Dirt Gravel and Low Volume Road Program

January 19, 2023

SPREAD FOOTER BRIDGES

CDGRS

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SPREAD FOOTER BRIDGES

- Spread Footer vs. Traditional Abutments
  - When to Consider a Spread Footer
  - Pros & Cons

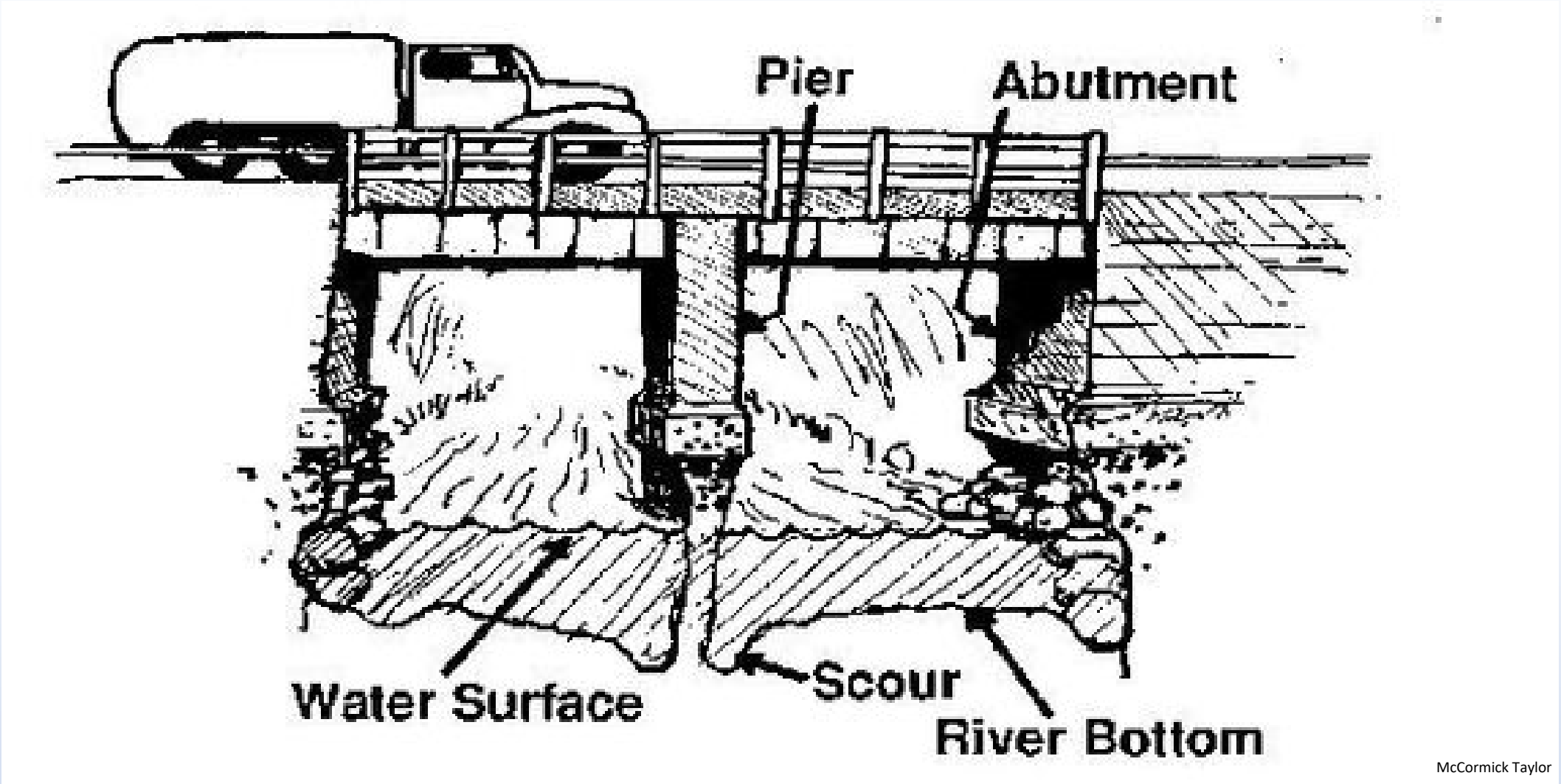
- Spread Footer Project Installation Sequence - Barr Road, Indiana County

