

## Bridge Design Review 2019 Review & 2020 Preview

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## What Just Happened?

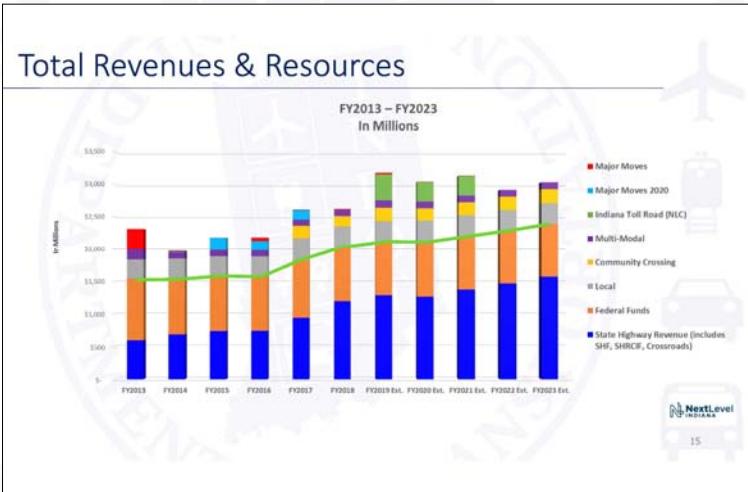


Our Favorite Bridge Rehab  
Engineer Retired!



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## What Just Happened?



Starting to Notice Gas Tax Increase

\* Stolen from 2018 Biennium Budget Report



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## What Just Happened?

Old Review Process



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## What Just Happened?

Old Review Process

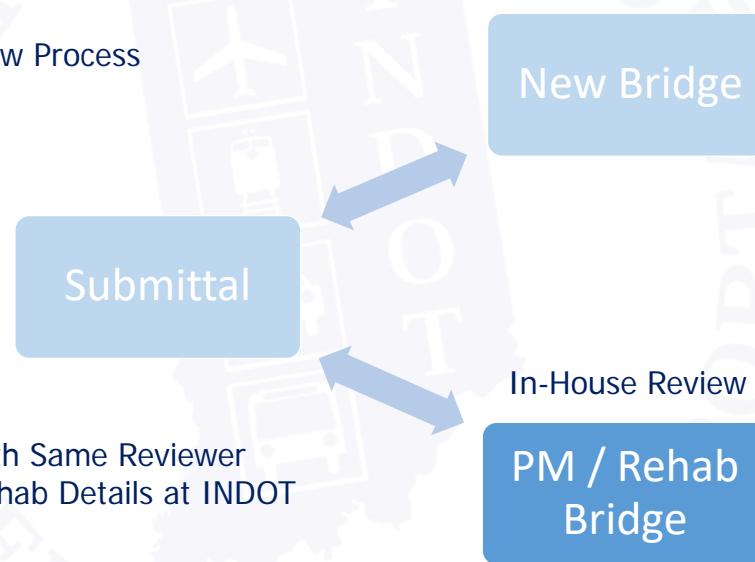


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## What Just Happened?

Old Review Process

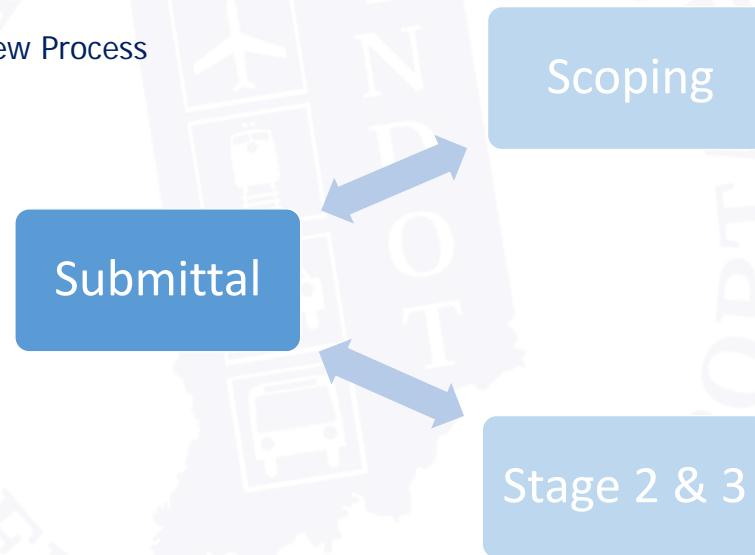
- Kept with Same Reviewer
- Kept Rehab Details at INDOT



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## What Just Happened?

