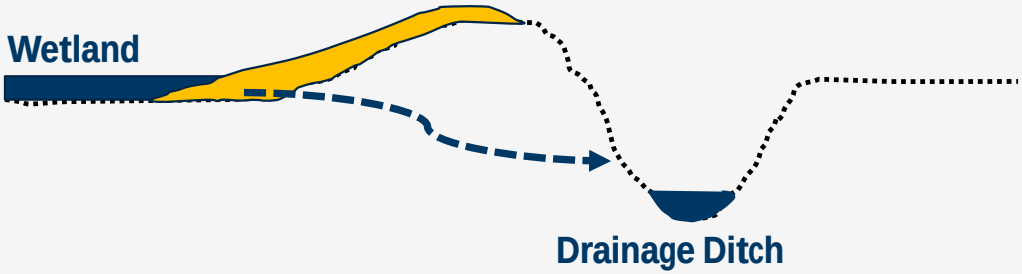




Foundation Suitability

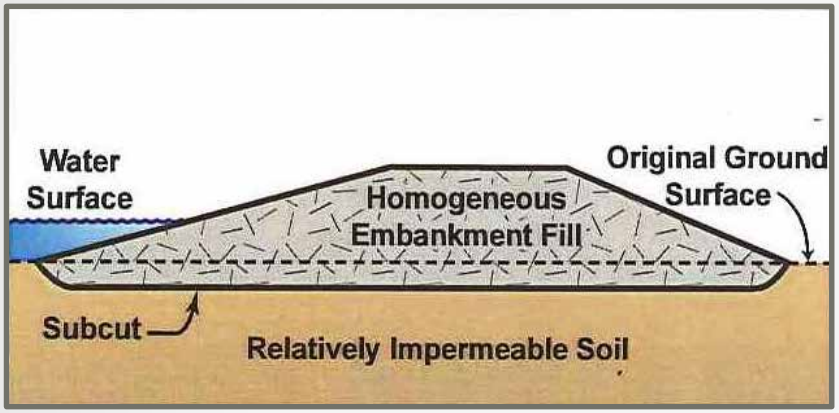
Design Analyses - *Geotechnical*

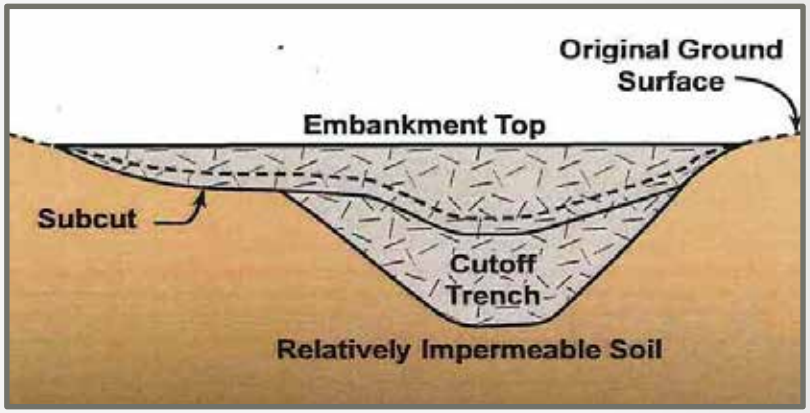
Design Analyses - *Geotechnical*

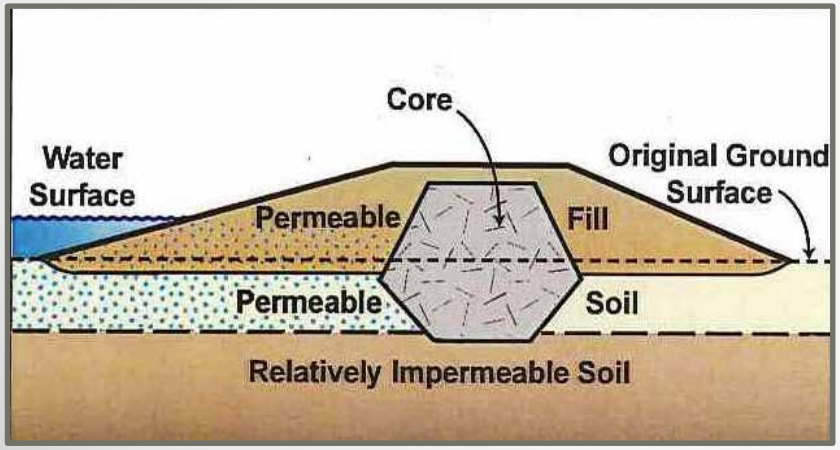


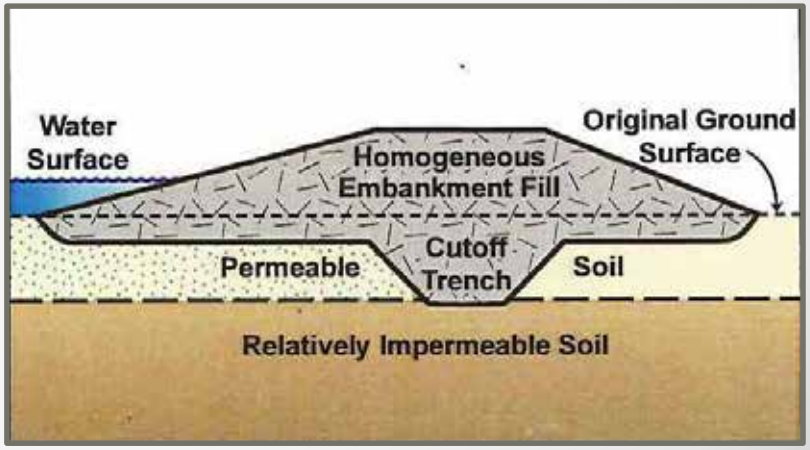
Design Analyses - *Geotechnical*

Design Options/Considerations





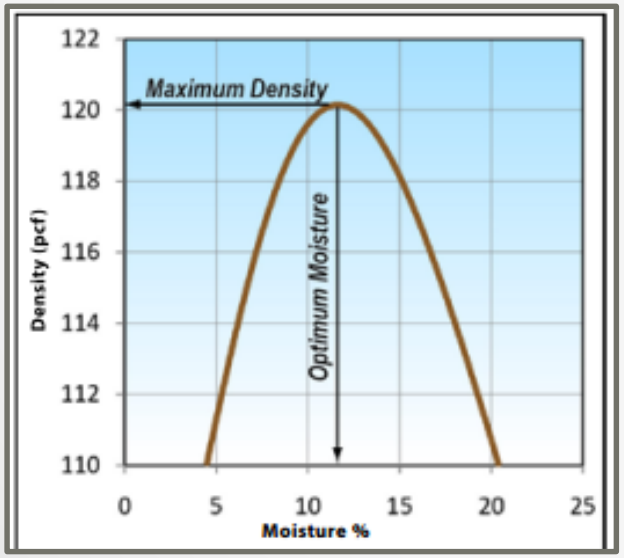




Design Analyses - *Geotechnical*

Compaction Requirements

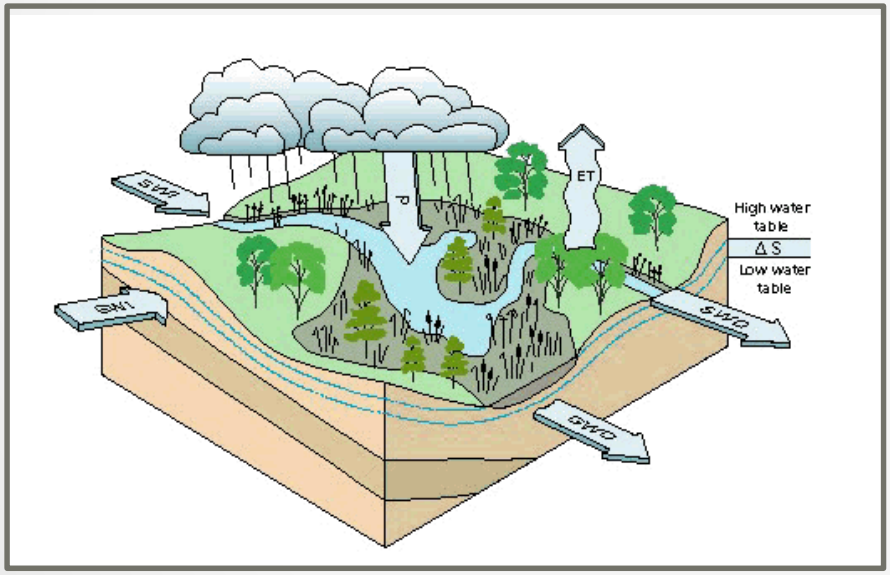
-Dozer	10-20 psi (lb/in$^{2)}$
-Loaded Scraper	100 psi (lb/in$^{2)}$
-Sheepsfoot	200 psi (lb/in$^{2)}$



Design Analyses – *Hydrology/Hydraulics*

What Question(s) Need to be Answered?

