

## More than Just A Bridge Design

Presented By

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## More than Just A Bridge Design

This session includes information regarding some common project elements beyond the actual bridge design that contribute to the success of a project.

- Cofferdams
- Causeways
- Scour countermeasures
- Permits
- Right of Way
- Utility Impacts

## When is a Cofferdam Required?

INDOT Standard Specifications 206.09

Cofferdams shall be constructed for all abutments and piers where

- Water or unstable soil is encountered
- Soil may become unstable
- Excessive stream pollution or stream flow restriction might occur
- If necessary to support the sides of excavated areas, embankment, adjacent buildings, tracks

## When is a Cofferdam Required?

INDOT Design Manual 409-6.04(02)

If a cofferdam is anticipated to be required, the hammerhead portion of the pier shall be above the average low-water level of the stream.

## When is a Cofferdam Required?

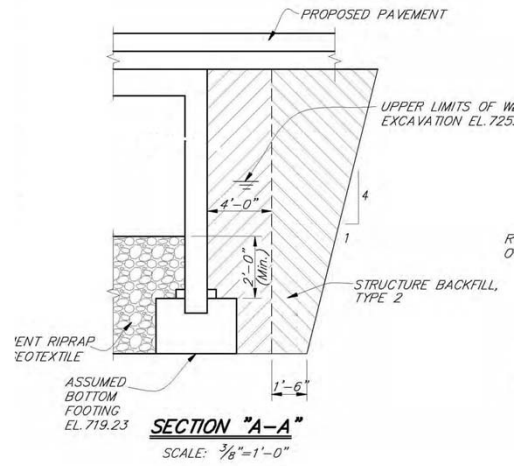
INDOT Standard Specifications 206.11(b)

If cofferdams are not specified as a pay item, and if cofferdams are necessary, their cost shall be included in the cost of excavation or the concrete requiring their use.

## When is a Cofferdam Required?



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## When is a Cofferdam Required?

Is really a “means and method” for more shallow excavations

Specify cofferdams for situations where low water depths are greater than 2' to 3'

## Cofferdams

Construction Materials

- Pump around installations
- Sand bags for shallow installations
- Steel sheet piling for more substantial installations



## Cofferdams

INDOT Standard Specifications 206.10

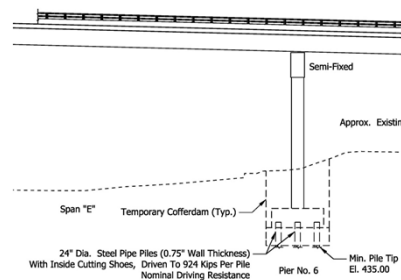
When conditions are encountered ... that no reasonable pumping will dewater the cofferdam ... the construction of a foundation seal may be required of such dimensions as necessary.

- Foundation seal limits are typically 18" beyond neat lines of footing
- Thickness is based on weight and friction resisting buoyant forces

## Cofferdams

Plan Details

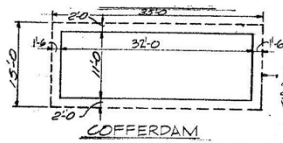
- General Plan  
Elevation View



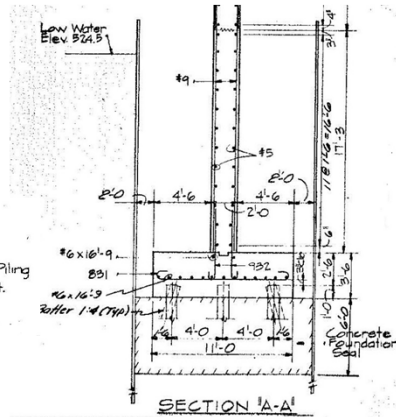
## Cofferdams

### Plan Details

- Pier Detail Sheet



Interlocking Sheet Piling  
 section MB-117  
 section Mod. 2.41 Ft.  
 Wt. 234 Lbs./Sq. Ft.



## Cofferdams

### Pay Items

- Wet Excavation CYS
- Cofferdam LS
- Concrete Foundation Seal CYS

## Cofferdams

Costs vary widely based on perimeter and depth.

INDOT unit costs	<u>2014</u>	<u>2015</u>
• Low	\$500	\$10,000
• High	\$169,626	\$1,450,000
• Weighted Average	\$42,583	\$383,792

## Causeways

Typically used for construction of multiple span bridges

Smaller applications often fit into the category of “means and methods”.

It is important to include in permits to allow Contractor to perform construction without amending permits.



