INFORMATION DEPARTMENT OF TRANSPORTATION

Production Management Division
Proudly Presents:

PRODUCTION
CONFERENCE '08

Those strongly encouraged to attend:

INDOT Production Staff (Districts and Central Office)
- Road, Bridge and Traffic Designers
- Project Managers

No more than one representative from each consultant pre-qualified in the following work type descriptions:
- 8.1 Non-complex Roadway Design
- 8.2 Complex Roadway Design
- 9.1 Level 1 Bridge Design
- 9.2 Level 2 Bridge Design
- 10.1 Traffic Signal Design
- 10.2 Traffic Signal System Design
- 10.3 Complex Roadway Sign Design
- 10.4 Lighting Design
- 10.5 Intelligent Transportation System Design

Highlighted Topics:
- ADA
- 3 Sidew and 4 Sidew
- Precast Structures
- Consultant Evaluation and Expectations
- Design Exception
- Design Exception
- Utility Coordination
- MDOT Best Practices
- Roadside Safety and Guardrail Design
- Road Design and Bridge Design Breakouts

Monday, April 28, 2008
Indiana Government Center South
Conference Center Room A-C
8:00 AM to 4:00 PM
(Pre-Registration ends April 18th)

INFORMATION DEPARTMENT OF TRANSPORTATION

To register (email preferred), please contact,
Gary Mrozczka, Director
100 N. Senate Avenue, Room 447
Indianapolis, Indiana 46204-2216
Work: 317-232-5226
Cell: 317-694-9193
E-mail: gmrozczka@indot.in.gov
Road Design Breakout Session

Roadway Services:

- What parts of Roadway Services interacts with Consultants?
  - Standards Section
  - Review Section
  - Traffic Section
Published Road Design breakout Session

- New or recently published Design Standards / Procedures / Policies
- Partial 3R v 3R v 4R
- New Superelevation / Shoulder break
- Calculating Inlet Spacings / Layout of Storm Sewers
Published Road Design breakout Session

We will discuss most of these items, but the itinerary has been changed to include items from each of the following:

Standards Unit (1st Group)
Review Team (2nd Group)
Traffic Team (3rd Group)
Road Design Breakout Session
(Standards Section) (1st Group)

- Cable Barrier
- Bicycle Facilities (Shared-Use Paths)
- Best Practices for Inlets and Storm Sewers  (in lieu of Inlet Spacings & Storm Sewers)
- New Superelevation / Shoulder Break
Road Design Breakout Session (Review Section) (2\textsuperscript{nd} Group)

- ERMS Information
- Recent Design Memos
- Annual Construction Evaluation Report
Road Design Breakout Session
(Traffic Section) (3rd Group)

- Traffic Squad (IPOC Projects)
- Signal Design Memo
- New Standards for Sign Trusses
Road Design Breakout Session (Standards Section)

- Cable Barrier (Yadu Shah)
Cable Barrier System (CBS)

High-Tension CBS NCHRP Report 350, Test Level 4 (TL-4)
There are no changes in design of rigid (concrete) and semi flexible (W-Beam and Thrie-Beam) barriers.

INDOT will use a new barrier type, a flexible barrier, high-tension cable barrier system (CBS) for median installation.

This CBS should be considered in the median of a high-speed, high traffic volume roadway where fatal median-crossover crashes have been reported or are anticipated.

The CBS consists of 4 pre-stretched, individually anchored wire ropes in tension between safety terminal and held in position by intermediate line posts.
Why Cable Median Barrier?

- To avoid median-crossover crashes
- To reduce disabling injuries
- To save lives
- To decrease fatal crash costs
- Cable median barriers are safe, effective, cost efficient and have proven results
INDOT will use high-tension pre-stretched 4 wire rope TL-4 CBS.

CBS intermediate line post will have a socket tube cast-in-place in concrete for easy removal and replacement of line posts after vehicle impact.

The contractor will select CBS from INDOT approved product list of CBS.

All CBS in approved product list are proprietary items.

INDOT will install 150 miles of CBS at a cost of approx. $22 million in 2008 and 2009.
### Case for Median Barrier Installation on Select Segments of Rural Interstate System (Statewide)

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CBS with High-Tension Pre-Stretched Cables

Why High-Tension CBS ……

- Tensioning cables after installation improves the performance of the system by reducing deflection and increasing the potential to capture the impacting vehicle.
- High-tension system also results in less damage to the barrier after a vehicle impact.
- Has low maintenance cost

Why Pre-Stretched Cables ……

- Reduced dynamic deflection
- From the experience, contractors find it easier to tension
Roadway Design: Side Slope and Placement