- Capability of site to produce/maintain wetland functions/characteristics

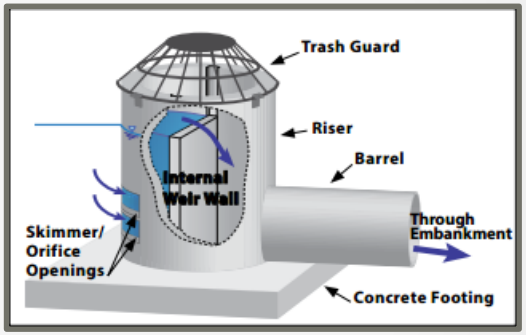


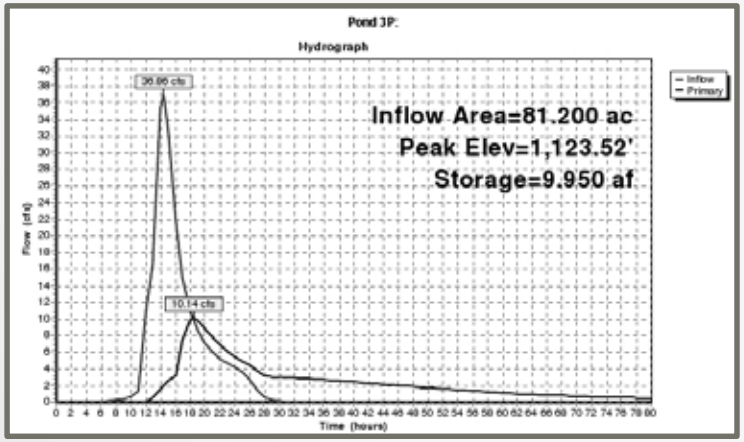
Stormwater modeling <u>will not</u> answer this question

Design Analyses – *Hydrology/Hydraulics*

What Question(s) Need to be Answered?

- Capability of site to produce/maintain wetland functions/characteristics
- **Stormwater Modeling/Analyses**
  - **Capacity of outlets**

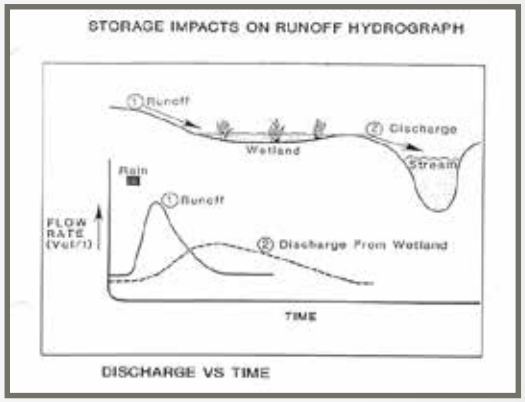


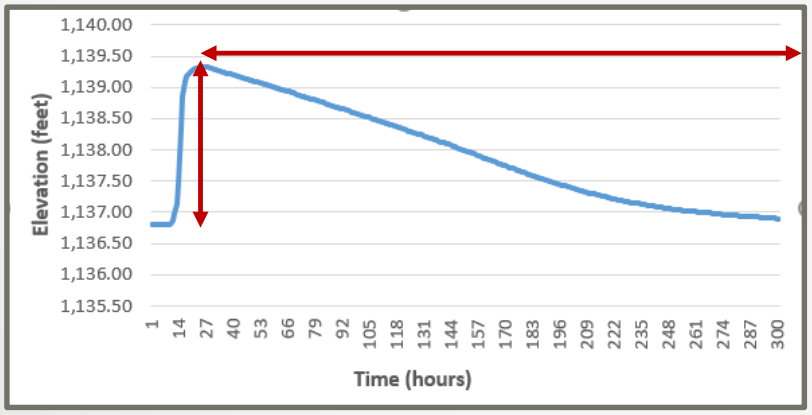


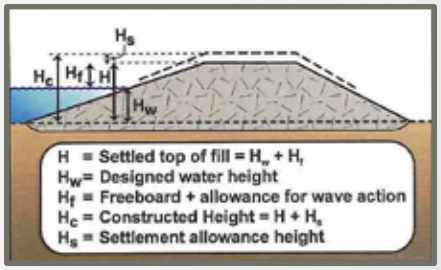
Design Analyses – *Hydrology/Hydraulics*

What Question(s) Need to be Answered?

- Capability of site to produce/maintain wetland functions/characteristics
- **Stormwater Modeling/Analyses**
  - Capacity of outlets
  - **Flood extents and durations**





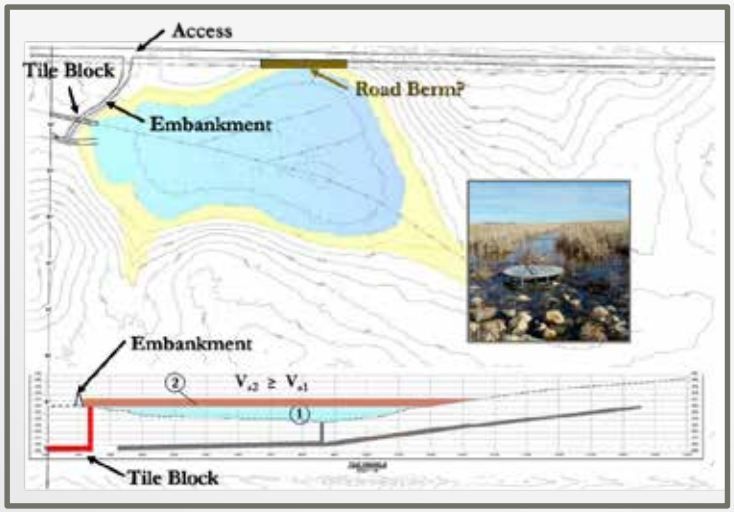


Design Analyses – *Hydrology/Hydraulics*

What Question(s) Need to be Answered?

- Capability of site to produce/maintain wetland functions/characteristics
- **Stormwater Modeling/Analyses**
  - Capacity of outlets
  - Flood extents and durations
  - **Upstream/Downstream Impacts**

Pre-Project vs. Post-Project Analysis



BOARD OF WATER AND SOIL RESOURCES

Off-Site Impacts

Off-Site Impacts

Drainage Laws
Legal Agreements

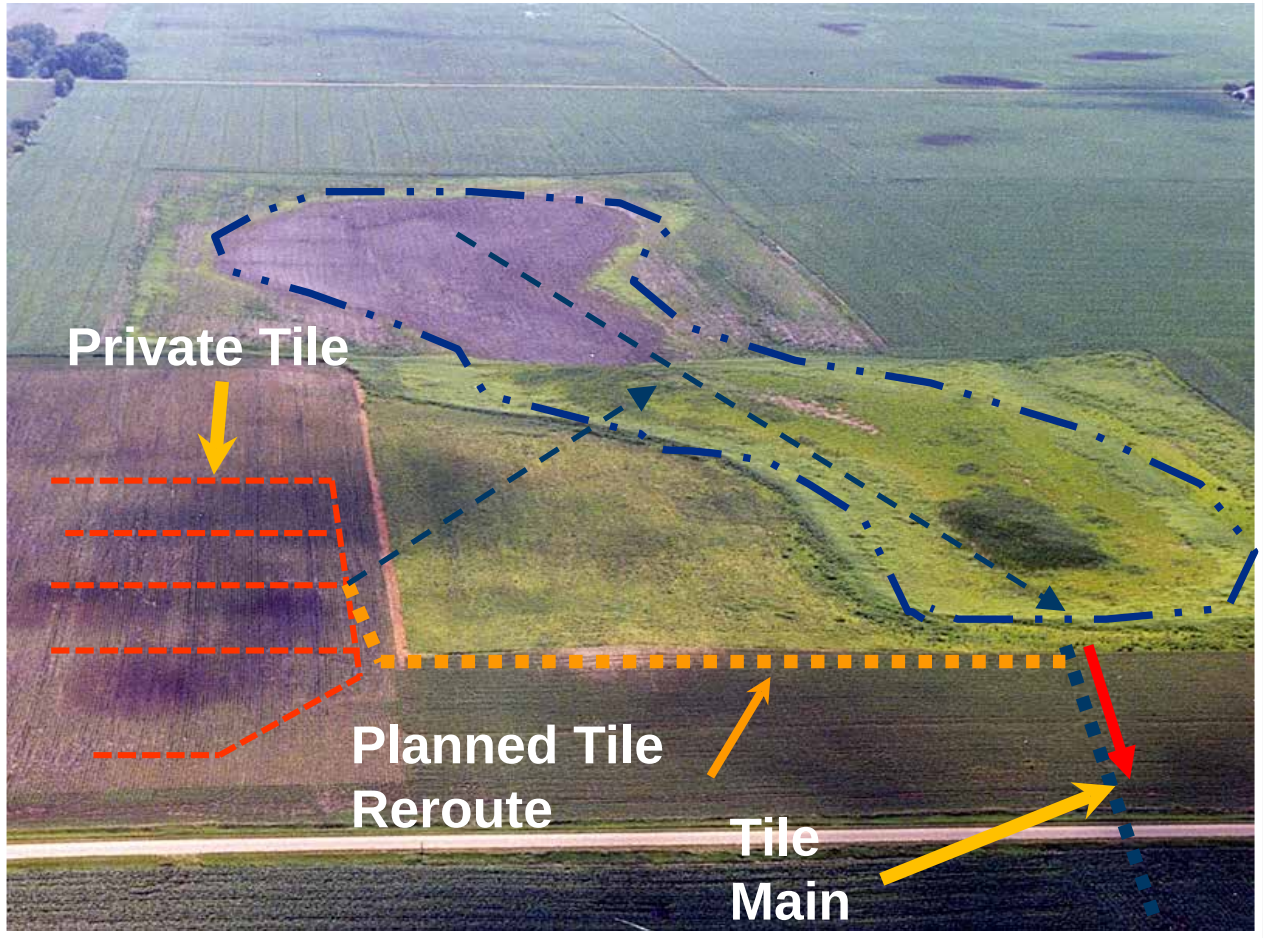
vs.