- Clarion County Gowdy Road Project

- Warren County Stoddard Road Project

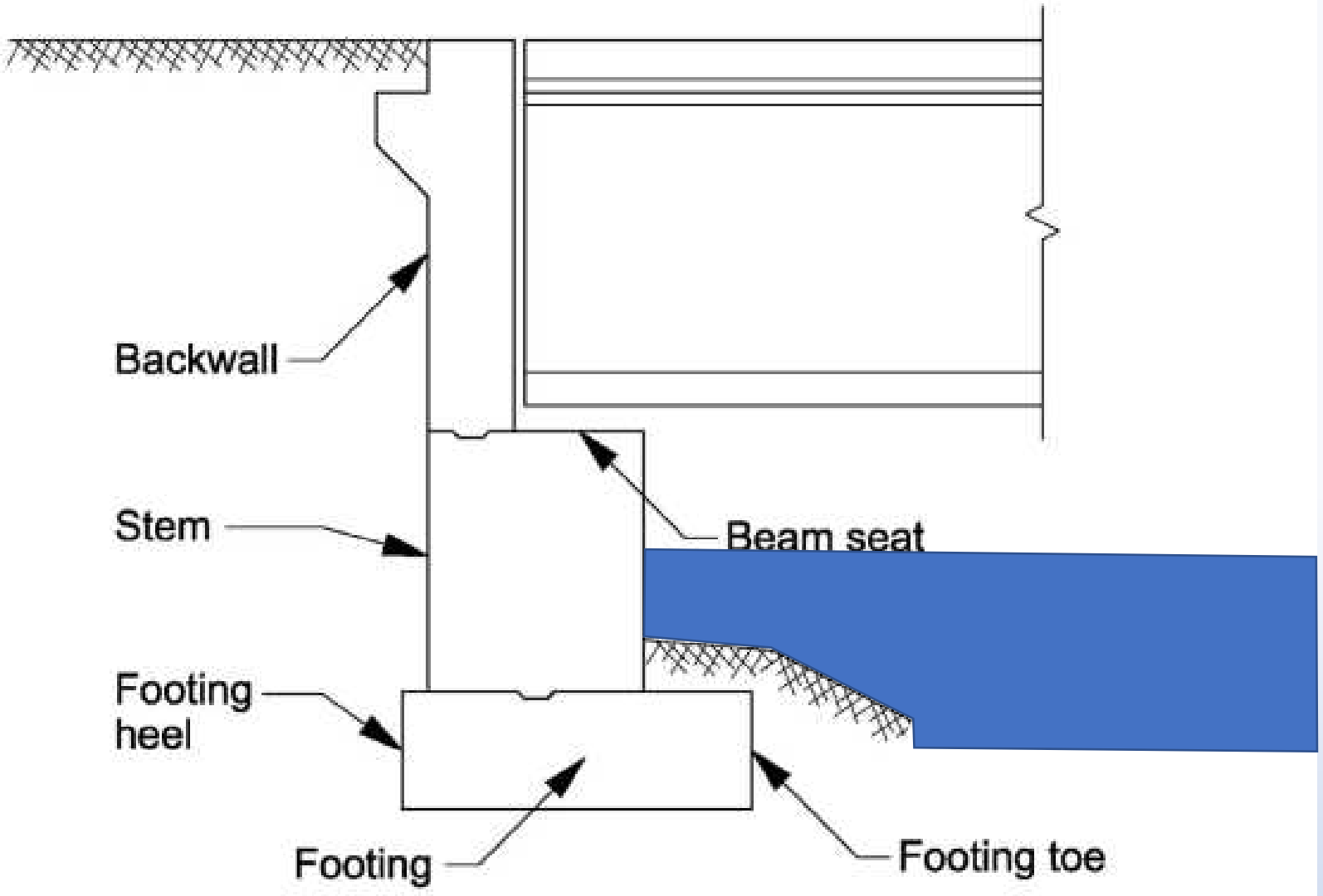
Center for Dirt and Gravel Road Studies

Traditional Bridge Abutments



McCormick Taylor

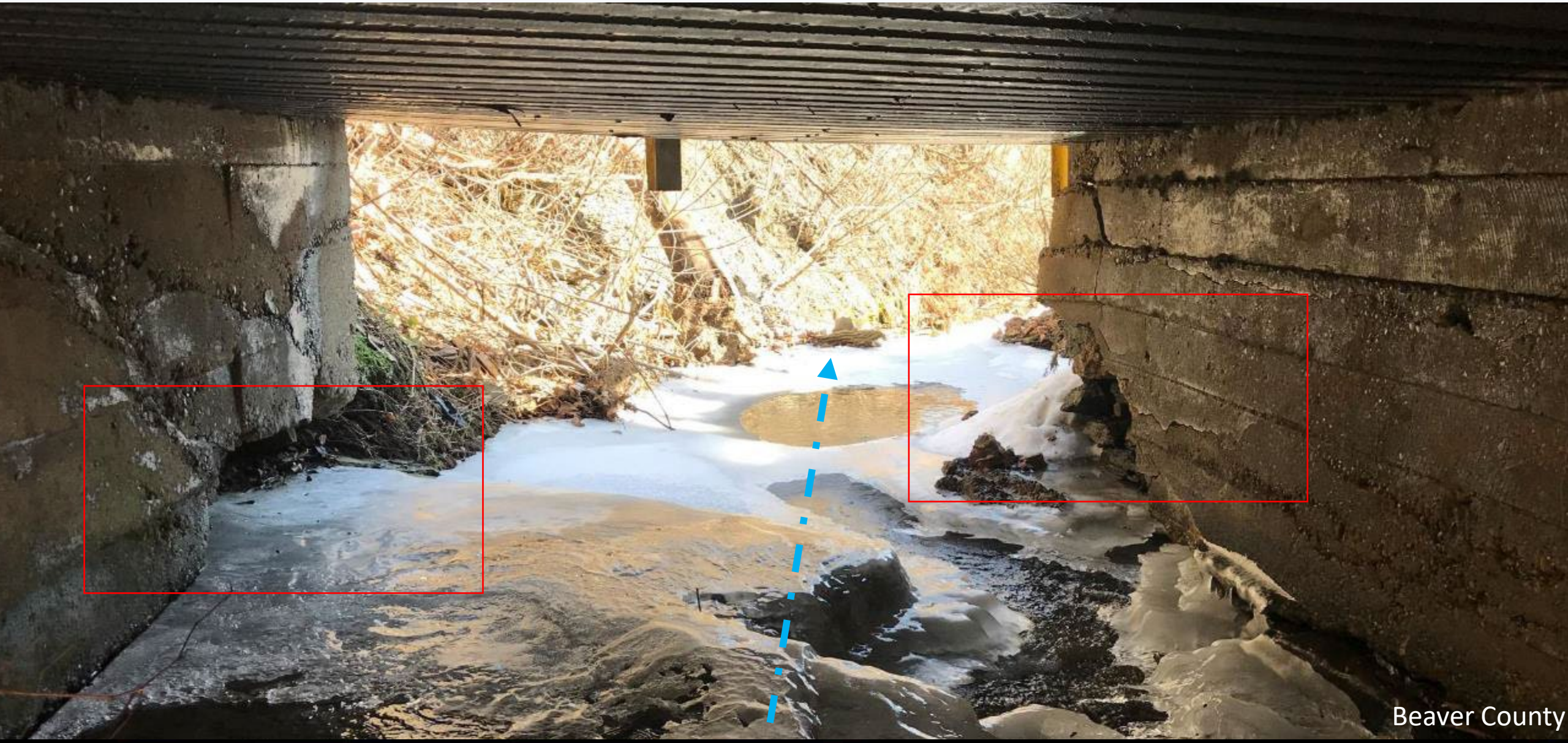
Traditional Bridge Abutments



Wisconsin DOT

Traditional Bridge Abutments

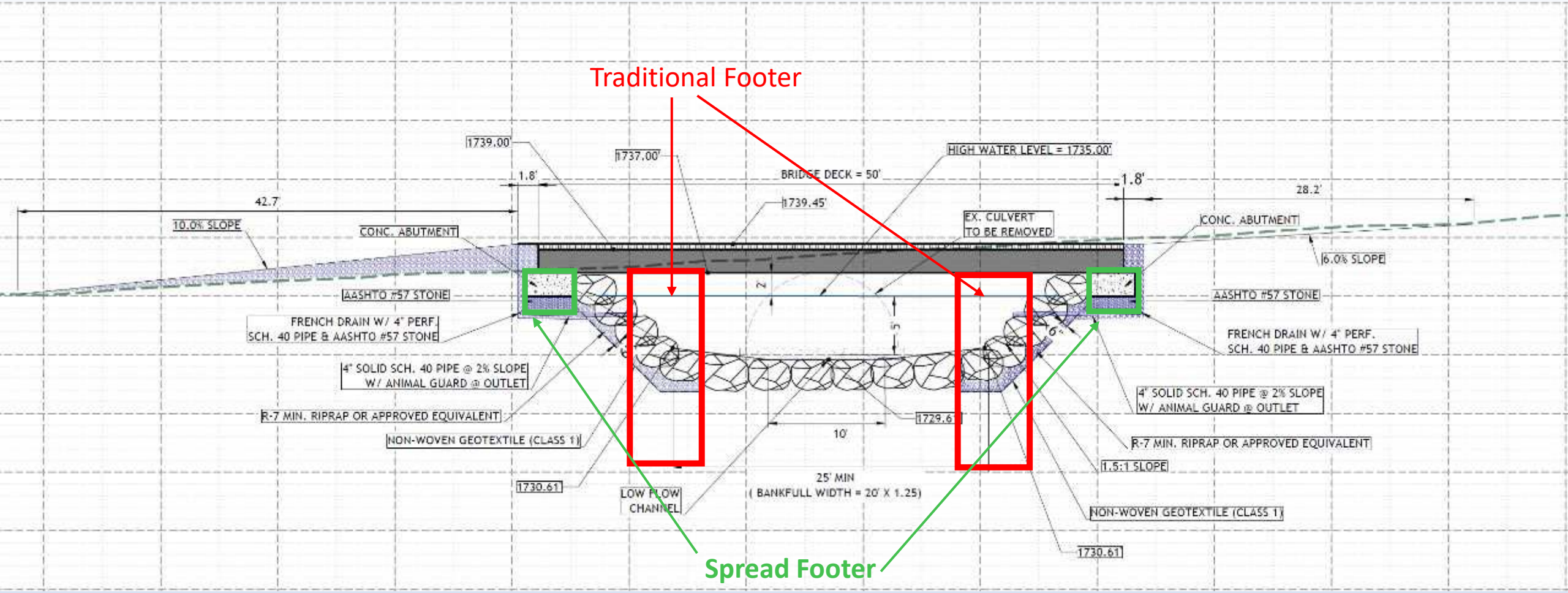
Traditional Bridge Abutments



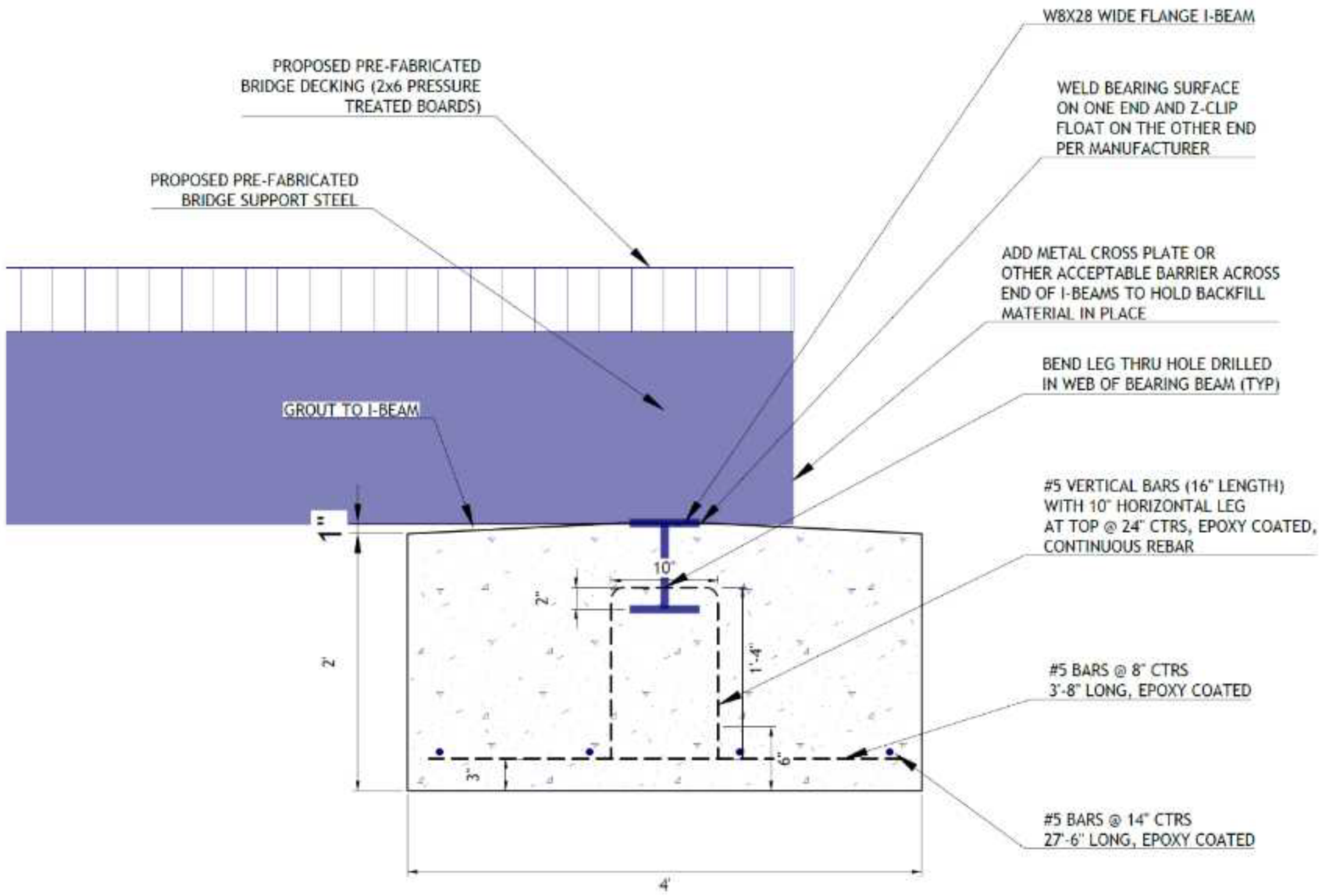
Traditional Bridge Abutments

Wayne County

Spread Footer Foundations



Spread Footer Foundations



PROPOSED BRIDGE ABUTMENT SECTION (TYP.)
NOT TO SCALE

Spread Footer Foundations

Spread Footer Foundations

When to Consider A Spread Footer

- Bankfull measurements that require structures 20’ span or greater
  *~16.25 Bankfull Width
- Areas that require additional opening area to meet the Q100 at 80% of the structure capacity
- Areas where the vertical rise is limited for roadway elevation but additional span (width) is necessary
- Stream channels that exceed 4% continuity slope and require a bottomless structure

Pros & Cons

Pros

- Reduced depth of excavation
- Less concrete and sequential concrete pours = less concrete cure time
- Expedited installation schedule = less environmental and community impact
- Increase structure capacity, better flood resiliency, lower maintenance requirements

Cons

- Longer bridge spans required
- Cost analysis to determine if reduction in abutment costs offsets additional structure length expense
- Alternative design approach from Penn DOT Standard – may require additional discussion and coordination with design engineer and bridge inspectors.

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- **Spread Footer Project Installation Sequence - Barr Road, Indiana County**

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Center for Dirt and Gravel Road Studies