- Avoid placing CBS in the median ditch due to conflicts with drainage inlets and dikes. These locations may be wet and offer poor support for post and anchor foundation.
- Maximum 8 feet deflection allowed at maximum 16 feet post spacing side slopes 6:1 or flatter.
- 16 feet from edge of travel lane with 4 feet paved shoulder width
- 8 feet from centerline of V ditch or 10 feet from centerline of flat bottom ditch line (4 feet wide ditch)
- The above placement of CBS requires a minimum median width of 48 feet for V ditch and 52 feet for flat bottom ditch.
- Lateral clearance to a rigid obstacle such as a bridge pier, sign support, utility pole, tree, etc, should be minimum 10 feet.
- A minimum lateral clearance of 10 feet from other parallel barriers (concrete barrier or W-Beam Guardrail)
- Geotechnical information will require to determine sizes of safety terminal foundations and line post foundations prior to installation of CBS.
NOTES:
1. CBS: Cable Barrier System.
2. Regrading of slope shall not extend beyond the centerline of the median and shall not impact the existing ditch flow line.
3. Cable barrier placement detail shown on this drawing is applicable to median with a maximum paved shoulder width of 4 ft. and the following median width:
   a. A minimum median width of 6 ft. for a V ditch
   b. A minimum median width of 52 ft. for a 4 ft. wide flat bottom ditch.
4. CBS horizontal alignment transitions shall be made on a 50:1 or flatter taper.

---

DETAIL A

DETAIL B

MINIMUM SIZE AND REINFORCEMENT FOR LINE POST FOUNDATION FOR CBS TL-4 SYSTEM

POST FOR TL-4 SYSTEM

8" dia. No. 3 reinforcing rings
4 - No. 4 reinforcing bars

6:1 slope or flatter

See Detail A

See Detail B for line post foundation

6:1 slope or flatter

Regrading of V ditch or 4" flat bottom ditch

8" dia. No. 3 reinforcing rings
equally spaced

No. 4 reinforcing bars
3'-0" long

INDIANA DEPARTMENT OF TRANSPORTATION

LOCATION OF CBS IN MEDIAN

ELEVATION

LOCATION OF CBS IN MEDIAN

LIMITS OF PAY LENGTH FOR CABLE BARRIER

End terminal
Begin length of need for system
vertical transition length

Safety terminal
Ground line

ELEVATION

TYPICAL CBS LAYOUT
BRIFEN USA INC.
WIRE ROPE SAFETY FENCE

NCHRP 350 APPROVED
Proven Design, Years of Real World Performance

Because You Only Want The Very Best
Road Design Breakout Session
(Standards Section)

- Bicycle Facilities
  (Shared-Use Paths) (Brian Zafar)
Bicycle Facilities

Shared Use Paths
Introduction

• The purpose of the Indiana Bicycle Facilities Section in the INDOT Design Manual is to provide engineers, planners and designers with a primary source of guidance to implement the Indiana Trails, Greenways and Bikeways plan. Safe, convenient and well-designed facilities are essential to encourage bicycle use. This guide is designed to provide information on the development of facilities to enhance and encourage safe bicycle travel. The majority of bicycling will take place on ordinary roads with no dedicated space for bicyclists. Bicyclists can expect to ride on almost all roadways, as well as separated shared use paths and even sidewalks, where permitted, when special conditions warrant.
This guide provides information to help accommodate bicycle traffic in most riding environments. It is not intended to set forth strict standards, but rather, to present sound guidelines that will be valuable in attaining good design, sensitive to the needs of both bicyclists and other users. However, in some sections of this guide, design criteria include suggested minimum guidelines. These are recommended only where further deviation from desirable values could result in unacceptable safety compromises.

This Section regarding the design of bicycle facilities should be used in conjunction with other Sections in the IDM, the Indiana Manual on Uniform Traffic Control Devices (IN MUTCD) and the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (1999).
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• 51-7.23 Shared Roadway
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  - 51-7.51(02.4) Other Intersection Design Issues
  - 51-7.51(02.5) Paths and At-Grade Railroad Crossings
- 51-7.51(03) Pavement Structure
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- 51-7.51(09) Bicycle Parking Facilities
- 51-7.52 Trails
- 51-7.53 Greenways
• 51-7.30 SELECTION

• A local governmental agency will determine the bikeway type and location for the bicycle facility during the planning stages. If it is determined that a bicycle facility is feasible and can be properly funded, the designer should coordinate with the agency in the design of the bikeway facility.
• 51-7.50 SHARED - USE PATHS

• Introduction

• 51-7.51 Shared-Use Paths
• Shared-use path is a term adopted by the 1999 AASHTO Guide for the Development of Bicycle Facilities in recognition that paths are seldom, if ever, used only by bicycles. A shared-use path is typically located on exclusive right-of-way, with no fixed objects in the pathway and minimal cross flow by motor vehicles. Portions of a shared-use path may be within the road right-of-way but physically separated from the roadway by a barrier or landscaping. Users typically include bicyclists, in-line skaters, wheelchair users (both non-motorized and motorized) and pedestrians, including walkers, runners, people with baby strollers or dogs with people. Shared-use paths are usually designed for two-way travel except under special conditions. The guidance in this manual is for two-way facilities unless otherwise stated.
• **51-7.51(01)** GEOMETRIC DESIGN OF SHARED-USE PATHS
  
The following sections provide guidelines for geometric design of shared-use paths. These guidelines are intended to be applied using a flexible design approach. Where recommended minimum design standards cannot be met due to right-of-way limits or other constraints, a detailed safety analysis should be conducted to determine the best compromise design solution and apply for a design exception from the INDOT Roadway Services Manager.