Reasonable Use

vs.

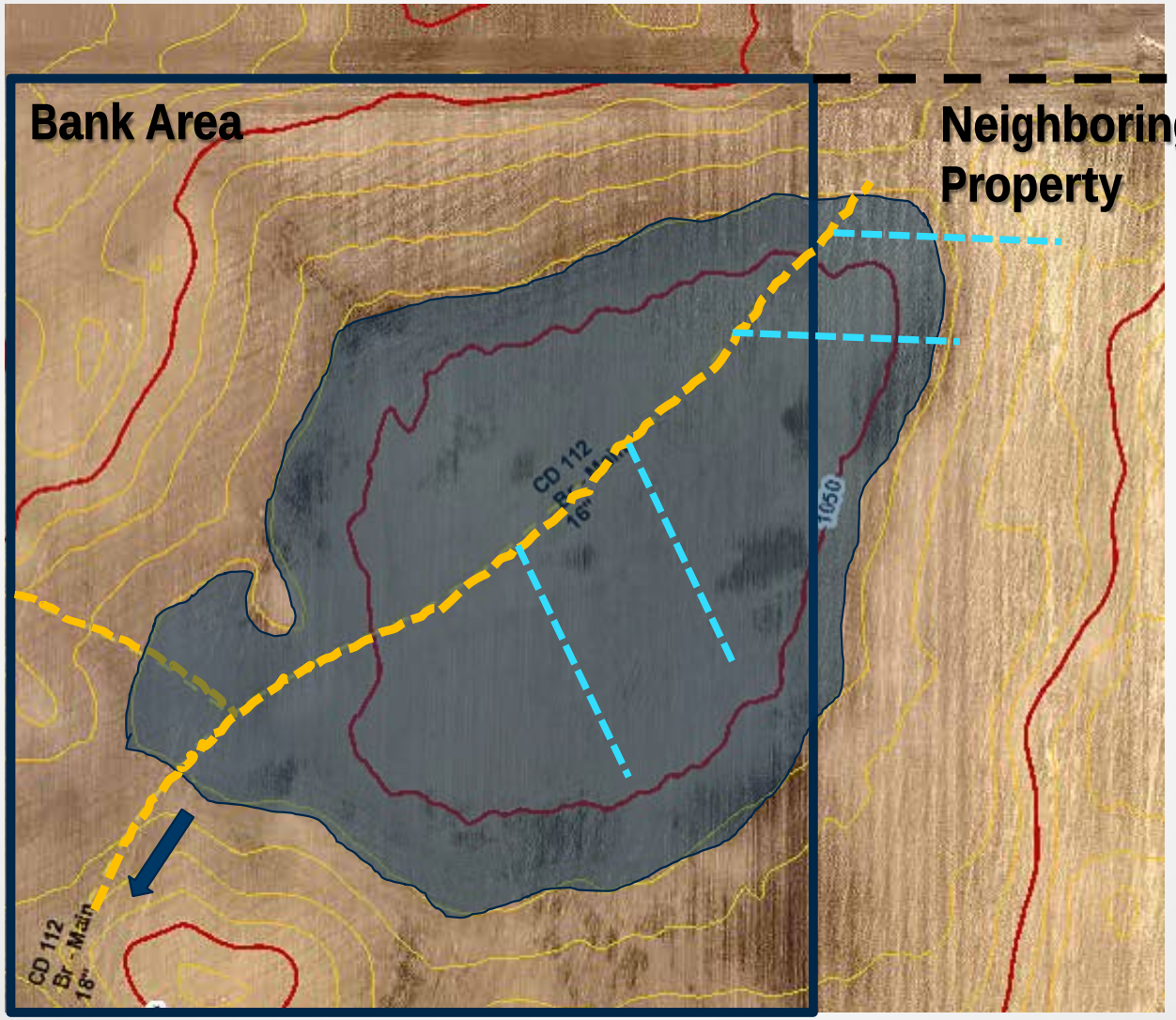
Public Perception and Risk – Program Implications