Indiana County

Green Township Barr Road

Spring 2020


Existing Inlet
5’ Round
Plastic Pipe


Existing Inlet
5’ Round
Plastic Pipe


Existing
Inlet

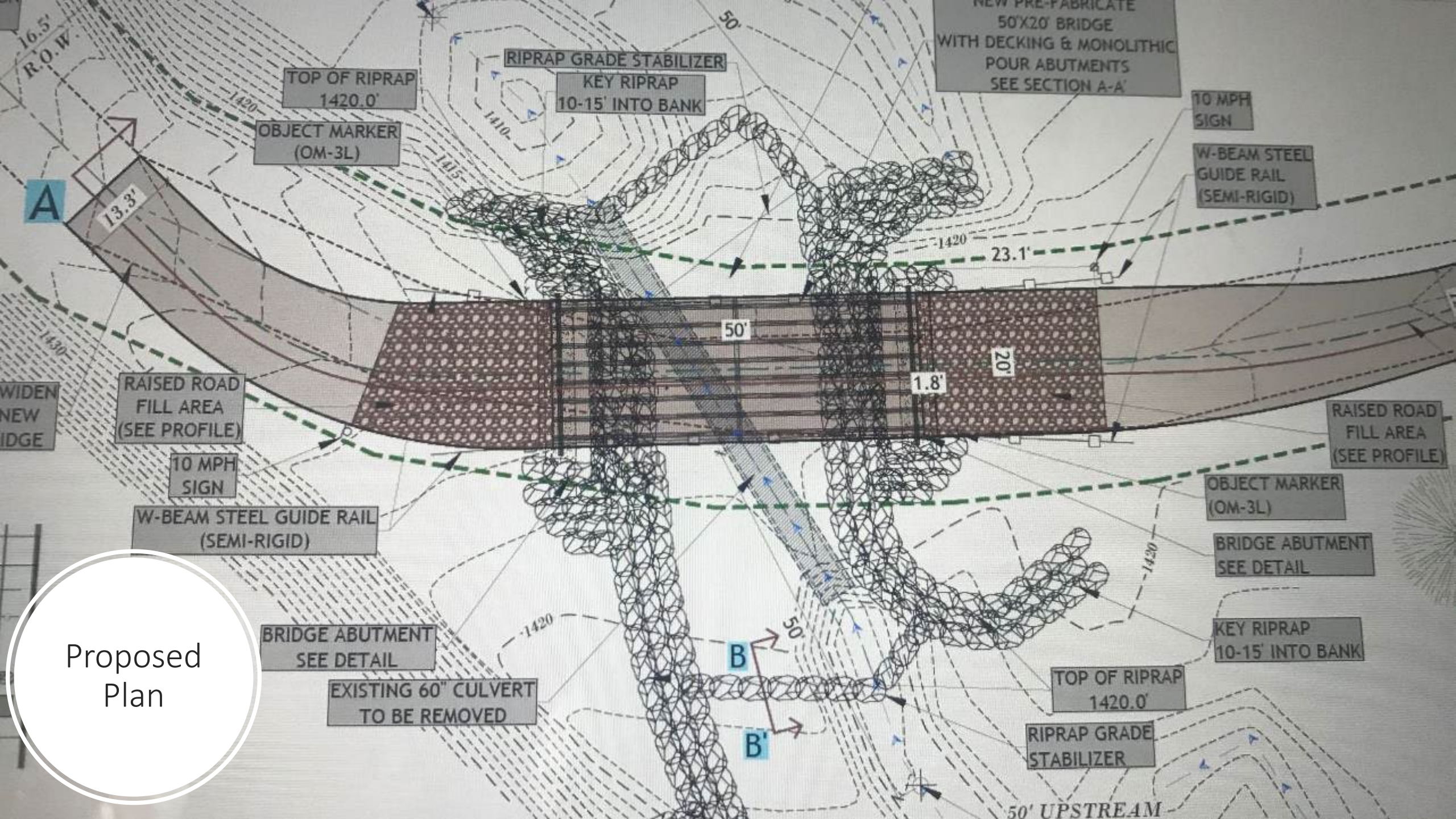

Upstream
Conditions


Existing
Structure
Downstream
Outlet


Existing
Structure
Outlet
Downstream
Conditions

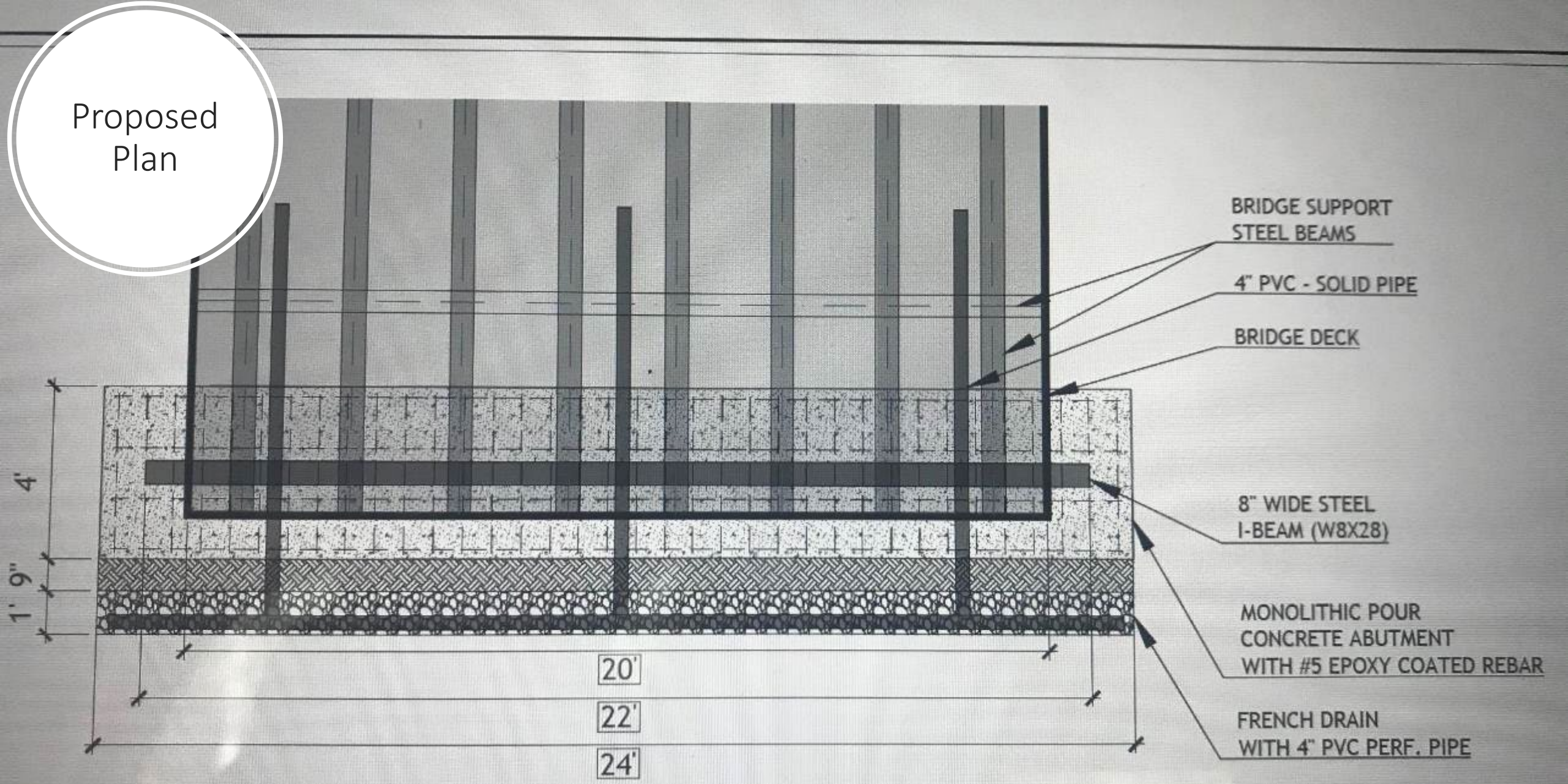

Existing
Conditions
Roadway
Approach


Existing
Conditions
Roadway
Approach



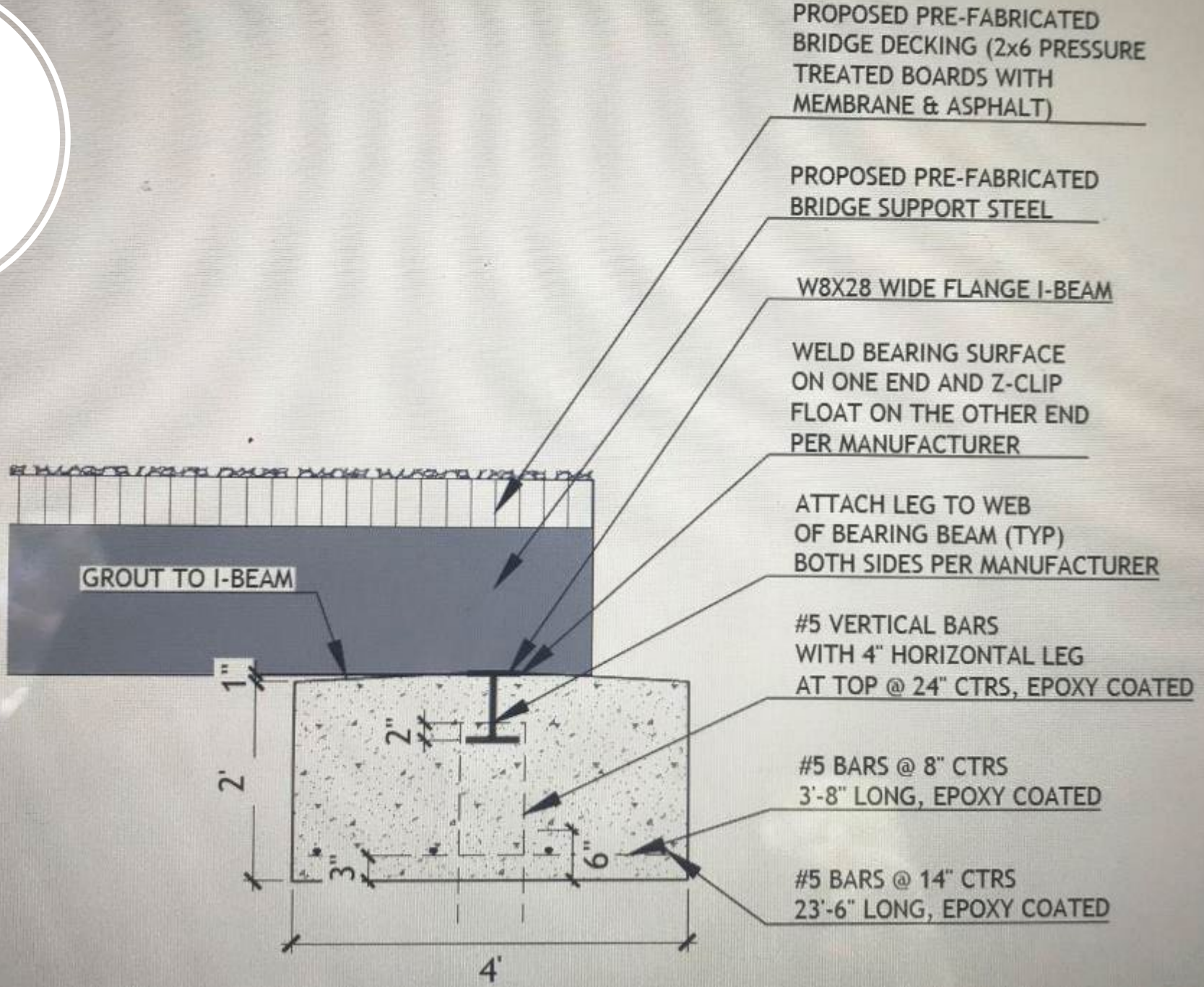
Proposed Plan

Proposed Plan



BRIDGE ABUTMENT LAYOUT PLAN

Proposed Plan




River Left
Spread Footer
Foundation
Excavation


River Left
Spread Footer
Foundation
Excavation &
Drainage

River Left
Spread Footer
Foundation
Excavation &
Drainage


River Left
Spread Footer
Foundation
Base
Compaction


River Left
Spread Footer
Foundation
Based
Prepared

River Left
Spread Footer
Rebar
Reinforcement

River Left
Spread Footer
Form and Rebar
Reinforcement


River Left
Spread Footer


Temporary
Stream Bypass
Stream
Channel
Restoration


Stream
Channel
Restoration
and
Streambank
Stabilization

River Right
Spread Footer
Framing


Completed
Stream
Channel