• **51-7.51(01.1) Separation Between Path and Roadway**
  
  When a two-way shared-use path is located adjacent to a roadway, a wide separation between the shared-use path and adjacent highway is desirable, demonstrating to both the bicyclist and the motorist that the path functions as an independent facility. The factors in determining how far away a shared-use path should be separated from the roadway include the posted speed of the road, the type of signs between the path and roadway, the amount of space available, and whether the roadway has a rural (shoulder and ditch) cross section or urban (curb and gutter) cross section.

  The separation distance between a path and a roadway depends primarily on the posted speed limit of the road. Recommended separations for rural (shoulder and ditch) and urban (curb and gutter) road cross sections are illustrated in Figures 51-7C and Figure 51-7E and detailed in Figure 51-7D and Figure 51-7F.
• **51-7.51(01.3)  Design Speed**

• For the general design of shared-use paths, a bicycle design speed of **20 mph** is desirable. For descending grades **500 ft** or longer and **4%** or steeper grades, a bicycle design speed of **30 mph** is desirable. On unpaved paths, where bicyclists tend to ride more slowly, a bicycle design speed of **15 mph** may be used. However, since skidding is more common on unpaved surfaces, horizontal curvature design should take into account a lower coefficient of friction. The selected design speed should be maintained throughout the length of the shared-use path. Alternating design speeds is not recommended. If site conditions will not allow the appropriate path geometrics for the selected design speed, then, a lower design speed should be selected for the path except where a portion of the path is in a rural area and another path is in an urban area.
NOTE: All other slides presented in the Bicycle Chapter session have been deleted from this powerpoint to conserve space. The Chapter will be put online as soon as Commissioner Browning reviews it.
Road Design Breakout Session
(Standards Section)

• Best Practices for Inlets and Storm Sewers
  (in lieu of Inlet Spacings & Storm Sewers)
• New Superelevation / Shoulder Break

(Richard VanCleave)
Best Practices for Inlets and Storm Sewers

• I. Introduction – This is a brief review of some items, many of which are found in the Design Manual, often overlooked or misinterpreted in the plan development process

• II. Inlet Related Items
A. Inlet Locations (also Catch Basins)
   1. Always place Upstream of:
      a) Driveways
      b) Streets
      c) Sidewalk curb ramps
      d) Pedestrian walkways (crosswalks)
      e) Reversals in pavement cross slopes
Best Practices for Inlets and Storm Sewers

f) Bridge decks

g) In gore areas – Interchange ramps, etc.

2. Roadside

   a) Low spots adjacent to lawn
   b) In ditches intercepting sheet flow

3. Sags in gutter grade

   a) Short run – double frame inlet, grates properly aligned to accept flow
   b) Medium run – inlet plus one flanking inlet
   c) Long run – inlet plus two flanking inlets
Best Practices for Inlets and Storm Sewers

B. Driveway Treatments to Contain Gutter Flow
   1. Provide slight hump in driveway grade near gutter line for down grade driveways
   2. Provide face of curb line lip 1 to 1 ¼” high past drive entrance

C. Pavement Grades
   1. Minimum longitudinal – 0.3%
   2. Flat < 0.3% - roll gutter grade with inlet in sag
   3. Slotted drains may be utilized

D. Utilities – coordinate location/elevation of pipes
Best Practices for Inlets and Storm Sewers

E. Grates
   1. Should be bicycle safe where bicycles permitted
   2. Grate width (transverse) should not exceed gutter width
   3. Should be compatible with inlet/catch basin boxes
   4. Correct orientation of vane grates (basically a construction problem)

F. Slotted Drain Usage
   1. High side shoulder on superelevated pavements – longitudinally
   2. Angled out from H-5 inlets in median shoulders next to concrete barriers
Best Practices for Inlets and Storm Sewers

c. Two smaller trunk lines, one on each side of roadway to avoid multitude of cross pipes under pavement or to better meet outfall elevation in flat areas

d. If no other option, place under center of right lane out of wheel tracks to avoid manhole cover clatter when vehicles pass over

e. Thoroughly review utility locations to avoid conflicts

H. Properly size manhole to accept all entering and exiting pipes while maintaining structural integrity of the manhole
Best Practices for Inlets and Storm Sewers

I. Assure adequate fall available to drain sewer – if in ditch, may have to provide extra wide outlet ditch to provide some detention capability

III. Shoulder Slope Break Point

A. Typical shoulder slope break point is at the right edge of the outside through travel lane

1. Exception – On PCCP with 14 foot wide right outside lane and HMA shoulder, slope break occurs at outside edge of 14 foot wide lane
Best Practices for Inlets and Storm Sewers

2. PCCP with concrete shoulders, slope break point is at right edge of outside travel lane
3. HMA pavements – Shoulder slope break point at right edge of outside travel lane

B. Underdrains
1. Subbase drainage layers extend out to and over underdrains
2. Shoulder surface lays extend over underdrains
3. Current 45-degree slope angles from outside edge of outside travel lane are used to set location of underdrains
Best Practices for Inlets and Storm Sewers