Off-Site Impacts –
Construction Work



Off-Site Impacts –

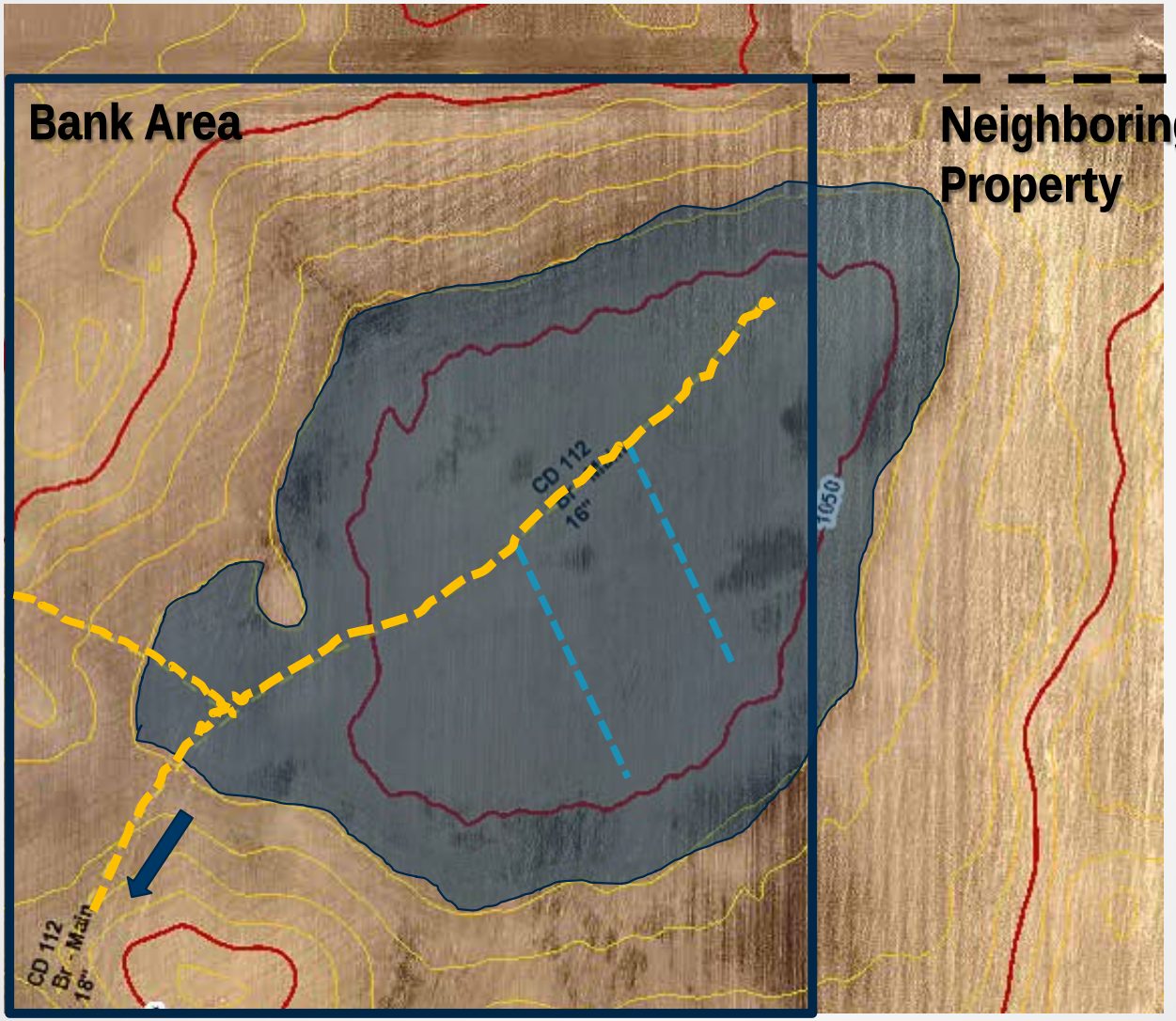
Hydrology/Drainage



Options

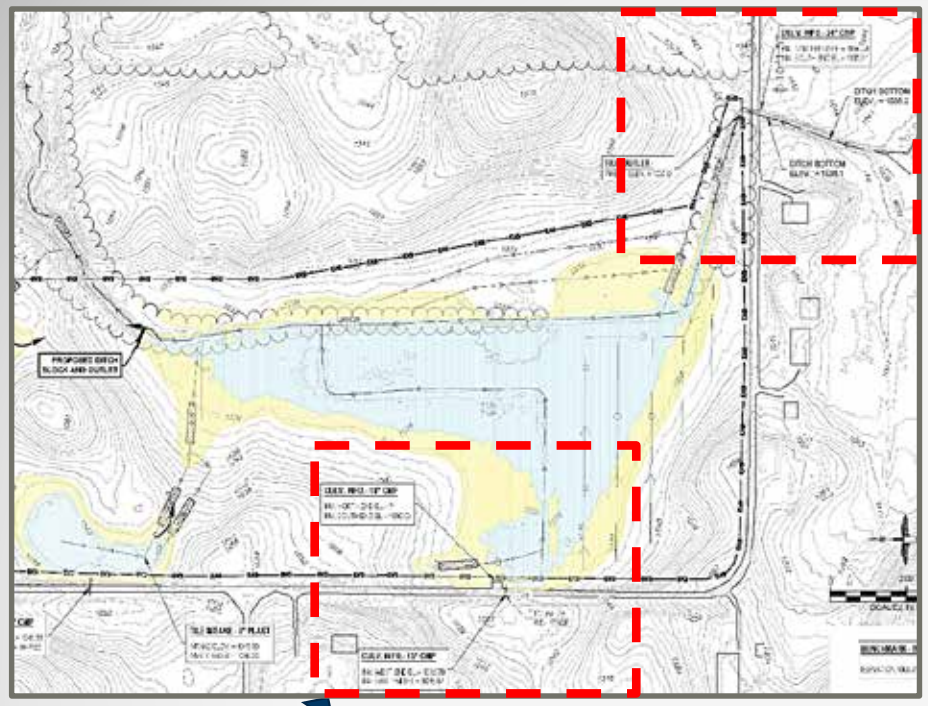
Public vs Private Drainage?

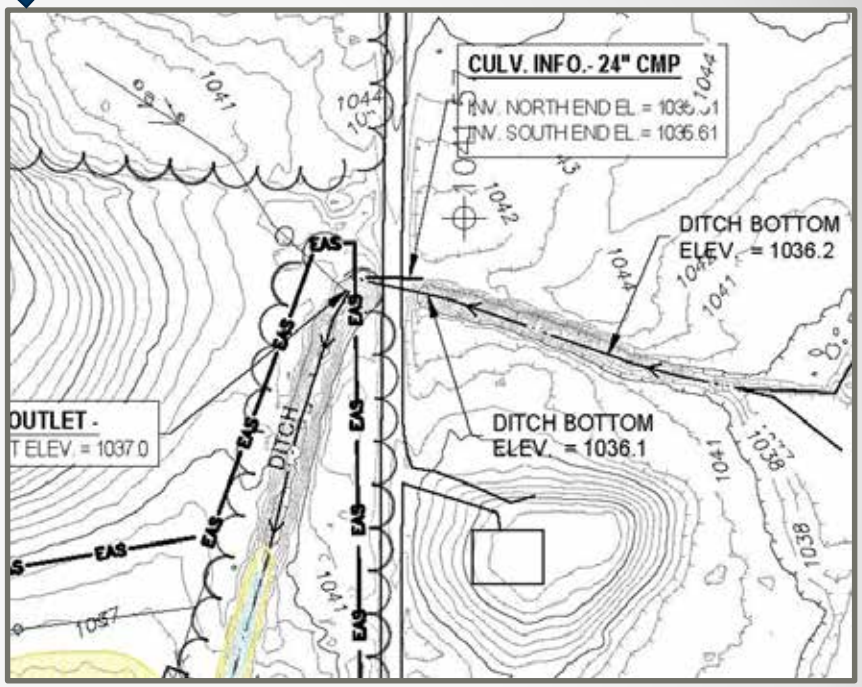
Off-Site Impacts –
Hydrology/Drainage

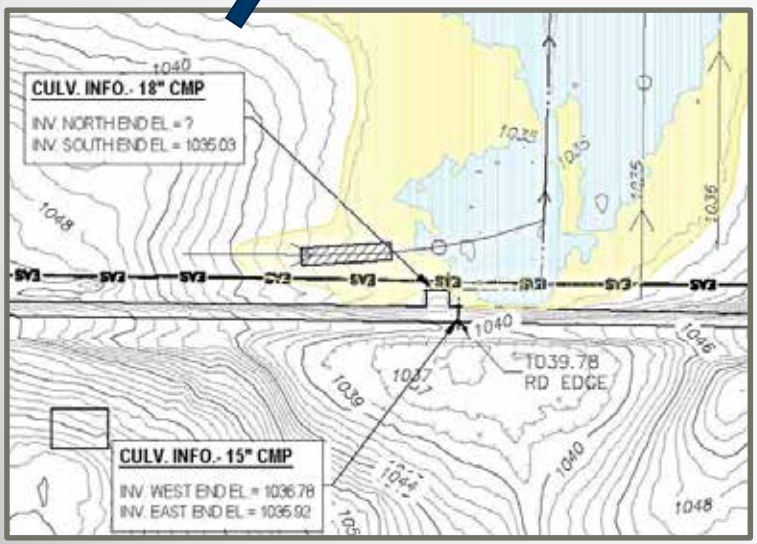


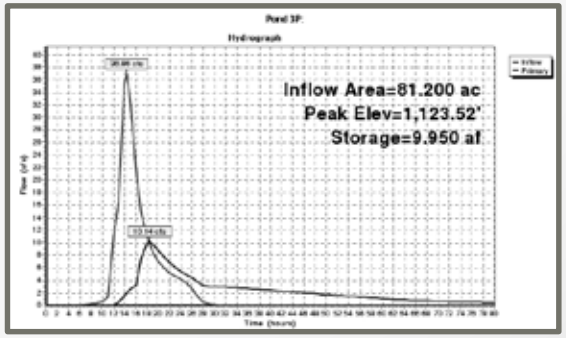
Options

Public vs Private Drainage?

