Hydraulics Updates to the Indiana Design Manual

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Updates to the IDM

How-to Information

Helpful set of presentations on the Office of Hydraulics website
Updates to the IDM

Status of the current updates...

Mmmm... It is done!
Updates to the IDM

Bridge REPLACEMENT Updates...

ONE FOOT
Updates to the IDM

Bridge REPLACEMENT Updates...
Backwater...

First assess the existing backwater

Basic backwater criteria:

<table>
<thead>
<tr>
<th>If the existing backwater is...</th>
<th>The allowable backwater will be...</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 3 feet</td>
<td>3 feet or less</td>
</tr>
<tr>
<td>Between 0.14 and 3 feet</td>
<td>Match or improve existing</td>
</tr>
<tr>
<td>Less than 0.14 feet</td>
<td>Up to 0.14 feet</td>
</tr>
</tbody>
</table>

This can be affected by other factors →
Backwater: Check velocity...

Requires judgment

Evidence of instability?

If the existing bridge is unstable, the average velocity in the proposed bridge waterway should be $\leq 1.5 \times$ the downstream channel velocity.
Backwater: U/S structures...
Backwater: U/S structures...

- Lowest adjacent land grade
- "Target" water surface elevation
- 1 Foot
Backwater: U/S structures...

Is the “Target” water surface elevation less than 1 foot of backwater?

Lowest adjacent land grade

Existing backwater (More than 1 foot)
Updates to the IDM

Bridge Replacement

Backwater: U/S structures...

“Target” water surface elevation = 1.5 feet of backwater. GOOD!

Lowest adjacent land grade

Existing backwater (More than 1 foot)
Updates to the IDM

Bridge Replacement

**Backwater: U/S structures...**

- Lowes adjacent land grade

- Proposed water surface elevation for 1.0 feet of backwater. **Allowed!**

- "Target" water surface elevation < 1.0 feet of backwater. **OOPS!**

- Existing backwater (More than 1 foot)
**Backwater: Waterway areas...**

**Gross Waterway Area**
**Backwater:** Waterway areas...

Net Waterway Area
Backwater: Waterway areas...

Request plans at: http://www.in.gov/indot/2345.htm
Other Criteria: Freeboard...

Current criteria:
Ideal is 2’ or...
maybe 1’ or...
maybe 3’

New criteria:
What do I need to achieve?
Other Criteria: Freeboard...

Goal: Meet the existing criteria

Three possibilities:
1. The existing low structures is above the goal
2. The existing low structure is in pressure flow
3. The existing low structure is above the 1% EP elevation, but no pressure flow
Other Criteria: Freeboard...

Matching existing freeboard

Debris issues?

Yes: Meet the current criteria

0.81'
Updates to the IDM  Bridge Replacement

Other Criteria: Freeboard...

Matching existing freeboard

Debris issues?

Yes: Meet the current Criteria

No: Can match the PROFILE

0.81'
Two-Span Structures
Updates to the IDM

Culvert REPLACEMENT Updates…

Replacement in Kind…
Updates to the IDM

Culvert REPLACEMENT Updates...

Replacement in Kind... Is now the main policy!
Updates to the IDM Culvert Replacement

Replacement in Kind... is now the main policy!

Backwater...

Proposed backwater can be as much as 3 feet provided is less than the existing backwater.

But what if an upstream structure would be affected? See the bridge design criteria...
Other Criteria...

Span and Waterway Area:

- Proposed ≥ Existing
- 1% EP Water Surface
- Existing Waterway Area
Other Criteria...

Outlet Velocity $\leq 1.5 \times$ Channel Velocity

Does the pipe have a scour issue?
Other Criteria…

Outlet Velocity ≤ 1.5 x Channel Velocity

Exceptions:

• Minimum outlet velocity = 6.5 ft/ sec
• 1 foot of backwater
Culvert Extension

- The headwater elevation has to stay the same
- Remember: HEADwater, not BACKwater
- How to deal with that?

If the culvert is extended, what happens to the headwater here?
Other Things...

When making a submittal, include the electronic files - and mention the version that is used.

Is there concern about downstream impacts? Contact the Office of Hydraulics.
50% Clogging Factor...

REQUIRED

Bridge deck drains

NOT REQUIRED

Sags with flanking inlets
**Flanking Inlets...**

Required for curb and gutter sections.

Required for median and side ditches unless there is a good place for the water to go.
Updates to the IDM

Pipe Cover

New set of standard drawings...

Cover is now based on pipe type and size

<table>
<thead>
<tr>
<th>CORNER RADIUS (in.)</th>
<th>SPAN (in.)</th>
<th>RISE (in.)</th>
<th>AREA (sf)</th>
<th>THICKNESS (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.060</td>
</tr>
<tr>
<td>8 (Min.) 18 3/4 (Typ.)</td>
<td>60</td>
<td>46</td>
<td>15.6</td>
<td>MIN.</td>
</tr>
<tr>
<td>9 (Min.) 20 3/4 (Typ.)</td>
<td>66</td>
<td>51</td>
<td>19.3</td>
<td>1.1</td>
</tr>
<tr>
<td>12 (Min.) 22 7/8 (Typ.)</td>
<td>73</td>
<td>55</td>
<td>23.2</td>
<td>1.1</td>
</tr>
<tr>
<td>14 (Min.) 20 7/8 (Typ.)</td>
<td>81</td>
<td>59</td>
<td>27.4</td>
<td>1.2</td>
</tr>
<tr>
<td>14 (Min.) 22 5/8 (Typ.)</td>
<td>87</td>
<td>63</td>
<td>32.1</td>
<td>1.2</td>
</tr>
<tr>
<td>16 (Min.) 24 3/8 (Typ.)</td>
<td>95</td>
<td>67</td>
<td>37.0</td>
<td>1.2</td>
</tr>
<tr>
<td>16 (Min.) 26 1/8 (Typ.)</td>
<td>103</td>
<td>71</td>
<td>42.4</td>
<td>1.2</td>
</tr>
<tr>
<td>18 (Min.) 27 3/4 (Typ.)</td>
<td>112</td>
<td>75</td>
<td>48.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Updates to the IDM

Find information on the INDOT Hydraulics website

http://in.gov/indot/3595.htm

Culvert Lining and more…
THANKS

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