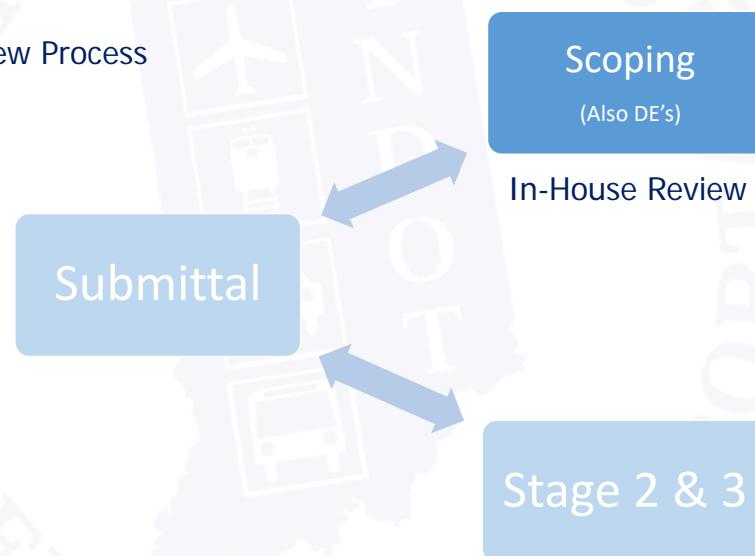
New Review Process



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## What Just Happened?

New Review Process



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## What Just Happened?

### New Review Process

- Helps Balance Workload
- Keeps Bridge Design Familiar with Special Projects

Scoping

Submittal

### Consultant Review

Stage 2 & 3



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## What's Coming

### Checklist for Each Submittal

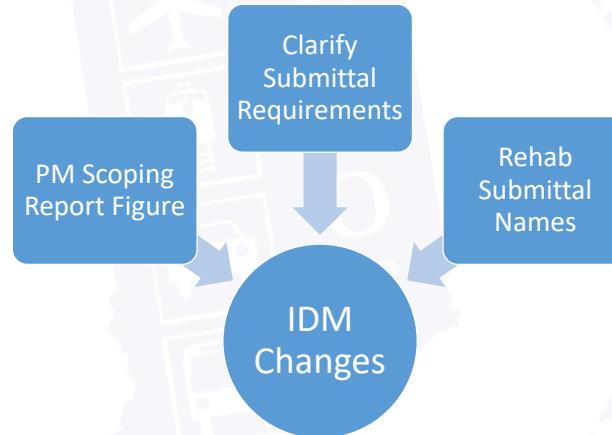


- Impact Based Review
- Improved Transparency
- Improved Accountability



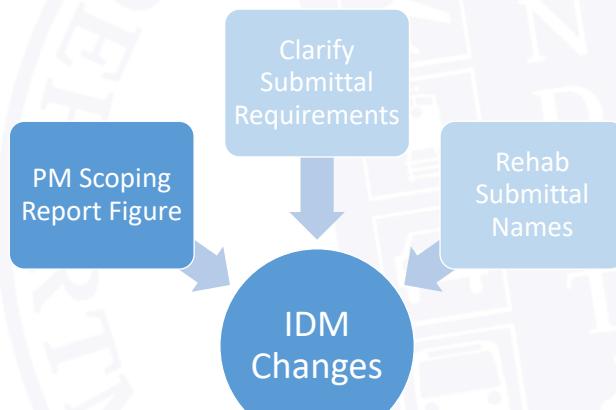
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## What's Coming