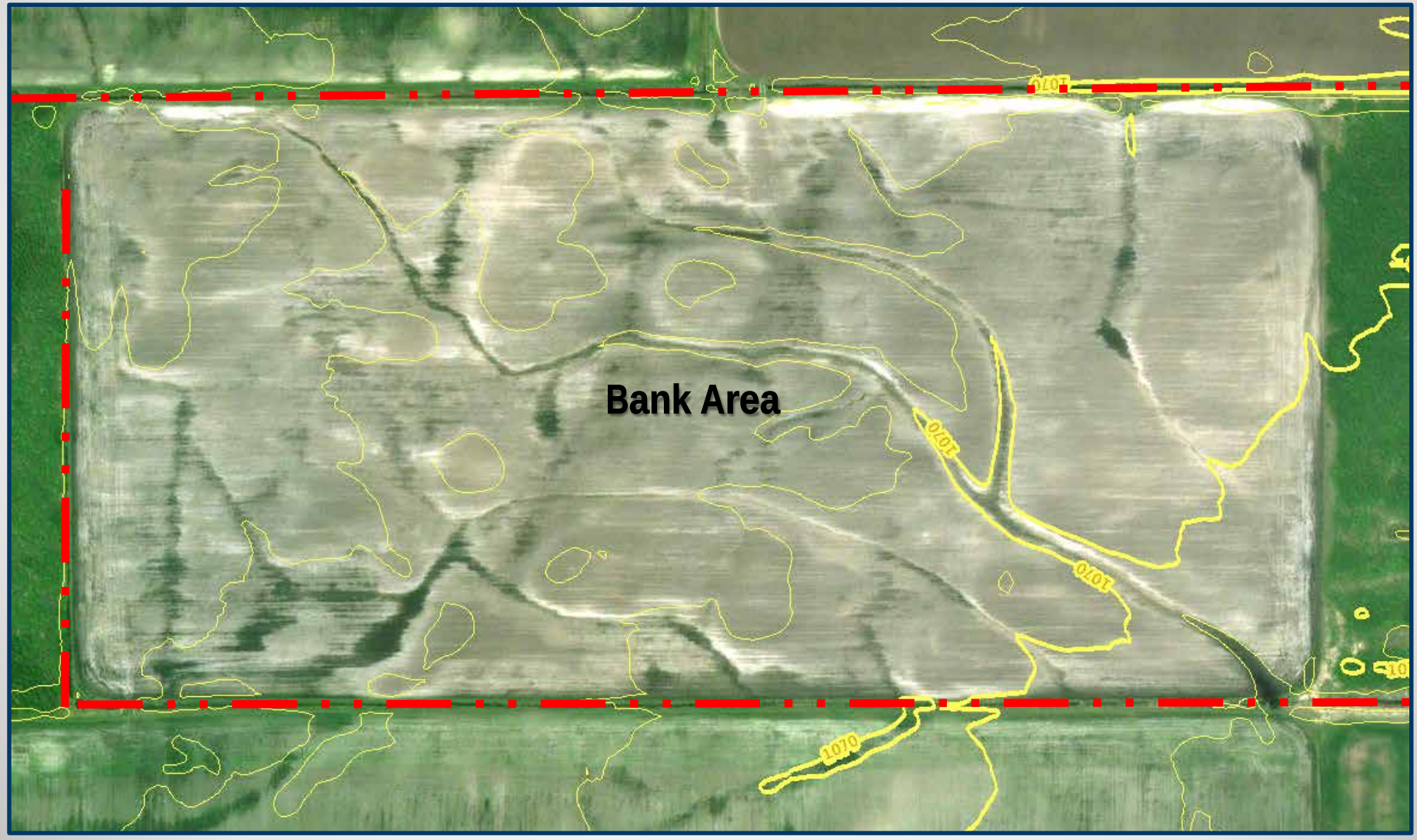



CULV. INFO.- 24" CMP
INV. NORTH END EL = 1036.61
INV. SOUTH END EL = 1036.61
DITCH BOTTOM
ELEV. = 1036.2
DITCH BOTTOM
ELEV. = 1036.1
DITCH
EAS


CULV. INFO.- 18" CMP
INV. NORTH END EL = ?
INV. SOUTH END EL = 1035.03
CULV. INFO.- 15" CMP
INV. WEST END EL = 1036.78
INV. EAST END EL = 1035.92
1039.78
RD EDGE


Inflow Area=81.200 ac
Peak Elev=1,123.52'
Storage=9.950 af

Off-Site Impacts –
Hydrology/Drainage



BOARD OF WATER AND SOIL RESOURCES

Construction Plans – What is Needed

Construct Wetland Here

Construction Success
Quality of Construction Plan

Construction Plan

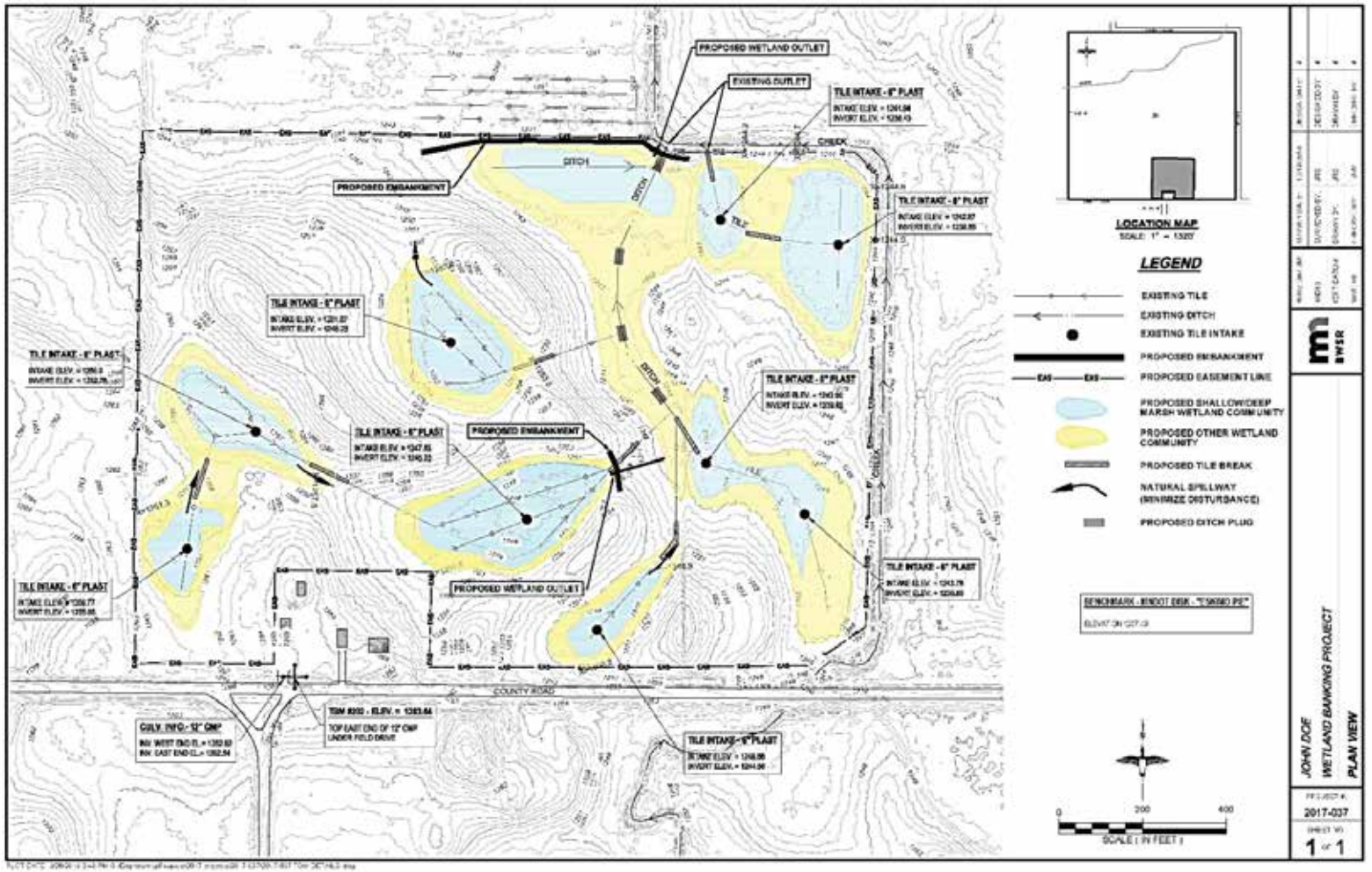
Should:

- **Accurately Convey to the Contractor and Others all Required Work**
- **Should be Easily Understood Allowing for:**
  - **Good decisions being made regarding necessary permits, approvals, orders, etc.**
  - **Good decisions regarding implementation and construction sequencing**
  - **Project elements to be maintained or reproduced into the future, should it be necessary**

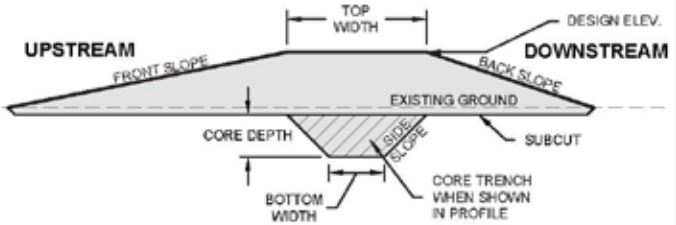
Construction Plan

Should Include:

- Appropriately Scaled Plan View showing Grading Limits and Locations of all Proposed Construction Features
- Detailed Layout and Plan Dimensions of all Construction Features
- Profiles and Cross Sections of Embankments, Channels, Spillways, etc.
- Necessary Details and Other Information to Ensure Correct Materials are used and/or Products are Fabricated
- Applicable Construction Notes and Directions, where needed