C. Chapter 52 – Currently being reviewed and revised with some typical section revisions which will further clarify the dimensions, etc.
New Superelevation / Shoulder Break

* All Pavement, Including All Shoulders
  1. 185 lb/ft² HMA Surface 9.5 mm
  2. 275 lb/ft² HMA Intermediate 19.0 mm
  3. 440 lb/ft² Minimum HMA Base 25.0 mm
  ** 4. 440 lb/ft² QC/QA-HMA Intermediate OG25.0 mm
  5. 440 lb/ft² HMA Base 25.0 mm
  6. Subgrade Treatment
  7. Variable-Depth Compacted Aggregate, No. 53
  8. Pipe, Type 4, Circular, 6 in.

* Open graded mixtures OG19.0 mm or OG25.0 mm should be QC/QA-HMA, 5, 76. For all other mixtures, see Section 52-9.02 to determine the appropriate HMA mixture designation.

** If underdrain warrants are not met, Intermediate OG25.0 mm mix should be replaced with HMA Base 25.0 mm, minimum 495 lb/ft².

FULL DEPTH HMA PAVEMENT,
≥ 30 MILLION ESALs
Figure 52-13A
New Superelevation / Shoulder Break

* Mainline
  1. 165 lb/yd² HMA Surface 9.5 mm
  2. 275 lb/yd² HMA Intermediate 19.0 mm
  3. 440 lb/yd² HMA Base 25.0 mm
** 4. 300 lb/yd² QC/QA-HMA Intermediate OG25.0 mm
  5. 440 lb/yd² HMA Base 25.0 mm
  6. Subgrade Treatment
  10. Pipe, Type 4, Circular, 6 in.

* Shoulders
  7. 165 lb/yd² HMA Surface 9.5 mm
  8. 495 lb/yd² HMA Base 25.0 mm
  9. Compacted Aggregate, No. 53, Base
     (Depth equals mainline HMA thickness minus 6 in.)
  11. Variable-Depth Compacted Aggregate, No. 53

FULL DEPTH HMA PAVEMENT,
10 MILLION ≤ ESAls < 30 MILLION
Figure 52-13B

* Open graded mixtures OG19.0 mm or OG25.0 mm should be
 QC/QA-HMA, 5, 76. For all other mixtures, see Section 52-9.02
to determine the appropriate HMA mixture designation.

** Where underdrains are not required, QC/QA-HMA Intermediate
 OG25.0 mm mix should be replaced with HMA Base
  25.0 mm, 330 lb/yd².
**New Superelevation / Shoulder Break**

*Mainline Pavement (Section With Shoulders)*

1. 165 lb/yd² HMA Surface 9.5 mm
2. 275 lb/yd² HMA Intermediate 19.0 mm
3. 275 lb/yd² HMA Base 19.0 mm
4. **275 lb/yd² Minimum QC/QA-HMA Intermediate OG 19.0 mm**
5. 330 lb/yd² QC/QA-HMA Base 19.0 mm
6. Subgrade Treatment
7. Pipe, Type 4, Circular, 6.0 in.

*Shoulders*

7. 165 lb/yd² HMA Surface 9.5 mm
8. 455 lb/yd² HMA Base 25.0 mm
9. Compacted Aggregate Base

*Open graded mixtures OG 19.0 mm or OG 25.0 mm should be QC/QA-HMA, 5. 76. For all other mixtures, see Section 52-9.02 to determine the appropriate HMA mixture designation.*

**If underdrain warranties are not met, Intermediate OG 18.0 mm mix should be replaced with HMA Base 18.0 mm minimum 465 lb/yd².**

FULL DEPTH HMA PAVEMENT,
1 MILLION ≤ ESA ≤ 10 MILLION
Figure 52-13C
New Superelevation / Shoulder Break

Mainline and Shoulders

1. PCCP
2. Subbase for PCCP (3 in. Coarse Aggregate No. 8 On 6 in. Coarse Aggregate No. 53, Base)
3A. 6 in. Compacted Aggregate, No. 53, Base
3. Variable-Depth Compacted Aggregate, No. 53
4. Pipe, Type 4, Circular, 6 in.
5. Subgrade Treatment
6. Longitudinal Joint or Longitudinal Construction Joint. See Figure 52-13F for Pavement Joint Options.
7. Concrete Median Barrier

* Where underdrains are not required, Dense Graded Subbase should be used.

PCCP SECTION WITH PCC SHOULDER, ≥ 30 MILLION ESALs

Figure 52-13F
New Superelevation / Shoulder Break

Mainline
1. PCCP
2. Subbase for PCCP (3 in. Coarse Aggregate No.8 On 6 in. Coarse Aggregate No.53, Base)

Shoulders
3. 165 lb/yr" HMA Surface 9.5 mm
4. 330 lb/yr" HMA Intermediate 19.0 mm
5. HMA Base 25.0 mm
6. CompactedAggregate, No. 63, Base
7. Variable-Depth Compacted Aggregate, No. 53
8. Subgrade Treatment
9. Longitudinal Joint or Longitudinal Construction Joint
10. Pipe, Type 4, Circular, 6 in.

