What is a Bridge Deck Overlay?

A protective wearing surface placed on a (usually) existing bridge deck to prolong the service life and to provide a smooth riding surface.

The overlay protects the deck by providing a non-permeable sacrificial layer that prevents water and chlorides from penetrating to the deck reinforcing steel.

Typical overlay materials include:

- Latex modified concrete
- Microsilica
- Thin polymer synthetic
- Asphal tic
History of the Bridge Deck Overlay in Indiana

First used by INDOT in the early 1970s

Bridge deck overlays placed at the rate of between 40 to 60 projects annually (State and Local)

One of the most cost effective method of bridge deck preservation and “ride ability”

Typical Cross Section

- Typical Slab overlay with railing updates.
# Just Deck Overlays

<table>
<thead>
<tr>
<th>Year</th>
<th>Projects</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>16</td>
<td>$8.4 million</td>
</tr>
<tr>
<td>2009</td>
<td>33</td>
<td>$24.9 million ranging from $76,000 to $2.7 million</td>
</tr>
<tr>
<td>2010</td>
<td>24</td>
<td>$13.2 million</td>
</tr>
</tbody>
</table>

- Bridge deck overlays may also be a part of other project types like:
  - Bridge Rehabilitation or Repair
  - Bridge Maintenance and Repair
  - Bridge Deck Reconstruction and Widening
  - Bridge Deck Reconstruction

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# Bridge Deck Overlay Project Identification

District programs project based on condition rating of deck and existing wearing surface, if applicable

Normally, a rating of 5 will trigger programming
Factors to consider for an Overlay

- Age of Deck
- Chloride Contamination
- Deck Condition (% delamination)
- Areas of efflorescence (viewed from the deck underside)
- Structural Widening
- Load Rating

Bridge Deck Overlay Project Scoping

An initial scoping field check should include;

- the designer
- related district personnel
- a representative of the central office bridge rehabilitation group.

If questions arise as to the deck quality, core samples may be requested for testing for chloride ion content and/or fragmentation.
Scoping Report

FORMAT See IDM Figure 72-2B for typical outline
For Overlay projects use Design Tables from Chapter 55

The report contains but is not limited to:

- existing conditions
- repair recommendations
- cost estimates
- a design criteria checklist
- permit information
- a maintenance of traffic recommendation..
- design exception write-up (if applicable) IDM 40-8.04(01)

Is a stand alone document submitted with the inspection report

Scoping Report (con't)

- Prepared by designer
- Reviewed by Central Office Bridge Rehab
- To obtain design approval
- Also at this phase, the environmental section will begin their work on the categorical exclusion documentation
When design approval has been granted, the designer should proceed with developing preliminary plans.

Preliminary plans include:
- the title sheet
- the general plan sheet
- the maintenance of traffic detail sheets.

The general plan sheet should include all recommendations as approved in the scoping report.
**Maintenance of Traffic (MOT)**

The MOT details for non divided highway bridges will normally entail a signalized alternating one way traffic scheme.

- A crossover may be utilized for divided highway bridges.
- For highways with >10,000 AADT, it is advisable to maintain one lane in each direction to avoid traffic congestion at the project site.
- Detours are an option on most Local Projects and on some INDOT Projects given the AADT is low and with approval from District Traffic Department.

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**Typical Alternate One-Way Traffic Scheme**
Environmental Issues

Also submitted with the preliminary plans will be any environmental permits.

**These may include:**

- Rule 5
- DNR Construction in a Floodway
- IDEM 401
- Army Corps of Engineers 404

Railroad & Utility Coordination

The preliminary plan submittal will be the initial coordination regarding any railroad or utility issues
Preliminary Plan Approval

- Once preliminary plans have been approved, the designer should start work on preparing FINAL PLANS.

Final Plans

**Final Plan details could include:**

- bent reconstruction details
- bridge railing details
- superstructure details
- bridge approach details
- substructure related details
- Special provisions, final quantities, a cost estimate and a load rating request are included
Final Field Check

All previous parties are invited

Primary purpose is to verify that the plans reflect the improvement needs

Any changes in field conditions are evaluated for plan content impact

Final Tracings

Designer should make revisions based on final field check notes and project reviewer input

**The submittal should include:**
- all plan content
- updated special provisions
- final quantities
- cost estimate
- approved environmental permits
- all project commitments report
Tracing submittal will be delivered to the project manager often times a month or more before RFC. Please check with your project manager for due date.