PROPOSED WETLAND OUTLET
EXISTING OUTLET
TILE INTAKE - 8" PLAST
PROPOSED EMBANKMENT
DITCH
CHECK
TILE INTAKE - 6" PLAST
TILE INTAKE - 8" PLAST
TILE INTAKE - 8" PLAST
TILE INTAKE - 8" PLAST
PROPOSED EMBANKMENT
TILE INTAKE - 6" PLAST
TILE INTAKE - 6" PLAST
PROPOSED WETLAND OUTLET
COUNTY ROAD
TILE INTAKE - 8" PLAST
LOCATION MAP
SCALE: 1" = 1320'
LEGEND
EXISTING TILE
EXISTING DITCH
EXISTING TILE INTAKE
PROPOSED EMBANKMENT
PROPOSED EASEMENT LINE
PROPOSED SHALLOW/DEEP MARSH WETLAND COMMUNITY
PROPOSED OTHER WETLAND COMMUNITY
PROPOSED TILE BREAK
NATURAL SPILLWAY (MINIMIZE DISTURBANCE)
PROPOSED DITCH PLUG
BENCHMARK - MNDOT DISK - "TS6080 PID"
0
200
400
SCALE IN FEET
JOHN DOE
WETLAND BANKING PROJECT
PLAN VIEW
2017-037
1 of 1

EMBANKMENT CONSTRUCTION REQUIREMENTS



EMBANKMENT DETAIL

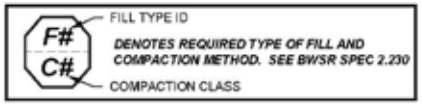
NOT TO SCALE

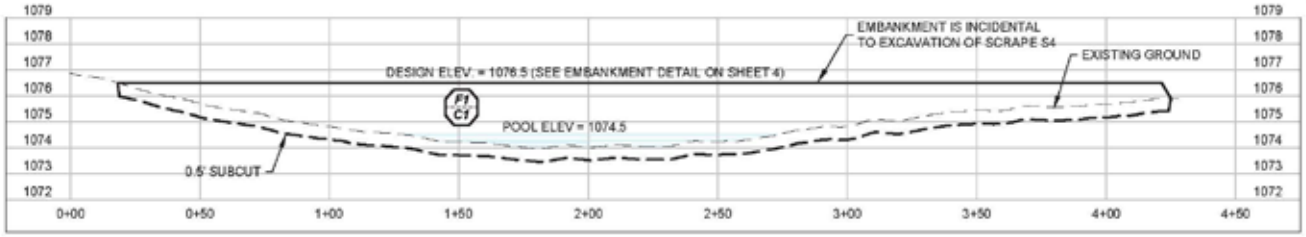
SUBCUT DIMENSIONS SHOWN ON EMBANKMENT PROFILE ARE MINIMUMS. THE SUBCUT DEPTH MAY NEED TO BE INCREASED BASED ON SITE AND SOIL CONDITIONS. ENGINEER MAY DIRECT WHEN TO EXCAVATE TO DIFFERENT DEPTHS THAN SHOWN.

THE FILL VOLUME SHOWN FOR AN EMBANKMENT INCLUDES QUANTITIES FOR SUBCUT AND SETTLEMENT ALLOWANCE.

PLACE ±4 INCHES OF STRIPPED TOPSOIL ON THE ENTIRE EMBANKMENT SURFACE AFTER CONSTRUCTED ELEVATION IS ACHIEVED. TOPSOIL MATERIAL USED SHALL BE SUITABLE FOR VEGETATION ESTABLISHMENT.

WHEN REQUIRED ON EMBANKMENT PROFILE, CORE TRENCH DEPTHS MAY VARY BASED ON SITE AND SOIL CONDITIONS. ENGINEER MAY DIRECT WHEN TO EXCAVATE TO DIFFERENT DEPTHS THAN SHOWN.



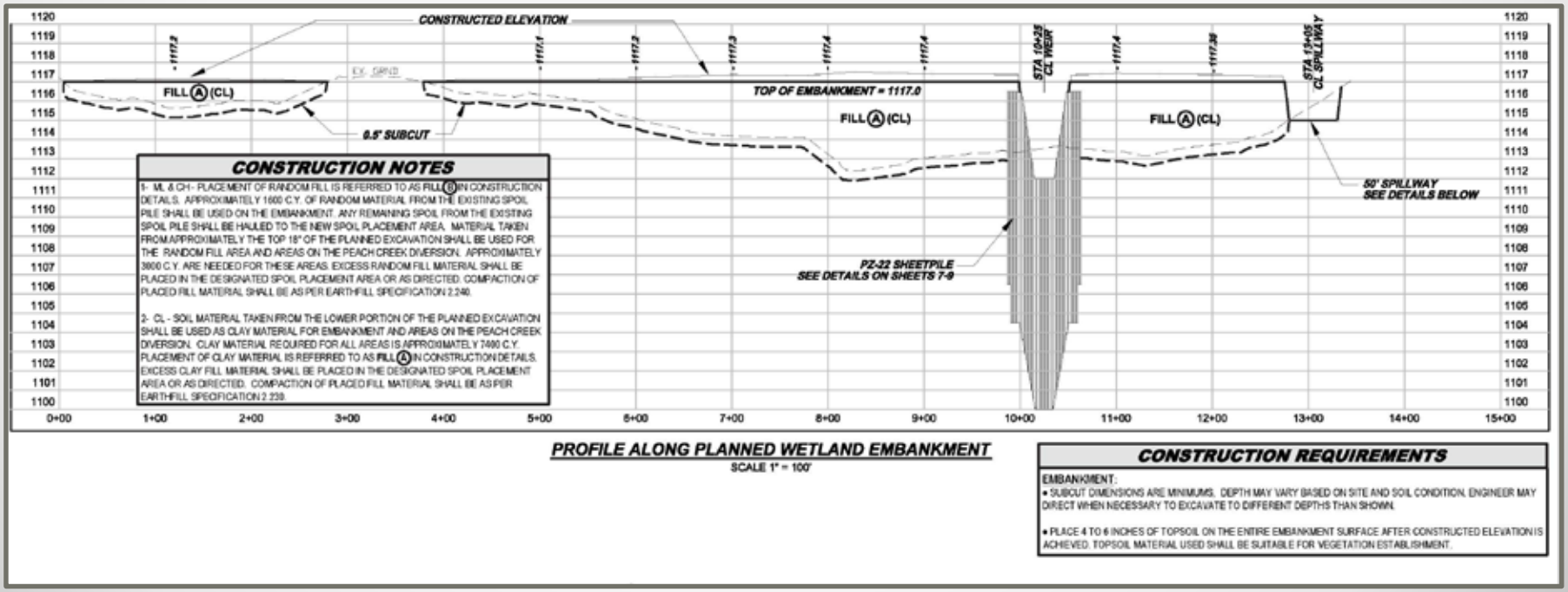


PROFILE ALONG SOUTH EMBANKMENT AT WETLAND #2

SCALE 1" = 50'

EMBANKMENT DESIGN

TOP WIDTH	= 10 FT
FRONT SLOPE	= 8:1 (H:V)
BACK SLOPE	= 3:1 (H:V)
SETTLEMENT	= 10%
SUBCUT QTY	= 212 CY
FILL QTY	= 781 CY



CONSTRUCTION NOTES

1- ML & CH - PLACEMENT OF RANDOM FILL IS REFERRED TO AS FILL Ⓐ IN CONSTRUCTION DETAILS. APPROXIMATELY 1600 C.Y. OF RANDOM MATERIAL FROM THE EXISTING SPOIL PILE SHALL BE USED ON THE EMBANKMENT. ANY REMAINING SPOIL FROM THE EXISTING SPOIL PILE SHALL BE HAULED TO THE NEW SPOIL PLACEMENT AREA. MATERIAL TAKEN FROM APPROXIMATELY THE TOP 18" OF THE PLANNED EXCAVATION SHALL BE USED FOR THE RANDOM FILL AREA AND AREAS ON THE PEACH CREEK DIVERSION. APPROXIMATELY 3600 C.Y. ARE NEEDED FOR THESE AREAS. EXCESS RANDOM FILL MATERIAL SHALL BE PLACED IN THE DESIGNATED SPOIL PLACEMENT AREA OR AS DIRECTED. COMPACTION OF PLACED FILL MATERIAL SHALL BE AS PER EARTHFILL SPECIFICATION 2.240.

2- CL - SOIL MATERIAL TAKEN FROM THE LOWER PORTION OF THE PLANNED EXCAVATION SHALL BE USED AS CLAY MATERIAL FOR EMBANKMENT AND AREAS ON THE PEACH CREEK DIVERSION. CLAY MATERIAL REQUIRED FOR ALL AREAS IS APPROXIMATELY 7400 C.Y. PLACEMENT OF CLAY MATERIAL IS REFERRED TO AS FILL Ⓐ IN CONSTRUCTION DETAILS. EXCESS CLAY FILL MATERIAL SHALL BE PLACED IN THE DESIGNATED SPOIL PLACEMENT AREA OR AS DIRECTED. COMPACTION OF PLACED FILL MATERIAL SHALL BE AS PER EARTHFILL SPECIFICATION 2.239.