## Causeways

### Construction materials

- Smaller applications - clean fill such as riprap and/or aggregate
- Larger applications - steel sheet pile or a temporary bridge

## Causeways



## Causeways

Pay items

- Not normally paid for directly
- Temporary Causeway LS
- Temporary Bridge and Approaches LS
- Pay items for sheeting and temporary fill

## Causeways

Costs vary widely based on situation

	Temporary Causeway LS	
INDOT units costs	<u>2014</u>	<u>2015</u>
Low	N/A	\$20,000
High	N/A	\$677,511
Weighted Average	N/A	\$404,170

## Scour Countermeasures

### Unique Issues for Bridge Rehabilitation Projects

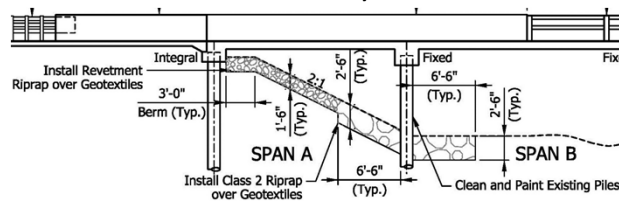
- Verify there is adequate access
- Verify there is existing right of way for access



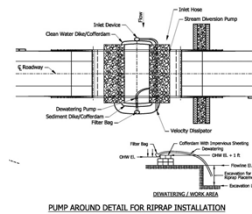
## Scour Countermeasures

### Unique Issues for Bridge Rehabilitation Projects

- Consider constructability issues



- Consider dewatering requirements



## Permits

Identify permit requirements early in the process

If in doubt, request a permit determination from  
INDOT Permit Coordinator

## Permits

401/404 Permit

COE 404 permit required when impacting waters of the US.  
IDEM 401 permit is required if a Section 404 Permit is required

What does Waters of the US include?

- Jurisdictional wetlands
- Streams shown as a blue solid line or blue dashed line on USGS quadrangle maps

What is considered an impact?

- Any construction below Ordinary High Water (OHW)

## Permits

The OHW elevation is provided in the Waters Report performed during the environmental study.

It is different from the average high water and is established by a review of the channel characteristics and is generally in the vicinity of where bare soil from the channel meets the channel bank vegetation.

## Permits

Types of 404 Permits

Individual Permit

Impacts greater than one acre

Review period – 12 to 18 months

Regional General Permit (RGP)

Impacts > 0.1 acre and < 1 acre

Single form used for both COE 404 and IDEM 401

IDEM Short Form may be used for wetland impacts < 0.1 acre

Review period – 4 to 6 months

## Permits

### IDNR Construction in a Floodway

Required for structures with drainage areas greater than 1 square mile

### Exemption for State and County Bridges

- Drainage areas less than 50 square miles
  - Not within planning authority (2 miles) of an incorporated town
  - No buildings within 2' of base flood elevation

## Permits

New bridges and bridges with a change in flow regime require hydrologic and hydraulic computer modeling

Bridge replacements and rehabilitations may qualify for a non-modeling assessment

## Permits

There are four IDNR worksheets for non-modeling assessments. The most common for bridge applications is “Bridge replacement in kind”

- Waterway area greater or equal to existing
- Low chord is equal to or higher than existing
- No changes in flow regime

Permit may be required for tree mitigation

## Permits

Review periods for IDNR permit applications

Modeling required – 9 months

Bridge replacement in kind – 6 months

IDNR Publications

<http://www.in.gov/dnr/water/2454.htm>

Regulatory Permit Programs and Related Information

<http://www.in.gov/dnr/water/2455.htm>

## Permits

Other Permits

Rule 5

FAA

Regulated Drain

## Right of Way

Right of Way Plans – Designer Responsibilities

Preliminary Right of Way Plans

Set of plans produced after the preliminary field check from the construction plans with LCRSP, reformatting and additional information per IDM Chapter 85.

Final Right of Way Plans

Preliminary R/W Plans updated per review comments and approved to transmit for commencing right of way engineering.



## Right of Way

Right of Way Plan Development AKA Right of Way Engineering

Prepare Plats and Descriptions

Prepare Right of Way Plans from set transmitted from designer

R/W Staking

Typical Time frame – 2 to 3 months

## Right of Way

Right of Way Acquisition

Environmental approval required prior to certain activities

Appraisal

Appraisal Review

Negotiation/Buying

Title Updates

Closing

Typical time frame – 6 to 12 months

## Utility Impacts

Underground facilities at scour countermeasures

OSHA requires a set clearance from overhead lines depending on voltage. This clearance may conflict with bridge erection