* Where underdrains are not required, Dense Graded Subbase should be used.
** See Section 52-9.02 to determine the appropriate HMA mixture designation.

PCCP SECTION WITH HMA SHOULDER, < 30 MILLION ESALs
Figure 52-136
Road Design Breakout Session  
(Review Section)  

• ERMS Information  
• Recent Design Memos  
• Annual Construction Evaluation Report
Road Design Breakout Session
(Review Section)

• ERMS Information (Shariq Husain)
• Recent Design Memos (John Wright)
• Annual Construction Evaluation Report (John Wright)
ERMS Update

- CO Coordinator 7 processes about 300-400 projects per month.

- Goal is to transition projects within 2 days or less

- Improvements have been made to the system

- Additional staff has been added (3 people now have role as coordinator 7)
ERMS Project Submittal Process

Design Consult or In-House Design → District Coordinator

District Coordinator → District Project Manager

District Project Manager → CO Coord (Coord 7)

Project Review: Either Review Consultant or In-House Review → CO Coord (Coord 7)
ERMS Improvements

- **Changes in the workflow (see the attached diagram)**
  - Add a route for non-IPOC projects designed by Central Office (CO) to go from Submit for Review state to Consultant Coord (DCSC) state.
  - Add a route for Consultant Coord (Dist. Coord) to transition docs from Consultant Coord (DCSC) state to CS Review (Contracts Review) state.
  - Add a route for CO Coord to transition docs from CO Review state to CS Review (Contracts Review) state.
  - Add a route for CO Coord to transition docs from CO Review state to Consultant Coord (DCSC) state.
  - Add a route for Consultant Coord (Dist. Coord) to transition docs from Review Complete – Non IPOC to District Review state.
ERMS Improvements

• **Changes in security**
  – Grant view access to everybody who has been involved in the project, up to CS Review (Contracts Review) state.
  – Grant owner access (view, change, delete) to coordinators up to CS Review (Contracts Review) state.

• **Messaging**
  – Auto email to the designer, coordinator and project manager whenever the set of design documents arrives at Consultant Submit, Consultant Coord (DCSC) and CO Coord states. Use the Transmittal Letter as the tracking sheet.

• **Reporting**
  – A report on the time spent by each document at Consultant Coord (DCSC), District Review, CO Coord and CO Review states.
  – A report on the documents sitting in a smart folder.
# File Title Naming Rules

Title Naming Rules

Use the title to identify the contents of the document, here are examples:

<table>
<thead>
<tr>
<th>Submittal, Des #, Office of Review, <strong>What it is</strong></th>
<th>What does it mean?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyd 0012345 for Bridge Services, <strong>Memo</strong> Services</td>
<td>Hydraulic review going to Bridges</td>
</tr>
<tr>
<td>Insp 0012345 for Bridge Services, <strong>Letter</strong> Services</td>
<td>Inspection Report for Br. Rehabs for Br</td>
</tr>
<tr>
<td>Scour 0012345 for Bridge Services, <strong>Calc</strong></td>
<td>Scour calc being sent to Bridge Services</td>
</tr>
<tr>
<td>GR 0012345 for Roadway Services, <strong>Plans</strong></td>
<td>Grade Review</td>
</tr>
<tr>
<td>PFC 0012345 for Rdwy or Bridge Serv, <strong>Plans</strong></td>
<td>Preliminary Field Check</td>
</tr>
<tr>
<td>STG 1 0012345 for Rdwy or Bridge Ser, <strong>Letter</strong></td>
<td>Stage 1 Plans (new PDP process)</td>
</tr>
</tbody>
</table>
Design Memorandums

A reminder to all to review the Design Memorandums on the INDOT Website. A few of the most recent ones are listed below (please be aware of when the memo is effective):

DM 07-13, Structural Backfill and Flowable Backfill, 10/16/07
Summary: Confusion on a recent letting. A few contracts did not incorporate into the plans. It is currently in the process of being revised to clear up confusion.

DM 07-14, Plan Development Process, 12/21/07
Summary: Indicates that Chapter 14 has been revised to match the PDP Manual. The revised Chapter is effective immediately for projects that have not received a notice to proceed. For Projects in the process, whether or not to use the new version will be made by either the District or Central Office.

DM 08-02, Use of Indiana Design Manual, English-Units Version, 3/18/08
Summary: This is a clarification. English units version of the Design Manual must be used for the design of each project for which design work was begun in english units. The metrics units version for all parts must continue to be used for each project for which design work was begun in metric units.
Design Memorandums

DM 08-03, Federal Aviation Administration (FAA) Tall-Structure Permit, 3/18/08
Summary: The FAA no longer issues a Navigable Airspace Permit. The new formal name is Indiana Tall-Structure Permit (informal name is Tall Structure Permit). Permit is obtained from the Local Programs Division’s Office of Aviation where proposed construction may impact the navigable airspace of a public-use airport.