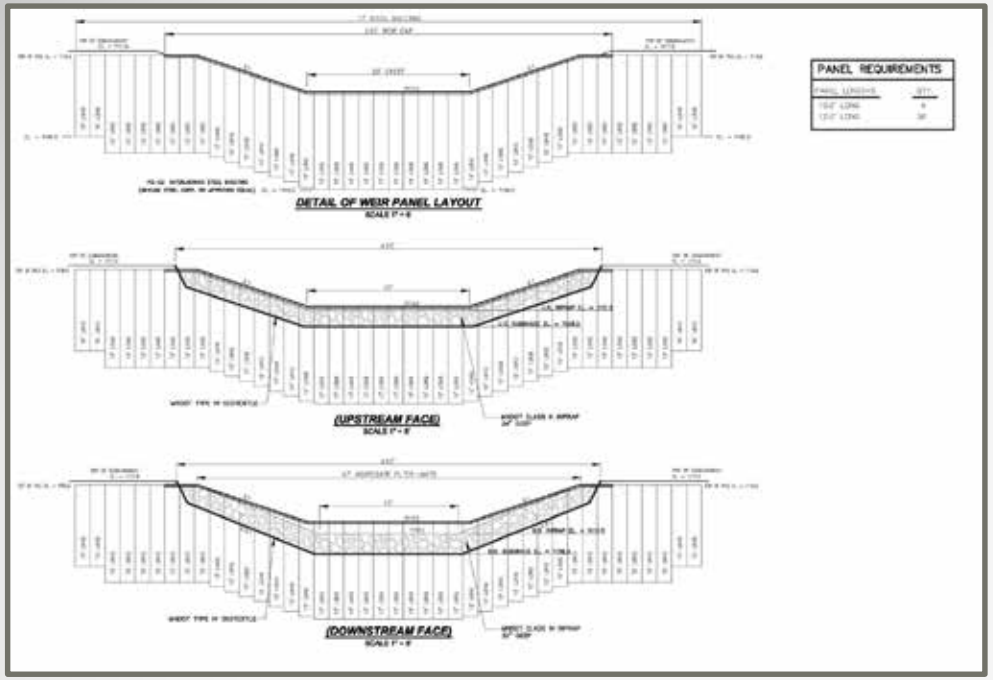
PROFILE ALONG PLANNED WETLAND EMBANKMENT

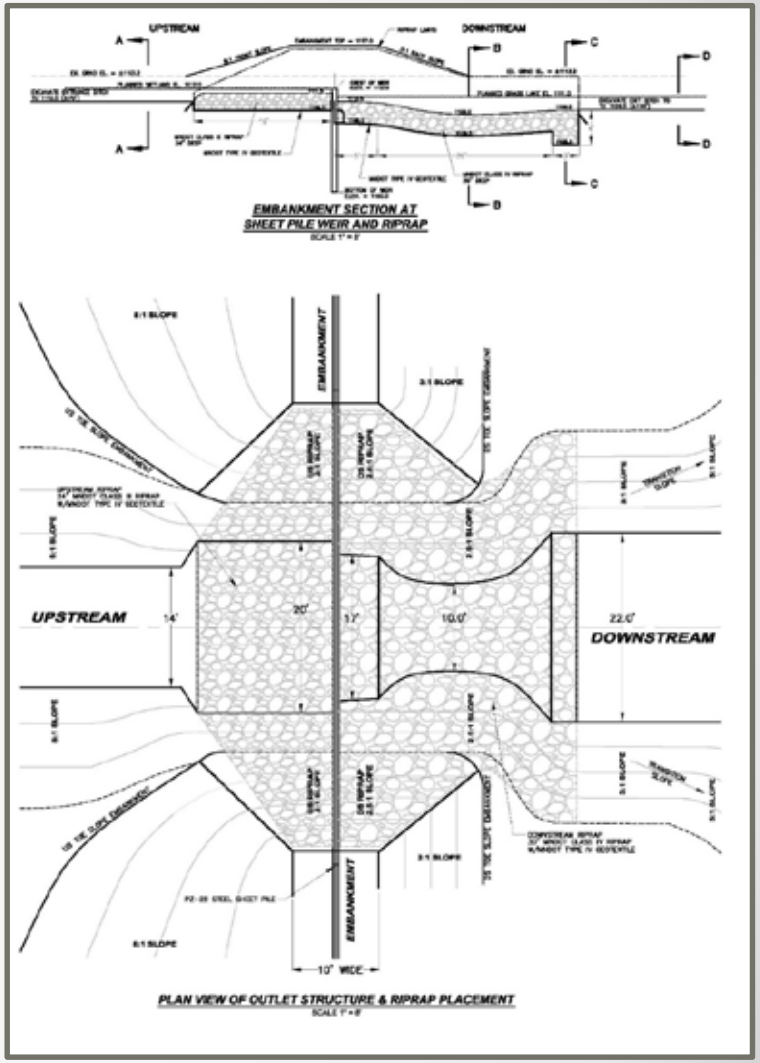
SCALE 1" = 100'

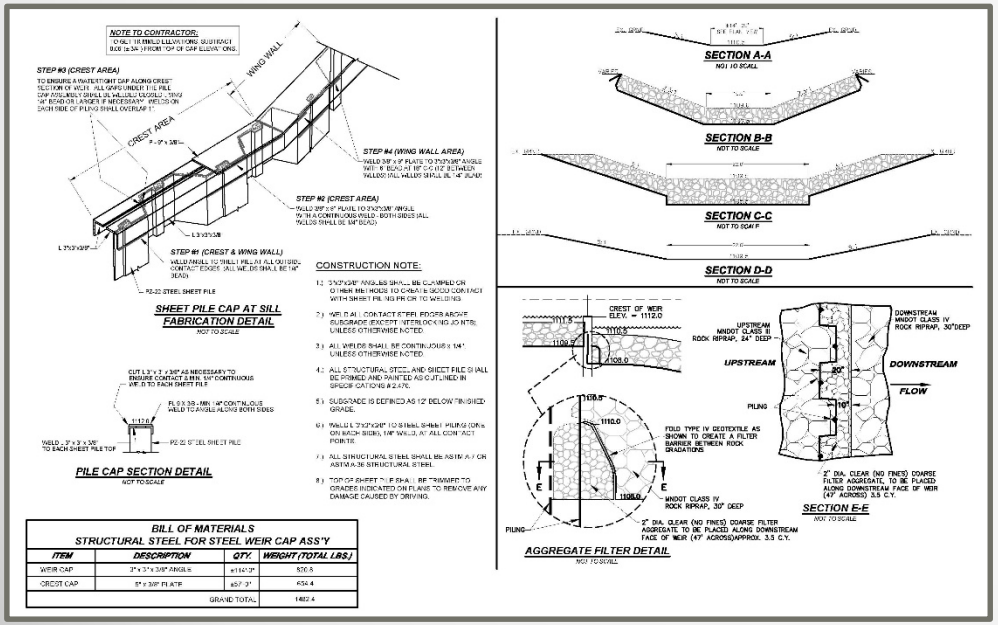
CONSTRUCTION REQUIREMENTS

EMBANKMENT:

- SUBCUT DIMENSIONS ARE MINIMUMS. DEPTH MAY VARY BASED ON SITE AND SOIL CONDITION. ENGINEER MAY DIRECT WHEN NECESSARY TO EXCAVATE TO DIFFERENT DEPTHS THAN SHOWN.
- PLACE 4 TO 6 INCHES OF TOPSOIL ON THE ENTIRE EMBANKMENT SURFACE AFTER CONSTRUCTED ELEVATION IS ACHIEVED. TOPSOIL MATERIAL USED SHALL BE SUITABLE FOR VEGETATION ESTABLISHMENT.