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## What's Coming



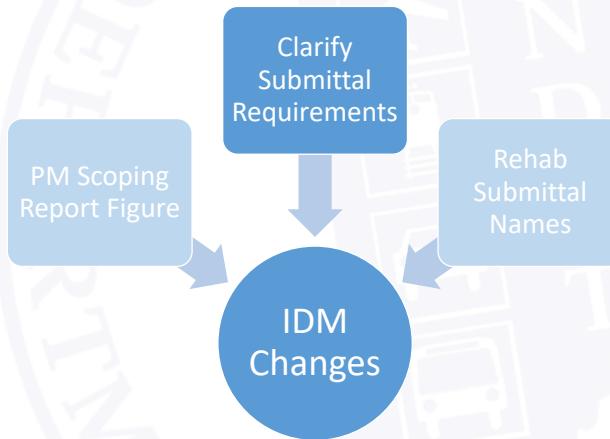
### Revising PM Scope Form:

- Photos
- Cost Estimate
- Proposed MOT (Bikes and Peds Also)
- Depth of Surface Milling
- Posted Speed
- Load Rating (if Applicable)



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## What's Coming



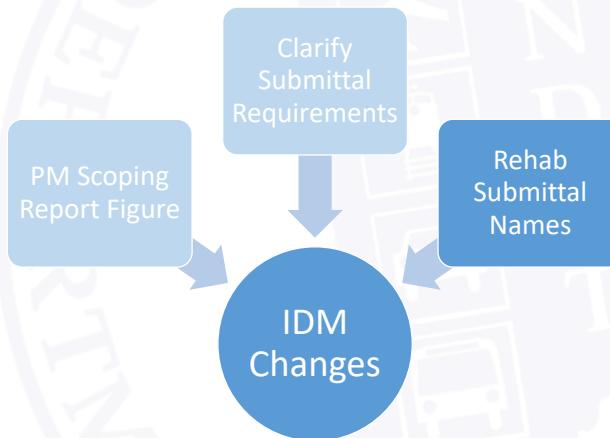
### Revising Submittal Requirements:

- Appropriate Existing Plan Sheets with Stage 1
- Scope Report with Preliminary Plans
- Supporting Documents with Foundation Review
- Pavement Design with Final Plans



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## What's Coming



### Revising Rehab Submittal Names:

(Maybe)

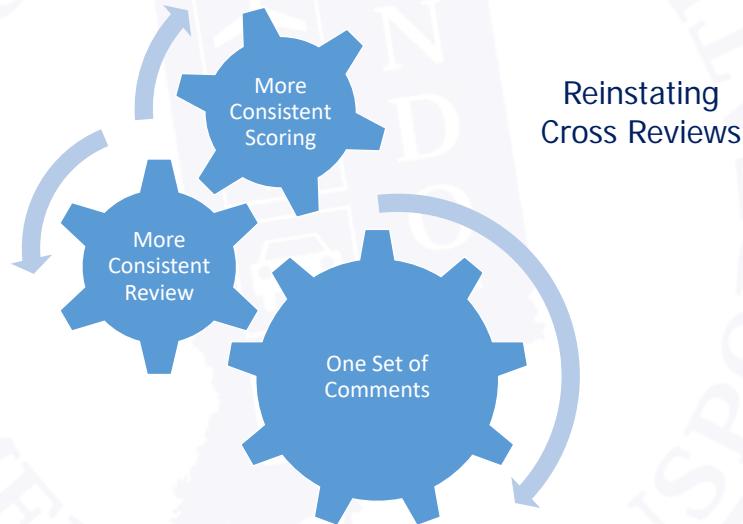
- Scoping Report = Stage 1
- Preliminary Plans = Stage 2
- Final Plans = Stage 3
- Final Tracings = Final Tracings

