ENVIRONMENTAL CONSTRUCTABILITY IN MOTION.

NEED FOR KNOWLEDGE

22st Annual Transportation Research Conference
Session 25, Storm Water Management
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Crowne Plaza Riverfront Hotel, St Paul MN
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Office of Environmental Stewardship
Engineering Storm Water Quality
Linear Construction Flux

- Natural resource protection is a design/build process
- On-going research
  - Concrete wash-water management
  - Effluent monitoring field set-up
- Research needs
  - Treating turbid waters from dewatering and construction operations
    - Active storm water treatment (facility operation)
    - Passive storm water treatment
  - Design interim storm water conveyance
  - Best value designing of resource protection during all stages and phases of construction
  - Costs of delivering environmental commitments during all stages
  - Dust control process that complies with the Clean Air Act
  - Delivering words into construction actions
  - Developing a reward system for clever construction work
Resource Protection Complaints

• Protecting the natural and people resources as the law requires prevents or delays bridge and road projects.
• Controlling resource protection costs are impossible; make all compliance costs incidental.
• Performing the work as designed is impossible.
• It is only a little bit of dirt, what’s the problem?
• No one else has to do this, why do I?
Static to Dynamic Design

- Set of base regulations
- Set of base design elements
- Set of preliminary structural and non-structural BMP estimated quantities for all stages of construction
- Method for amending/modifying the plan
- Preventing stubbornness and shallow thinking
- Sharing the costs to create ownership
Developing Scenario (photo) Based Guidance Documents

• Words into acceptable practices
  • Public Waters (Peter Leete)
  • Concrete washout
  • Concrete washoff
  • Winter stabilization
  • High performance hydraulic applied soil glues, flocculants, and covers
  • Mowable inslopes
  • Dewatering
Concrete Washoff

Minnesota Department of Transportation
Concrete Vehicle, Equipment, Pavement & Walls Washoff Guidance
May 2009

This document presents the following options for machine, equipment, and surface washoff:
- Method A: Designated Area Open Subgrade on Shoulder
- Method B: Designated Area Closed Surface
- Method C: Wash Area Isolation
- Method D: Sump Manhole Elevation Trap & Vacuum Removal

MinDOT Guidance: The MDOT construction permit requires that concrete washoff be managed in every project that uses concrete vehicles, equipment, and surface washoff. The following procedures are necessary to prevent the discharge of concrete liquids and solids from making contact with soils or debris in order to prevent discharge to ground and surface waters.

Pumping Machine Washoff Update Plan: At the end of each day of concrete equipment utilization, the contractor designates the location of equipment washoff on the paving plan sheet after water treatment is completed. All washoff is installed on grade or under ground level. The designee at the end of the day ensures that the washoff is installed correctly.

Washing Area Isolation: The washing area is isolated by the use of a washoff basin. The basin is designed to collect all washoff and prevent it from entering the waterway. The basin is typically excavated and lined with a impermeable material.

Washing Area Isolation Procedure:
1. Washoff is collected in a designated washoff basin.
2. Washoff is pumped from the washoff basin to a treatment facility.
3. Washoff is treated to meet the necessary discharge criteria.

"Concrete Grate Drain for machine washoff and new clear conveyance area where each pipe and grate, drain (piped or grouted) will need"
Design must:

• ENSURE environmental commitments are delivered
• ENSURE that all federal and state laws are followed
• Show environmental protection/ avoidance/ mitigation for every expected, or proposed stage and phase of construction, *from start to finish*
• Be fair for both engineer and contractor
• Develop the post construction operations and maintenance plan
Design Requirements

- NEPA/MEPA
- Watershed districts
- Public waters
- USACE WCA, dredge/fills, operations over water
- NPDES MS4
- NPDES Construction
- 401 Certification
Environmental Commitments

ENVIRONMENTAL COMMITMENTS: North Dakota and Minnesota Departments of Transportation, and the Federal Highway Administration have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

Commitment No. 1: Unavoidable impacts to wetlands will be mitigated on-site, adjacent to the project, or at an approved location.