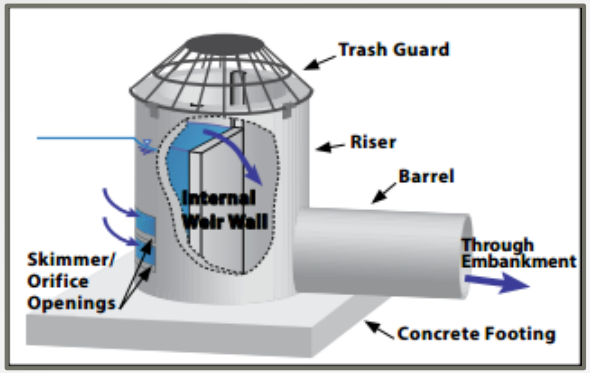


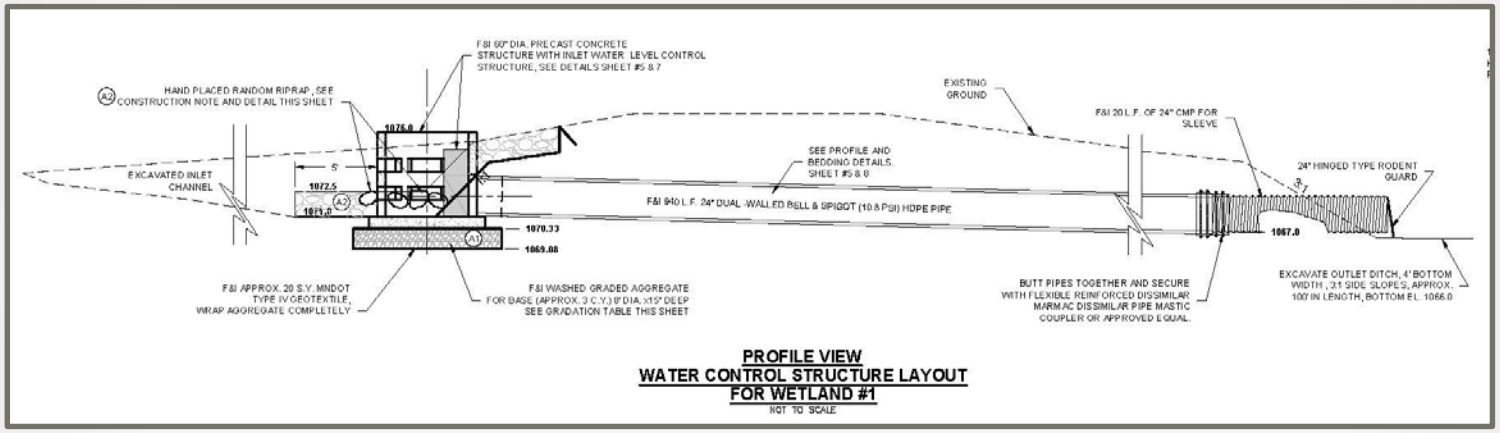




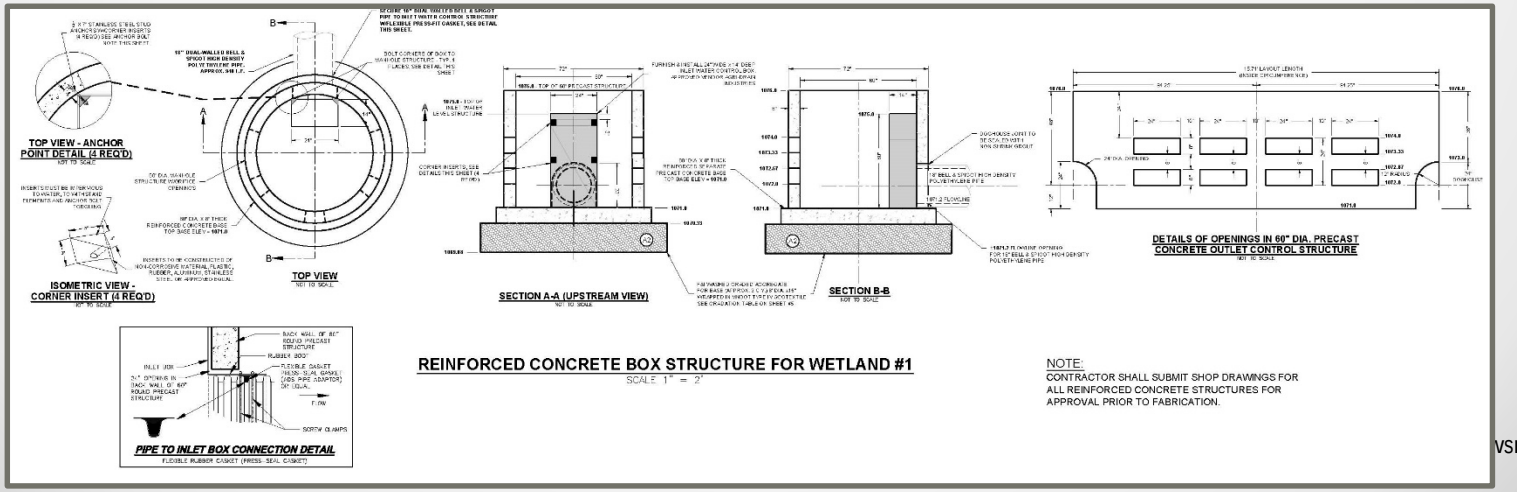
BILL OF MATERIALS
STRUCTURAL STEEL FOR STEEL WEIR CAP ASS'Y

ITEM	DESCRIPTION	QTY.	WEIGHT (TOTAL LBS.)
WEIR CAP	3" x 3" x 3/8" ANGLES	±1147.3'	930.5
CREST CAP	8" x 3/8" PLATE	±57.3'	464.4
		GRAND TOTAL	1402.4





PROFILE VIEW
WATER CONTROL STRUCTURE LAYOUT
FOR WETLAND #1
NOT TO SCALE



REINFORCED CONCRETE BOX STRUCTURE FOR WETLAND #1
SCALE: 1" = 2'

NOTE:
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL REINFORCED CONCRETE STRUCTURES FOR APPROVAL PRIOR TO FABRICATION.

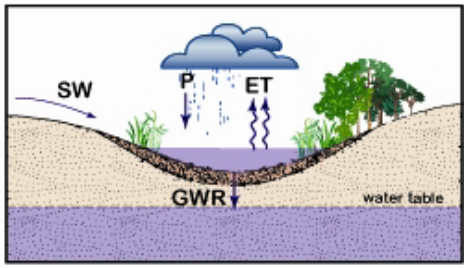
Construction Plan

- Final plans should be signed by designer (engineer of record)
- Construction Specifications???
- Construction certification
- As-Builts – long-term record

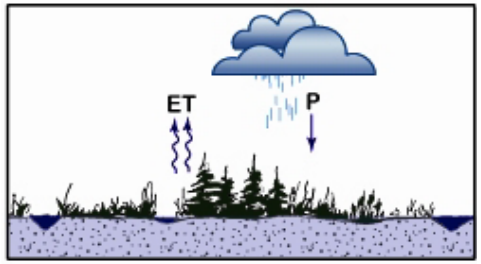
Questions?

With few exceptions, the former wetland type/extent should be the Target or Goal for Restoration Projects

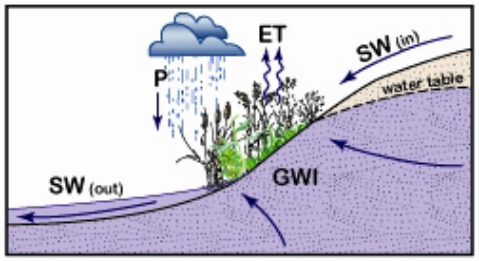
Always Achievable?



Surface Water - Depression



Surface Water - Extensive Flat

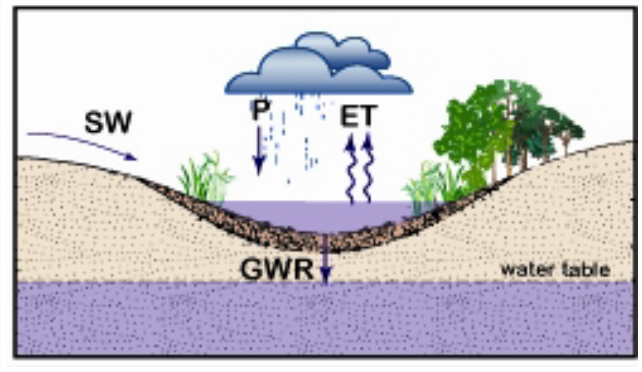


Ground Water - Slope

Wetland Conservation Act

8420.0528 Subp . 3A

Restored wetlands should emulate the hydrology and vegetation of the pre-settlement wetland condition



St. Paul District Policy for Wetland Compensatory Mitigation - Page 26

Credit for Restoration - Restoration is the preferred compensatory mitigation technique (§332.3(a)).

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Proposed bank site designs consisting of ponds, impoundments, and/or deep marshes will be rejected during the IRT review (see exceptions below). Failure to do so would perpetuate out-of-kind compensation and contribute to the surplus of open water and deep marsh acreage in bank sites.

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Compensation consisting of open water ponds, impoundments and/or deep marshes is no longer acceptable as a standard practice except when it would:

a. Constitute in-kind compensation in a particular case;

b. Not be practicable to establish any other wetland types due to landscape position and contributing watershed; and/or

c. Constitute 15 percent or less of the acreage of the bank site.

Restoration?