**Exact equivalents and further information still coming on this!**



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## What's Coming



Reinstating  
Cross Reviews



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## What's Coming

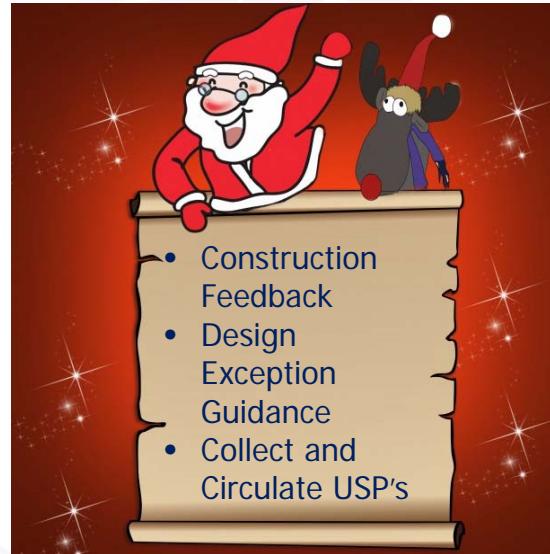


Working with Districts for a Uniform Message



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## What's Coming



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## Where Designers Come in



### Keep up Communication

- What was left out
- Why was it done
- In the Document if Appropriate

### Support Engineering Judgment

- Abbreviated SS&T
- Include Supporting Resources
- Does not have to be excessive
- Cost/District Scope is not Justification



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## Where Designers Come in

- Coordinate with INDOT Bridge Design on Non-Standard Designs and Details
- Notify INDOT of Scope Changes After Scope Approval
- Design and Plans Complete at Stage 3
- Notify INDOT Bridge Design of Any Design Changes after Stage 3 / Load Rating



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## Remember....

Scoping Report should be complete when submitted



Defined Scope (Noting DE's)



May Require Calculations or  
Abbreviated SS&T



Have All Questions Answered



May Require Crash Data/Analysis



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## Remember....



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## Plan Submittals and Quality Assurance

- IDM 14-1.02(02)
- Quality control measures should be an integral part of the design process
- Checklists for the various project types are included in Section 14-2.0
- Purpose of checklist is to provide a minimum list of items that are to be independently reviewed prior to submittal
- Checklists are intended as a guide and are not all inclusive
- These are not checklists of drafting and design items to be included on the plans
- Items in the checklist that are not included or addressed in accordance with a given submittal should be identified in the transmittal letter with a brief explanation of the omission



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## Submittal Documents

- Missing USPs and RSPs at Stage 3 and Final Plans
  - Utilize CES to assist with USP and RSP
- Missing All Commitments Report
  - almost 100% of the time for preliminary plans
  - 75% of the time for final plans
- Missing Final Pavement Design
  - 50% of the time for final plans
- Latest versions of Level 1 Checklist & Traffic Control Plan Checklist forms have not been used
  - 50% of the time
- Fail to submit Geotechnical Foundation Review Form and Geotechnical Waiver as required



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## Submittal Documents

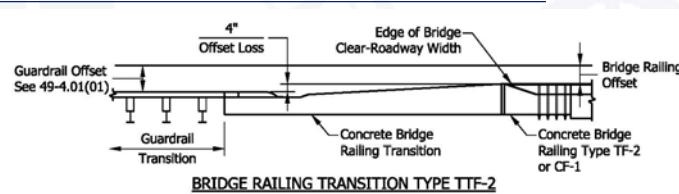
- MOT Level 1 checklists are filled out inconsistently
  - Most designers are consistent in filling in the design speed, lane width and shoulder width
  - Other items vary in how filled out
  - Additional guidelines would be helpful
- Traffic data is not always submitted with Level 1 Checklist
  - Would be helpful for reviewers
- Bridge Rehabilitation projects
  - Helpful to have the Existing Plans as part of the Preliminary Plan submittal
  - Reviewer usually does not have a copy to review with Level 1 items
  - Also used to see how the new work fits with the existing bridge
  - Usually need to be requested from the designer by the reviewer



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## Design

- Bridge clear roadway width and approach roadway shoulder width different because the bridge railing transition
- Results in wrong or odd roadway shoulder width on plans
- Refer to IDM Figure 402-6H



**BRIDGE RAILING TRANSITION TYPE TTF-2**

$$\text{Bridge Railing Offset} = \begin{array}{l} \text{Guardrail Offset} \\ \text{or} \\ \text{Reduced Guardrail Offset} \end{array} + \begin{array}{l} \text{Offset Gain (+)} \\ \text{or} \\ \text{Offset Loss (-)} \end{array}$$

Example: Guardrail Offset of 2'-0" on the bridge approach, and Bridge Railing Type PC. 4" of Railing Offset is lost through the Bridge Railing Transition Type TFC.  
 $\text{Bridge Railing Offset} = (2'-0") + (-4") = 1'-8"$