Action taken/required: NDOT will mitigate emergent wetlands primarily on site. Forested Wetlands will be mitigated off site with forested wetlands on the Red River system.

Commitment No. 2: Trees impacted during construction will be mitigated at a 2:1 ratio.

Action taken/required: Trees will be mitigated at a 2:1 ratio off-site.

Commitment No. 3: All disturbed areas will be seeded with a native grass mixture.

Action taken/required: The contractor will match and seed all disturbed areas as shown in the plans.

Commitment No. 4: No construction or demolition activities are to take place in the Red River Channel from March 15 to June 30 unless the DNR and NDG&R area supervisor waives the exclusion dates.

Action taken/required: The supervisor will be contacted if work needs to be done in the channel during the exclusion dates. Flotation silt curtains will be installed if fill is placed in the channel or near the banks.

Commitment No. 5: Erosion and sedimentation into the Red River and its adjacent habitat will be minimized.

Action taken/required: The contractor shall install and maintain erosion control devices as shown in the plans.

Commitment No. 6: No river channel alterations or changes in drainage patterns will be made.

Action taken/required: The project has been designed to avoid alterations to the channel and drainage patterns.

Commitment No. 7: If this project results in an Adverse Effect to historic properties, NDOT, and FHWA will work with the State Historical Society of North Dakota and Minnesota to develop a Memorandum of Agreement.

Action taken/required: The Robbin Camp building and the existing bridge are National Register eligible. The right of way has been reduced by the Robbin Camp building and it has been determined this project will have no adverse effects on it. The project will have an adverse effect on the existing bridge. Photos and documentation will be done in accordance with the memorandum of agreements with North Dakota and Minnesota SHPO.

Commitment No. 8: Coordination will take place with the affected utility companies during project design.

Action taken/required: Utility companies have been made aware of those utilities that need to be moved.

Commitment No. 9: Appropriate sources will have a cultural and environmental review.

Action taken/required: This will be done.

Commitment No. 10: A US Army Corps of Engineers Section 404 Permit is required.

Action taken/required: NDOT has obtained the Section 404 Permit.

Commitment No. 11: An NPDES permit is required.

Action taken/required: The contractor shall obtain an NPDES (National Pollutant Discharge Elimination System) Permit from the North Dakota Department of Health and the Minnesota Pollution Control Agency and shall comply with all requirements contained in the permit.

Commitment No. 12: Measures will be taken to limit construction noise, control dust, and maintain reasonable accessibility during construction.

Action taken required: All necessary measures will be taken by the contractor to minimize fugitive dust emissions increased during construction activities. Noise levels will be minimized by ensuring that all construction equipment is equipped with a recommended muffler in good working order. All complaints will be dealt with in an efficient and effective manner.

Commitment No. 13: All waste material associated with the project must be disposed of properly and not placed in identified environmental resource areas.

Action taken/required: The contractor will have to properly dispose of any construction/demolition material in accordance with the waste disposal note contained in the North Dakota Standard Specifications for Road and Bridge Construction. Caution is to be exercised during construction to prevent oil or fuel spills from entering waterways.

Commitment No. 14: There will be no increase in the 100 year flooding risk.

Action taken/required: The US Army Corps of Engineers study concluded that the bridge and roadway design does not increase the headwater for the 100 year flood.
EPA SWPPP

• Total Pollutant Management

Developing Your Stormwater Pollution Prevention Plan
A Guide for Construction Sites

Who?
Construction site operators (generally, the person who has operational control over construction plans and/or the person who has day-to-day supervision and control of activities occurring at the construction site).

Where?
Construction sites required to comply with stormwater discharge requirements.

What?
A guide to help you develop a good Stormwater Pollution Prevention Plan (SWPPP).

Why?
Stormwater runoff from construction sites can cause significant harm to our rivers, lakes, and coastal waters.

A SWPPP is required (by your construction general permit) and will help you prevent stormwater pollution.

A SWPPP is more than just a sediment and erosion control plan. It describes all the construction site operator’s activities to prevent stormwater contamination, control sedimentation and erosion, and comply with the requirements of the Clean Water Act.