DM 08-05, Temporary Seeding, 3/18/08
Summary: Temporary-seeding related pay items have been left out on a number of let contracts, especially in multi-phase contracts in urban areas. Erosion control is currently receiving additional scrutiny from both IDEM and the Department’s environmental personnel. The designer should be alert to recognize each work area where soil will be disturbed by construction operations and is likely to remain in an uncovered state for an extended period of time.
NOTE: Multi-season contracts need temporary mulching, in many cases, an item is not included (memo may be forthcoming)

DM 08-06, Temporary Pavement Markings, 4/18/08
Summary: emphasizes the guidelines and applications for: Paint, Temporary Raised Pavement Markings, Temporary Pavement Marking Tape, Thermoplastic/ Epoxy Markings and Buzz Strips.
### Design Memorandums

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- Site Map

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- Careers

#### Design Memorandums and Memos

- [Click here to print Design Memorandums Index](http://www.in.gov/dot/div/contracts/standards/memos/memos.html)
- [Link to archived memos](http://www.in.gov/dot/div/contracts/standards/memos/memos.html)
- [Link to Construction Memorandums](http://www.in.gov/dot/div/contracts/standards/memos/memos.html)

---

<table>
<thead>
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<th>Number</th>
<th>Memo Date</th>
<th>Effective Date</th>
<th>Affected Design Manual Section</th>
<th>Subject</th>
<th>Policy</th>
<th>Advisory</th>
<th>Attachments</th>
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</thead>
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<td>08-05</td>
<td>9/1/05</td>
<td>9/9/04/05, let</td>
<td>Indiana Design Manual Section 14</td>
<td>Temporary Pavement Markings</td>
<td>Advisory</td>
<td>801-T-166.PDF</td>
<td></td>
</tr>
<tr>
<td>08-05</td>
<td>9/1/05</td>
<td>Immediately</td>
<td>Indiana Design Manual PGP Chapter 14</td>
<td>Temporary Speeding</td>
<td>Advisory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

The Design Memorandum appendices include:
- [Temp Pavement Markings](http://www.in.gov/dot/div/contracts/standards/memos/memos.html)
- [Temporary Speeding](http://www.in.gov/dot/div/contracts/standards/memos/memos.html)
Annual Construction Evaluation Report

Overview:
In 2005 the INDOT Roadway Services Section had Janssen and Spaans Engineering (JSE) compile the Construction Evaluations of Plans and Contract Documents for projects all over the state. The Construction Evaluations were for projects completed between 1999 and 2004. After reviewing and compiling all the evaluations, JSE summarized the information into a Report. The Report summarizes trends, common errors and issues.

The first Report was completed in June 2005. Since then there have been updates to the report. The 2007 Report was sent to the Districts for comments and suggestions. We are currently in the process of summarizing the information.

NOTE: This report will be enhanced by 5 other reports;
Stage 1 Constructability Review evaluation
Stage 2 Constructability Review evaluation
Stage 3 Constructability Review evaluation
Pre-bid evaluation
Mid-Construction evaluation
Post Construction evaluation
INDOT Construction Evaluation Report

Indiana Department of Transportation

INSTRUCTIONS

INDOT's Construction representative shall complete this form at predetermined intervals during construction and at the conclusion of the project. All appropriate boxes should be checked with the necessary comments added and the form signed. The completed evaluation will be sent to the Water Line Quality Management Engineer Indiana Department of Transportation 100 N. Senate Avenue, Room 642 Indianapolis, IN 46204

The Department agrees that the information provided on this form is not a part of the contract document and is for the Department's information only, and the Department or its agents will not use any of the information, answers, or any other information on this form against the Contractor. (1) when reviewing or considering any claim for additional compensation, (2) during litigation, (3) if it is not an admission or an admission against interest, (4) at any administrative hearing, or (4) for any other purpose whatsoever.

Please submit a separate evaluation form, if there was a difference in the quality of the roadway plans and the bridge plans.

Evaluation pertains to: □ Roadway Plans □ Bridge Plans □ Both □ Traffic Plans

GENERAL

1. Were the plans clear with sufficient detail? If no, what details were lacking or omitted?
   □ Yes □ No

   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
GENERAL (Continued)
2. Were the special provisions clear and in sufficient detail? If no, which special provisions were inadequate and what additional information should have been scheduled?
   Yes [ ] No [ ]

3. Were the Standard Specifications and the Standard Drawings clear? If no, what was lacking or incorrect?
   Yes [ ] No [ ]

4. Were the quantities reliable? If no, which items had to be revised?
   Yes [ ] No [ ]

   (Provide details of any revisions, changes or additional information required.)

   (Include any additional notes here.)

