BRIDGES AND SMALL STRUCTURES

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WHAT WE’LL COVER

• Stay-In-Place Metal Deck Forms
• Complete Streets Policy
• Sizing Small Structures
• Marion County Bridge Inventory
STAY-IN-PLACE METAL DECK FORMS

• In general, DPW conforms to the INDOT guidelines and practices for the design & construction of bridges.
• One major exception:
  The City of Indianapolis has long had a policy of prohibiting the use of stay-in-place (SIP) metal deck forms, although that policy has been inconsistently applied at times.
• In 2017 the policy was formally adopted under DPW Design Memo 2017.05. You can find this design memo here:
  https://www.indy.gov/activity/indy-dpw-design-memos
Included in the memo is a specification to be added to all DPW bridge projects.

PERMANENT METAL FORM FOR BRIDGE DECKS

The Standard Specifications are revised as follows:
SECTION 702, BEGIN LINE 621, DELETE AND INSERT AS FOLLOWS:

2. Permanent metal forms shall not be used.

Fabricated permanent metal forms for concrete deck slabs may be used as an alternate method of forming on a steel beam, steel girder, prestressed concrete...

...2 ½ pages of this...

The cost of permanent metal forms shall be included in the cost of concrete, C, superstructure. The pay quantity of concrete in the slab will be computed from the dimensions shown on the plans, with no allowance for form deflection or geometry.
Why Prohibit Use of SIP Metal Forms?

• It allows for visual inspection of the underside of the concrete deck.
Why Prohibit Use of SIP Metal Forms?

- Fear that metal forms can accelerate deterioration by trapping moisture and chlorides.
How the Complete Streets Policy Impacts Bridge / Small Structure Projects

• Since 2012, by ordinance the City of Indianapolis has adopted a “Complete Streets” policy that calls for safe access for all modes of transportation: motorists, pedestrians and bicyclists.

• Each project requires an evaluation to determine if the existing structure conforms to the policy.

• Often, a structure will have to be widened to meet the policy requirements.

• Adding sidewalks to bridge / small structure projects can often result in the need for right-of-way acquisition.
Complete Streets Policy Example 1
38th Street over CSX
Complete Streets Policy Example 2
Lynhurst Drive over Mars Ditch
Complete Streets Policy Example 2
Lynhurst Drive over Mars Ditch
Complete Streets Policy Example 3
Southport Road over Bunker Creek

TYPICAL CROSS SECTION
Complete Streets Policy Example 3
Southport Road over Bunker Creek

TYPICAL SECTION
SCALE: 1/4" = 1'-0"
Sizing of Small Structures

• In order to meet the criteria of the DPW Drainage Standards, existing small structures will sometimes need to be upsized significantly.

• In light of that, DPW has developed the following 4-step methodology for the sizing of small structures. This guidance has not yet been formally adopted, but has been given to consultants on a case-by-case basis for use on DPW projects.
Sizing of Small Structures
DPW Methodology

1. Size the structure in accordance with the Standards.
2. Size the structure to effectively convey the peak discharge from the 10-year design storm event, with the 25-year design event overtopping the road by no more than 7 inches.
3. Size the structure in accordance with the INDOT 2013 Design Manual, where the backwater should be no more than the existing, or 3 feet, whichever is less.
4. Size the structure in-kind to match the open area of the existing structure; the backwater will not exceed existing.
Sizing of Small Structures: Example Emerson Avenue over Pleasant Run Creek

- Existing structure is a 79” x 117” CMP arch, approximately 45’ long. Modeling indicates that there is 1.5’ of road overtopping for a Q25 event. The structure will be replaced as part of a road widening project.

- Currently two lanes; Emerson Avenue will be widened to four lanes, with a center turn lane and raised median and sidewalks along both sides. The replacement structure will be 96’ in length along its skew.
Sizing of Small Structures
Emerson Avenue over Pleasant Run Creek

• Step 1: Size it per the DPW Drainage Standards.

• This option would eliminate road overtopping. The resulting bridge is 3 spans, approximately 150’ in length, estimated cost of $2.5M.

• Seems excessive; move to Step 2.
Sizing of Small Structures
Emerson Avenue over Pleasant Run Creek

• Step 2: Size the structure to pass Q10, no more than 7” of road overtopping for Q25.

• Modeling indicates a 20’ 3-sided structure can pass the Q10. Overtopping for Q25 can be reduced to 7” by lowering the profile grade to provide a wider area of road being overtopped. Estimated cost of this option is $800k.

• Lowering the profile grade causes issues with utilities and adjacent drives and intersections. Look at Step 3.
Sizing of Small Structures
Emerson Avenue over Pleasant Run Creek

• Step 3: Size the structure with no increase in backwater.

• Using the same 20’ span 3-sided structure as option 2, with no significant change to the profile grade meets the requirement. Road overtopping depth is 9” for Q25, estimated cost is $750k.

• This does increase the waterway opening by more than 50%, so look at Step 4.
Sizing of Small Structures
Emerson Avenue over Pleasant Run Creek

• Step 4: Size the structure to maintain the same waterway opening as the existing structure. The resulting backwater cannot exceed that of the existing structure.

• Due to the increased length of the structure, maintaining the existing waterway opening increases the backwater depth, so it doesn’t meet the criteria for option 4.

• Result: Go with Option 3 for the design of the replacement.
Sizing of Small Structures Example
Emerson Avenue over Pleasant Run Creek
Marion County Bridge Inventory
Background

• There are 539 LPA bridges in the Marion County bridge inventory.
• Federal law requires bridges to be inspected on a routine basis.
• Consultants are selected to perform inspections on a 4 year basis through an INDOT RFP.
• Marion County is currently in year 3 of an inspection agreement that runs through fiscal years 2018-2021.
Marion County Bridge Inventory
Routine Inspections

• Generally, bridges are typically routinely inspected on a 24 month cycle, but there are exceptions.
• Increased Frequency bridges: Structures that rate low on certain criteria must be inspected more frequently.
• Extended Frequency bridges: FHWA and INDOT now allow bridges that meet certain criteria to go longer between inspections.
Marion County Bridge Inventory
Compliance Month

• Each county in Indiana has a “compliance month” in which they are required to begin and complete all routine inspections. If a county has more than 200 bridges, they have 2 months to complete all routine inspections.

• Marion County’s compliance month is July; all routine inspections must be completed in July & August.
Marion County Bridge Inventory
Possible Changes to the Schedule

• INDOT has had preliminary discussions with several counties about allowing more time to complete inspections.

• Why?: Of the 92 counties in Indiana, about 2/3 perform their routine inspections on even year cycles. This imbalance strains participants in the system.

• One possible benefit to Marion County: an extended inspection time might encourage more competition on the next RFP.
Marion County Bridge Inventory
Next RFP

• The next RFP for the Marion County bridge inventory will be issued in early to mid 2021 for inspection cycle years 2022 through 2025.

• Because FHWA will not allow inspections to be completed later than previously performed, if INDOT and Marion County agree to an extended inspection time, the inspections would need to start earlier in the year, therefore the RFP would come out earlier than normal.
Bridges and Small Structures

Questions?