How? It’s the law that directs the contractor to implement.
HIGHWAY PROJECT DESIGN PROCESS (HPDP) SUBJECT GUIDANCE

ACCESSIBILITY REQUIREMENTS
AIR QUALITY
AIRPORTS & AVIATION
BIKEWAYS & PEDESTRIANS
CONSTRUCTION IMPACTS
CONSULTANT AGREEMENTS
CONTAMINATED PROPERTIES
COST EFFECTIVENESS POLICY
COST PARTICIPATION
CRITICAL AREAS
DESIGN STANDARDS AND EXCEPTIONS
ENERGY ANALYSIS PROCEDURE
ENVIRONMENTAL JUSTICE
EROSION CONTROL
EXCESS MATERIALS (DISPOSAL OF)
FARMLAND IMPACTS
FISH AND WILDLIFE
FLOOD PLAINS
GEOMETRIC LAYOUTS
GROUNDWATER, GEOTECHNICAL & EARTHBORNE VIBRATIONS
HISTORICAL, ARCHAEOLOGICAL & CULTURAL IMPACTS
INTERSTATE ACCESS REQUESTS
LAND USE IMPACTS
MUNICIPAL CONSENT
NOISE
RAILROAD
REGULATED MATERIAL/WASTE
RIGHT-OF-WAY
SECTION 4(F), SECTION 6(F)
SNOW: BLOWING & DRIFTING SNOW CONTROL
SOCIAL & ECONOMIC IMPACTS
SOILS, MATERIALS, FOUNDATIONS & PAVEMENT
STREAM OR WATER BODY MODIFICATION
THREATENED & ENDANGERED SPECIES, FEDERAL
THREATENED & ENDANGERED SPECIES, STATE
TRAFFIC FORECASTS
TRANSIT
VEGETATION
VISUAL QUALITY
WATER QUALITY
WETLANDS
WILD & SCENIC RIVERS

ENVIRONMENTAL ASSESSMENT WORKSHEET

Project Title: Monticello Southeast Interceptor/Bondhus Segment Trunk Sewer Extension

Proposer: City of Monticello
Contact Person: Jeff O'Neill
and Title: Deputy Administrator

Address: 505 Walnut Street – Suite 1
Monticello, Minnesota 55362
Phone: (763) 295-2711
Fax: (763) 295-4404

Contact Person: Barbara Jean Conti
and Title: Project Manager

Address: 520 Lafayette Road North
St. Paul, Minnesota 55155
Phone: (651) 296-6703
Fax: (651) 296-7782

Reason for EAW Preparation:
EIS Scoping ______ Mandatory ________ EAW X ________ Citizen Petition ________ RUS Discretion ________ Proposer Volunteered
If EAW or EIS is mandatory give EQB rule category subpart number and name: 4410.4300 subp.18.A – Wastewater Systems

Project Location: County ____________ Wright ____________ City/Twp ____________ Monticello

I/4 1/4 Section 13 Township 121N Range 25W

Attachments to the EAW:
1. County map showing the general location of the project;
2. United States Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries;
3. Map showing proposed alignment;
4. Aerial photo of potential future service area;
5. Minnesota Department of Natural Resources (DNR) Natural Heritage Database Review letter; and
6. State Historical Preservation Office (SHPO) report and

Figure 1. County map showing the general location of the project;
Figure 2. United States Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries;
Figure 3. Map showing proposed alignment;
Figure 4. Aerial photo of potential future service area;
Figure 5. Minnesota Department of Natural Resources (DNR) Natural Heritage Database Review letter; and
Figure 6. State Historical Preservation Office (SHPO) report; and
Hasting's Buried Past

What are we doing?

In anticipation of the construction of the new Trunk Highway 61 bridge, archaeologists are conducting excavations to learn if historical features or artifacts are present in the project area.

Why is archaeology being done?

As part of the review and permitting process for the new bridge, the Federal Highway Administration, the Minnesota Department of Transportation, the Minnesota State Historic Preservation Office, the City of Hastings, and the National Park Service (MNRRA) have agreed that this area undergo an archaeological investigation prior to construction.