   (Specify any other notes or comments.)
INDOT Construction Evaluation Report

GENERAL (Continued)
6. Did the pay items used match the work to be performed? If no, which pay items did not?
   ■ Yes  ■ No

6. If the contractor had a completion date, was the number of days...
   ■ too few  ■ too many  ■ about right  ■ N/A

UTILITIES/RAILROADS
7. Were the utilities accurately shown on the plans? If no, which utilities were not properly shown and what additional information should have been provided?
   ■ Yes  ■ No  ■ N/A

8. Was the project free of unknown utilities? If no, what utilities?
   ■ Yes  ■ No
The Construction Evaluation Form contains 23 questions related to general contract items, construction plans, utilities/railroads, right-of-way and so on. The Report organizes the 23 questions into groups. The groups are:

- Quantities and Pay Items
- Utilities and Railroad
- Soils and Foundations
- Structures
- Plans, Specifications, Special Provisions
- R/W and Maintenance of Traffic
- Permits and Contract Work Days
- Overall Project Rating
**QUANTITIES/ PAY ITEMS**

**Question #4: Were the quantities reliable?**

<table>
<thead>
<tr>
<th>Reviews</th>
<th>YES</th>
<th>NO</th>
<th>Total Responses</th>
<th>N/A</th>
<th>Not Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>375</td>
<td>278</td>
<td>653</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>% Yes/No</td>
<td>57%</td>
<td>43%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Question #5: Did the pay items used match the work to be performed?**

<table>
<thead>
<tr>
<th>Reviews</th>
<th>YES</th>
<th>NO</th>
<th>Total Responses</th>
<th>N/A</th>
<th>Not Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>535</td>
<td>118</td>
<td>653</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>% Yes/No</td>
<td>82%</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SUMMARY OF CONSTRUCTABILITY SCREENING MAGNITUDE OF CHANGES

**Plans- Earthwork Distribution**

- 23 Major Changes
- 39 Moderate Changes
- 97 Minor Changes
- 422 None

Summary: 62 of 581 (11%) Rated Major and Moderate Changes

**Quantities**

- 56 Major Changes
- 129 Moderate Changes
- 279 Minor Changes
- 132 None

Summary: 185 of 596 (31%) Rated Major and Moderate Changes

**Pay Items**

- 39 Major Changes
- 94 Moderate Changes
- 276 Minor Changes
- 181 None

Summary 133 of 590 (23%) Rated Major and Moderate Changes
Quantities/ Pay Items Summary

QUANTITIES
• The most notable figure from this study of Construction Evaluations is that on average, 43% of the Construction Project Supervisors do not feel that the calculated quantities are reliable.
• 45% of the supervisors rated the accuracy of the quantity calculations as fair or poor.
• Of the actual change orders due to quantity errors or omissions, 31% were rated as major or moderate changes. It appears that when there are change orders due to quantity miscalculations, the required change orders for over 25% of the projects are significant.

PAY ITEMS
• In addition, on average, 18% of the Supervisors feel that the pay items in the Itemized Proposals do not match the work to be performed.
• 30% rate the accuracy of bid items as fair to poor.
• Of the actual change orders due to pay item revisions or omissions, 23% were rated as major or moderate changes. When change orders due to pay items are required, almost 20% of the time, the changes are considered significant.
EARTHWORK DISTRIBUTION

11% of the Project Supervisors rated change orders due to earthwork distribution as major or moderate. Earthwork distribution calculations do not appear to be a significant problem as compared to other incorrect pay items and quantities.

Conclusions

Based on the results of this study, it appears that overall, designers are not consistently calculating quantities correctly nor are they using the correct pay items on the Itemized Proposals. On the majority of the projects with incorrect quantities, the calculations for road items including asphalt pavement and compacted aggregate base for the shoulder wedging are some of the most common items requiring change orders. Typical errors also include pay items called out on the plans and in tables not matching quantity calculations nor the itemized proposal. In addition, on bridge projects there were several incidences where the concrete and re-bar quantities were tabulated for one element (i.e. one pier), but the quantities were not multiplied by the number of similar elements (i.e. other piers that were similar, but not detailed).
## PLANS/SPECIAL PROVISIONS / SPECIFICATIONS

### Question #1: Were the plans clear with sufficient detail?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>Total Responses</th>
<th>N/A</th>
<th>Not Answered</th>
</tr>
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<tbody>
<tr>
<td>Reviews</td>
<td>482</td>
<td>175</td>
<td>657</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>% Yes/No</td>
<td>73%</td>
<td>27%</td>
<td></td>
<td></td>
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</tr>
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</table>

### Question #2: Were the special provisions clear and in sufficient detail?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>Total Responses</th>
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<th>Not Answered</th>
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</thead>
<tbody>
<tr>
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<td>603</td>
<td>63</td>
<td>666</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>% Yes/No</td>
<td>90%</td>
<td>10%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Question #3: Were the Standard Specifications and the Standard Drawings clear?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>Total Responses</th>
<th>N/A</th>
<th>Not Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviews</td>
<td>607</td>
<td>36</td>
<td>643</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>% Yes/No</td>
<td>94%</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INDOT Construction Evaluation Report

SUMMARY OF CONTRACTABILITY SCREENING MAGNITUDE OF CHANGES

Plans – Alignments –
  13 Major Changes
  39 Moderate Changes
  75 Minor Changes
  456 None

Summary: 52 of 583 (9%) Rated Major and Moderate Changes

Plans – Drainage Plans-
  25 Major Changes
  52 Moderate Changes
  108 Minor Changes
  398 None