Restoration &
Streambank
Stabilization

Delivery of
Pre-Fabricated
Modular Bridge

~9:00 am

Placement of Bridge on Spread Footers

Installation of Wood Deck

Installation of Wood Deck Panels

Securing of Wood Deck Panels to Superstructure

Expansion Anchor of Bridge to Spread Footers


Fixed Attachment of Bridge Superstructure to Spread Footer

Bridge Superstructure


Bridge Deck &
Guide Rail
Installation
~7:00 pm

Grading and Site Restoration Work


Stream
Restoration
Low Water
Level


Downstream
Condition
Post
Construction


Upstream
Condition
Post
Construction

Final Project

May 5, 2022

~ 2 years post construction

Scope of Work Included:
Removal of Existing Structure
Installation (2) Spread Footer Abutments
Stream Channel and Bank Restoration
50’ x 20’ Pre-Fab Modular Bridge & Installation
(4) New Cross Pipes
Roadway Bridge Approach Work

Completed in 4 Weeks Due to Weather and COVID 19 Delays

Total Project Value $186,402.22

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Center for Dirt and Gravel Road Studies

Clarion County Gowdy Road - BEFORE

- Gowdy Road, Washington Township, Clarion County
- McCauley Run, EV stream

Clarion County Gowdy Road - BEFORE

PLANNING PROCESS

- Applicant requested tech assist
- ‘Pre-app’ meeting: applicant, CDGRS, District, and District engineer
- TU and CDGRS survey
- RFP process to select engineer (including on site meeting)
- ‘Pre-design’ mtg.: applicant, chosen engineer, CDGRS, District
- Design and GP
- Pre-bid meeting (x2): applicant, CDGRS, District, potential contractors
- Construction

DURING CONSTRUCTION

COMPLETED PROJECT

COMPLETED PROJECT

SUMMARY OF EXPERIENCE

- Lessons learned
- Advantages to this type of structure
- Time investment

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Pennsylvania SCC

PennState Center for Dirt and Gravel Road Studies

Warren County Stoddard Road - BEFORE

PLANNING PROCESS

- Multiple Pre-Application site visits and project planning - Feb. through Oct. 2018
- Application Received Nov. 2, 2018 & approved for funding by CD Board on Dec. 18, 2018
- Held Contract signing meeting March 2019
- Multiple conversations and site visits with Engineer to develop site plans, GP11 permit package, and Bid Package – March 2019 through June 2020
- Public Ad in local newspaper June 29 and July 6, 2020
- Mandatory site showing held July 10, 2020
- Bid opening July 21, 2020
- Construction began August 31, 2020 and ended November 2020

DURING CONSTRUCTION

COMPLETED PROJECT

SUMMARY OF EXPERIENCE

- **Final Project Value: $217,775**
  - In addition to the stream crossing this included 16 cross pipes, 2,905 tons road fill, seeding, mulching and instream restoration work.
- No Road Closures Due to Flooding Since Project Completion
  - Better high-water flow under the new bridge
  - Series of (15) - 12 inch pipes provide flood relief through the road profile.
- Township has another LVR project to replace a multiple pipe crossing on a tributary to this stream
- **Lessons Learned**
  - Compaction of material right up to structure
  - Streams are going to flood - Plan for it!
  - Be as detailed as possible in your plan drawings and bid package.

SPREAD FOOTER BRIDGES

QUESTIONS?

Special Thank You to:

Clarion Conservation District

Warren County Conservation District

Indiana County Conservation District