### BRIDGE-RAILING OFFSET GUARDRAIL TRANSITION TO BRIDGE RAILING

**Figure 402-6H**  
(Page 2 of 2)



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## Design

- Documentation of Level Two criteria not satisfied
- IDM Chapter 49 Roadside-safety
- Shy-Line Offset, IDM 49-4.02(01)

Design Speed (mph)	Runout Length, $L_R$ (ft)				Shy-Line Offset, $L_S$ (ft)	
	Design-Year AADT [T]					
	$T \leq 1000$	$1000 < T \leq 5000$	$5000 < T \leq 10000$	$T > 10000$		
30	70	80	90	110	4.0	
40	100	110	130	160	5.0	
45	125	135	160	195	6.0	
50	150	160	190	230	6.5	
55	175	185	220	265	7.0	
60	200	210	250	300	8.0	
70	250	290	330	360	9.0	

*Note:* This figure is in accordance with the suggested values from the AASHTO Roadside Design Guide 4<sup>th</sup> Edition 2011

### DESIGN ELEMENTS FOR BARRIER LENGTH OF NEED

**Figure 49-4E [Rev. April 2013]**



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## Design

- Importance factor of 1.05 is not considered for NHS bridges
- IDM 403-1.02

The strength-limit-state factors to be used are as follows:

- $\eta_D$  = 1.05 for components subject to brittle failure
- $\eta_D$  = 1.00 for conventional design in accordance with the *LRFD Specifications*
- $\eta_R$  = 1.05 for a simple span with non-integral supports or non-redundant structure
- $\eta_R$  = 1.00 for other type of bridge
- $\eta_I$  = 1.05 for a National Highway System bridge, or a bridge which provides single access to a military base, medical facility, generating station, or a considerable population
- $\eta_I$  = 0.95 for a highway classified as a local road or street
- $\eta_I$  = 1.00 for a bridge on another type of highway



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## Design

- Request for Geotextile type
- Design Memo 17-18
- Type should be identified in Geotechnical Report if after May 2017
- If Geotechnical Report not required then contact Office of Geotechnical Services for recommendations



### INDIANA DEPARTMENT OF TRANSPORTATION Driving Indiana's Economic Growth

Design Memorandum No. 17-18  
Technical Advisory

August 7, 2017

TO: All Design, Operations, and District Personnel, and Consultants

FROM: /s/Athar Khan  
Athar Khan  
Manager, Office of Geotechnical Services  
Pavement Engineering Division

SUBJECT: Use of Geotextile in Geotechnical Applications

EFFECTIVE: Lettings on or After September 1, 2017

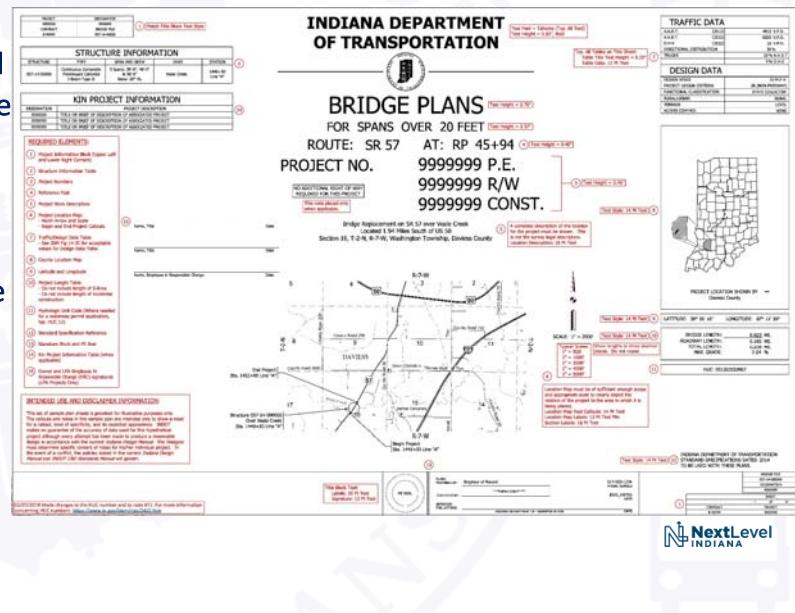


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## Plan Details

- Title Sheet

- Location map difficult to read
- Begin and end stations for the project not shown
- Latitude and Longitude coordinates for the structure not correct
- Kin Projects and Lead DES are not listed
- Title either “Bridge Plans” or “Bridge Rehabilitation Plans”
- New structure number for bridge replacement project