Summary: 77 of 583 (13%) Rated Major and Moderate Changes

Plans – Material Specifications-
  11 Major Changes
  34 Moderate Changes
  84 Minor Changes
  448 None

Summary: 45 of 577 (8%) Rated Major and Moderate Changes

Specifications –
  14 Major Changes
  33 Moderate Changes
  86 Minor Changes
  446 None

Summary: 47 of 579 (8%) Rated Major and Moderate Changes
INDOT Construction Evaluation Report

Plans, Special Provisions, Specifications Summary

On over 27% of the projects, the supervisors felt that the plans were not clear and did not have sufficient detail. Of the actual change orders that were required due to plans, provisions and specifications, approximately 7% to 13% were rated as major or moderate changes.

Conclusions
Based on the results of our study, it appears that overall the project supervisors are not having difficulties dealing with the special provisions or the standard drawings. 22% though, rate the plans as not being clear nor having sufficient detail. Apparently, in general, the construction plans are lacking enough details for the projects to be constructed.
## OVERALL SUMMARY AND PROJECT RATING

**Question #23A: Were the construction drawings and specifications complete?**

<table>
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<tr>
<th>Reviews</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Better than Expected</td>
<td>32</td>
</tr>
<tr>
<td>Met Expectations</td>
<td>485</td>
</tr>
<tr>
<td>Needs to Improve</td>
<td>80</td>
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<tr>
<td>Serious Problem</td>
<td>9</td>
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<tr>
<td>No Opinion</td>
<td>20</td>
</tr>
<tr>
<td>Not Answered</td>
<td>50</td>
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</table>

**Question #23B: Were the construction drawings and specifications accurate?**

<table>
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<th>Reviews</th>
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<tr>
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<td>30</td>
</tr>
<tr>
<td>Met Expectations</td>
<td>465</td>
</tr>
<tr>
<td>Needs to Improve</td>
<td>97</td>
</tr>
<tr>
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<td>14</td>
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</tr>
<tr>
<td>Not Answered</td>
<td>51</td>
</tr>
</tbody>
</table>
INDOT Construction Evaluation Report

**Question #23C: Were there a large number of contractor questions?**

<table>
<thead>
<tr>
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<tbody>
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<td>32</td>
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<td>Met Expectations</td>
<td>483</td>
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<tr>
<td>Needs to Improve</td>
<td>70</td>
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<tr>
<td>Serious Problem</td>
<td>8</td>
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<tr>
<td>No Opinion</td>
<td>33</td>
</tr>
<tr>
<td>Not Answered</td>
<td>50</td>
</tr>
</tbody>
</table>

**Question #23D: Did the construction documents impact contractor’s ability to meet schedule?**

<table>
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<tbody>
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<td>Needs to Improve</td>
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<td>Serious Problem</td>
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<tr>
<td>No Opinion</td>
<td>34</td>
</tr>
<tr>
<td>Not Answered</td>
<td>53</td>
</tr>
</tbody>
</table>
Road Design Breakout Session (Traffic Section)

• Traffic Squad (Review and Design)
• Traffic Design Memos
• New Standards for Sign Trusses

(Alfredo Hanza)
Road Design Breakout Session
(Traffic Section)

• The Traffic Squad, part of Production Division. In our squad we are 5 engineers and our work is to design and review traffic projects. These can be specific Traffic projects or Traffic items part of large road jobs. Including lighting, signing and signals our primary review is on all traffic items of the IPOC jobs. We interact with the managers of the IPOC jobs and the consultant designers in the review of these jobs. We conduct our review on the computer and communicate with the designer by phone or email and hold meetings when necessary.

• At the beginning phase of these jobs we get with the designer on the existing scoping to define more specifically the objective of the work. At 30% of the road design we should review all existing signing and the layout of proposed messages of the signing and some of the lighting alternatives. At 60% of the design we should review all new signing cross sections and design structures. At 90% of the design we should review final traffic design. Of course we are always open to inquiries and technical advice at any time the designer feels necessary.

• All none IPOC Traffic jobs or Traffic items included on road jobs that are submitted to Coordinator 7 (which is our review squad in Production) are sent to us for review. Depending on our work load we will review or send back to the Coordinator for Consultant review.

• Our Traffic Squad does all in-house Traffic design for all road jobs assigned in-house. Also, at the District’s request, we can assist with traffic design jobs when they feel assistance is needed.
Road Design Breakout Session
(Traffic Section)

• I would like to emphasize a couple of points that designers should be aware of. First, we are requiring that any traffic signal design shall have counting capabilities for vehicles in each traffic lane approaching a signalized intersection and identify the counting loops in the loop tagging table. There is a memorandum dated January 18, 2007 that explains in detail how this is to be done.

• Second, designers should be aware that our existing Signing Box Trusses standard sheet is not to be used. They need to be updated to the AASHTO 2001, 4th Edition with interims to 2007 that include the Fatigue Factor. A Design Memorandum was sent last week from our Design Resources Engineer concerning this matter.
Road Design Breakout Session (Finish)

- Questions & Answers