What might the archaeologists find?

Christmas Day Fire, 1899

Among the features that the archaeologists may uncover is evidence for the Christmas Day fire of 1899. This fire, which began at the Liberty sawmill on the riverfront, ravaged portions of four city blocks. While Hastings suffered many fires during the nineteenth century, this blaze was one of the most widespread and disastrous.

The St. John's Hotel and a neighboring saloon formerly stood on this corner. Both of these buildings were destroyed by fire on December 25, 1899. Archaeologists may discover artifacts left behind by people who once stayed at the hotel or frequented the saloon. They may also find evidence for earlier uses of these buildings. These pieces of the past will help us to understand what daily life was like for the early residents of Hastings.
SWPPP Addresses ALL Potential Pollutants

- Sediments
- Working in Water
- Concrete
- Hazardous Materials
- Construction Chemicals
- Solid Waste
- Wash Water
- Air
- Land
- Water
- Sediments
Critical Resource Identification
Natural Resource Plan Sheet

- Type 2,5 Tree protection area
- Scientific & Natural Area
- Type 6 Lake Woenotbegon
- Type 2 Fen
- Type 3
- Type 1
- Contaminated soil Area
- Shooting Star Population Area
- Type 3
- Holm's Lake
- Type 1 Tree protection area
- State Listed Blandin Turtle Nest Area
- Federally Endangered Prairie Orchid
- Type 2 Fen
- Nesting Osprey

*Site Plan required by Contractor as per 1717 prior to any construction related activity

Estimated ESC Construction Risk: 10/10 to Impossible
Mendota Bridge 1925
WASHED COARSE AGGREGATE

3 LAYERS BIAXIAL GEOMAT

35'-0"

CRAWLER CRANE

TRUCK

STABILIZING AGGREGATE

ELEV. 6884

RIPRAP

1:1 SLOPE (TYP.)

TYPICAL TRESTLE SECTION
CWA Certification

• A process that certifies the construction activity plan, if followed, amended with corrective actions, will comply with the Federal Clean Water Act.
NPDES Construction Permit Rules

• Manage sediment *and all other pollutants*
• Must make the design plan work, or amend as needed
• Stabilize exposed soils within 24 hours, or 7/14 days maximum
• Stabilize outfalls within 24 hours
• Stabilize conveyance systems within 24 hours
• Manage chemicals, trash, concrete, etc.
• Remove collected and ‘lost’ sediments in a timely manner
• Do not cause a nuisance.
Historic Preservation/Restoration
Outfall Monitoring
Chemical Treatment Options

• MSDS Required for any chemical used
• Natural base
  • Chitosan
  • Chitosan and pretreatment
  • Calgon
  • Corn starch
  • Cellulose
• Synthetic base
  • Poly acrylamide (PAM)
Detector signal too low!
Strong staged and phased Plans, and a willingness to pay the real costs for duration of construction

- Design at least one way for project to stay in compliance with all commitments and laws
- Design as if someone has to maintain what ever is built
- Design as if someone, someday will have to replace what was built
- Estimate true costs
- Compensate fairly
Design/Construction Stage Specifics

- Declaration of proposed chemicals
- Buried pollution discovery
- Demolitions/removals
- Clearing and grubbing
- Utilities
  - Sanitary, water, electric, gas, communications, storm sewer
- Traffic control
- Construction phasing
- Permanent storm volume, rate and quality controls
- Permanent vegetative covers
- Landscaping
- Lighting
Waste Water Solidification

Reduce's Disposal Cost
Encapsulates Disposal
Stabilizes Disposal

CONGELZ

Waste Water Solidification

Not WT. 40LB

Waste Water Solidification

Reduce's Disposal Cost
Encapsulates Disposal
Stabilizes Disposal

CONGELZ
Discovered Pollutants

- Mottled soils
- Smells
- Garbage
Staging Plan
Construction Plan
Bioretention Cell Detail
Iron enhanced sand media
Contingency Plan
Conclusion

- Estimating the in-between
- Designing for all stages
- Developing standards for commitments
- Research