**MEET YOUR RFC DATE!!!**

Project manager will deliver contract package to the CO Contracts Section

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**Am I Done Yet?**

- **During** the period between RFC and letting, the designer will be available to field issues and questions that may arise from the Contracts Section and District Construction

- **Questions** from bidders should be referred to Central Office Contracts Section

- **During** the construction period, the designer will be available to field issues and questions that may arise
Some Bridge Deck Overlay Examples

SR-243 at Deer Creek - overlay removal and replacement
SR-243 at Deer Creek - Deck underside

SR-236 over S. Fk. Little Raccoon Creek
overlay removal and replacement
SR-236 over S. Fk. Little Raccoon Creek
deck underside

SR-67 over Fish Creek
original bridge deck
SR-67 over Fish Creek
deck underside

US-41 over Main Street (Vincennes)
overlay removal and replacement
US-41 over Main Street (Vincennes)
dock underside

Additional Elements in Overlay Projects

- **Full Depth Patching**
  - When the concrete is unsound to the top layer of the bottom reinforcing, all concrete will be removed and a full depth patch is warranted. (Spec. 722.05)
  - Included in this cost is;
    - Removal of unsound concrete
    - Cavity preparation
    - Furnishing and applying bond coating or adhesive
    - Any necessary incidental
  - Patching material is not included in this item
Additional Elements in Overlay Projects

- **Partial Depth Patching**
  - Cavities which are deeper than the level of the adjacent prepared deck surface, but not full depth, shall require partial depth patching (Spec. 722.05)
  - Included in this cost is;
    - Removal of unsound concrete
    - Cavity preparation
    - Furnishing and applying bond coating or adhesive
    - And necessary incidentals
  - Patching material is not included in this item

Additional Elements in Overlay Projects

- **Additional Bridge Deck Overlay Material**
  - Is the quantity of material placed on a bridge deck minus the theoretical bridge deck overlay (bridge surface, area times overlay depth)
  - Covers the material placed in the partial depth patch and the full depth patch.
Additional Bridge Deck Overlay Material (con’t)

- Paid for at the unit price of $550.00 per cubic yard
  - (RSP 722-B-581)

- For Estimating Quantities
  - \(= 0.00617 \times (\text{Sft. Deck patching}) + 0.00292 \times (\text{Sys. Of Overlay})\)
  - 0.00617 factor assumes an average 2” deep patch
  - 0.00292 factor assumes a 6% increase for surface irregularities.
  - See IDM 72-3.01(02)

Additional Elements in Overlay Projects

- **Joint Replacement**
  - Acceptable joint types
    - Class Strip Seal (SS-type)
    - Expansion Joint Sealing System (XJS-type)
    - Modular Joint (MS-type)
  
  No Compression Seal (BS-type) allowed IDM 72-3.01(02)
  No Polymer Modified Asphalt Joint system allowed
Class SS Expansion Joint

Expansion Joint Sealing System (XJS)
Modular Expansion Joint

These joints are to be replaced when encountered.

BS Expansion Joint

These joints are to be replaced when encountered.
Asphaltic Bridge Joint

These joints are to be replaced when encountered

Additional Elements in Overlay Projects

- **Semi Integral end Bent**
  - Eliminates the need for expansion joint
  - See Design IDM Figure 67-1C
  - For skews of greater than 30 degrees or expansion length of 250 feet or longer, twisting or racking of the bridge should be investigated. (IDM 67-1.08)
Additional Elements in Overlay Projects

- **Approach Slabs**
  - Are detailed within the plans to allow for MOT factors and traffic phasing
  - Lap splices and threaded tie bar assemblies are especially important in this detail
**Additional Elements in Overlay Projects**

- **Wedge Details for new overlays**
  - Placed to allow a smooth transition from the approach slab to the existing pavement surface.
  - Two Types of wedge details
    - Concrete Pavement transitions (recast concrete approach pavement)
    - Asphalt Pavement transitions (mill and wedge asphalt over existing)

**Concrete Pavement Wedge Detail**

- 30'-0" (Continuation of Bridge Deck Profile)
- Variance (Taper to Existing Profile at 1" in 60")
- RCBA
- Terminal Joint
- Existing Sleeper Slab
- Retrofit Tie-Bar (See Std. Dwg. 303-CCP-J-88)
- PCCP
- Saw Cut
- Existing Pavement Surface

Typical Wedge Detail for Concrete Pavement
Asphalt Pavement Wedge Details

- Hydro Demolition
  - After the initial milling of the deck, this operation removes all unsound bridge deck concrete in a uniform manner and does so without the use of jack hammering.
  - With the use of Hydro Demolition, the need for “partial depth patching” pay item is not required.
Additional Overlay Project Information

- For Project Specific Information contact
  - **George Snyder** INDOT Bridge Rehabilitation
    Engineer for additional guidance or more questions.
  - IGCN Room N-642 Indianapolis, IN 46204
  - (317)-232-5163
  - gsnyder@indot.in.gov