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## Plan Details

- Grading at MGS guardrail posts is often missing from the plans
- Pavement markings are not shown either in plan view or typical sections
- Wrong type of Pavement marking is used, violating IDM Figure 502-2C

Application	Material Type				
	Paint	Thermoplastic	Multi-Component	Preformed Plastic	Raised Pavement Markers
<b>AADT</b>	<b>&lt; 10,000; or &lt; 8 Years</b>	<b>≥ 10,000; and ≥ 8 Years</b>	<b>≥ 10,000; and ≥ 8 Years</b>	<b>≥ 20,000; and ≥ 8 Years</b>	<b>≥ 5000, 2-Lane; and ≥ 4 Years</b>
Pavement Surface Life					
Edge Lines	X	X	X	X	
Center Line	X	X	X	X	X
Transverse Markings	X	X			
Concrete Pavement	X		X	X	X
Asphalt Pavement	X	X	X	X	X

Notes:

1. Other applications or restrictions apply; see Section 502-2.01(03) for additional information.
2. For guidance on the use of milled longitudinal rumble stripes in place of raised pavement markers, see Section 502-2.09.
3. Snowplowable RPM's should be used to supplement lane lines on roadways with a functional classification of interstate (1), freeway or expressway (2), or other principal arterial (3).



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## Plan Details

- Scour Data and Hydraulic data not provided or not matching the hydraulic report
- Label for structure skew missing
- Individual span length and overall structure length not adding up
- Missing plan information for pre-compressed foam joints
  - Expansion length
  - Joint opening @ 60 deg
  - Min. recess
  - Details at bridge rails and sidewalks



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## Plan Details

- Minimum integral end bent dimensions not meeting IDM 409-2.04(03)
- Minimum semi-integral end bent dimensions not meeting IDM 409-3.03
- Violating maxing pile spacing without proper calculations of the pile cap IDM 409-4.01(01)
- Elastomeric bearing should be vulcanized to Steel Bearing Plate
- Cross Sections fail to show benching
- Wrong type of Structure Backfill used, not following IDM 203-2.06(04)
- Not listing allowed substitute options for precast concrete three-sided structure per IDM 203-2.056(03)



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## MOT

- INDOT Interstate Highways Congestion Policy (IHCP) not always checked
  - Required exception request not submitted
- Construction zone design speed missing from plan sheets
- Construction Memo 14-06 for Two Step Speed reduction (>15mph) not followed
- Buffer/roll ahead distance for Truck Mounted Attenuator is not called out correctly
  - See the roll ahead distance per INDOT Work Zone Traffic Control Guidelines, 2013, page 72
- When sidewalk is closed either not providing the required signage or alternate path
- Per IDM 503-7.04(02) Concurrence from the District Traffic Engineer is required prior to including the portable signal pay item into a contract. Temporary Traffic Signal Type Determination form should be submitted.



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## Cost Estimates

- Contingency in Final Plans estimate
  - IDM 20-1.03(03) says all quantities should be finalized at this stage
- Quantities not matching between plans, quantity calcs & estimate
- Partial depth patching
  - Pay Item and/or USP missing on non overlay projects
  - Pay Item should not be included when Hydrodemolition used
- Polychloroprene joint membranes used for semi-integral end bents
  - Included in the cost of Concrete, A, Substructure per 702.28 of Std Specs
  - USP needed if no pay item for Concrete, A, Substructure
  - Also High Density Plastic Bearing Strip missing
- Missing bridge numbers in supplemental description for LSUM items
- Pay Item for temporary signal per IDM 503-7.04
  - Supplemental description noting the location for one lane, two-way operations, must be included with the use of the fixed temporary signal or portable signal pay item.



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## Constructability

- Consider using small section of full depth pavement at ends of new RC bridge approach slabs to provide room for form work
- Include in plans so included in the final pavement design
- For phased construction continue to see missing temporary shoring between construction phases for semi-integral end bent conversions or other end bent work
- Temporary Shoring can be covered with USP