INDIANA DEPARTMENT OF TRANSPORTATION

STANDARDS COMMITTEE MEETING

Driving Indiana's Economic Growth

APPROVED MINUTES

May 21, 2009 Standards Committee Meeting

MEMORANDUM

June 25, 2009

TO: Standards Committee

FROM: Mike Milligan, Secretary

RE: Minutes for the May 21, 2009 Standards Committee Meeting

The Standards Committee meeting was called to order by the Chairman at 9:01 a.m. on May 21, 2009 in the N755 Bay Window Conference Room. The meeting was adjourned at 12:19 p.m.

The following members were in attendance:

Mark Miller, Chairman	Dave Andrewski, Pvmt. Engineering
Jeff James*, Constr. Mgmt.	Bob Cales, Contract Admin.
Ron Heustis, Constr. Mgmt.	John Wright, Roadway Services
Dave Boruff**, Highway Operations	Anne Rearick, Structural Services
Ron Walker, Materials Mgmt.	Jim Keefer, Fort Wayne Dist.
Tom Caplinger, Crawfordsville Dist.	

* Proxy for Dennis Kuchler
** Proxy for Todd Shields

Also in attendance were the following:

Mike Milligan, Secretary	Paul Berebitsky, ICA
Scott Trammell, INDOT	Bren George, FHWA
Lalit Garg, INDOT	Kumar Dave, INDOT
Tony Uremovich, INDOT	Jim Reilman, INDOT
Joseph Bruno, INDOT	Pankaj Patel, INDOT
Nate Whitacre, INDOT	Steve Fisher, INDOT
Mike Byers, IC-ACPA	

Page No.

A. GENERAL BUSINESS ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

1. Approval of the April 16, 2009 Minutes.

   Approved as Submitted.

   Motion: Mr. Heustis
   Second: Mr. Keefer
   Ayes: 10
   Nays: 0

2. Correction to January 15, 2009 Standard Committee Minutes

   Mr. Heustis handed out to the Committee a mark up of page 29 of the Approved Minutes of the January 15, 2009 Standards Committee meeting concerning 701.15. The Committee had decided at the January 15, 2009 meeting to strike out a sentence concerning payment for piling not used, but the minutes did not accurately reflect this decision. A Recurring Special Provision to the 2010 Specifications will be created to address this discrepancy. *(See last page).*

   Approved as Submitted.

   Motion: Mr. Heustis
   Second: Mr. Keefer
   Ayes: 10
   Nays: 0

3. Milled Centerline Corrugations RSP for LPA Projects

   DISCUSSION: Mr. Miller discussed the FHWA request that INDOT create a Recurring Special Provision for use of milled centerline corrugations for LPA stimulus projects.

   Mr. Wright addressed the status of design guidance to complement this RSP.

   Mr. Heustis expressed concern that it was important to identify that the RSP was for use on LPA projects only.

   Mr. Miller clarified that milled centerline corrugations are more applicable to LPA projects than typical INDOT projects because of narrow roads and limited sight distance.

   A Recurring Special Provision will be created and made available for use as soon as possible.

   (NOTE: RSP 606-R-563, Milled Centerline Corrugations has been created and made effective for lettings on or after Aug 1, 2009.)

4. Revision of Indiana Design Manual

   DISCUSSION: Mr. Wright mentioned that the Production Division is completely revising the Design Manual.

   ACTION: Mr. Wright will submit a conceptual proposal to the Standards Committee concerning the Design Manual revision.

5. Unique Special Provision Process

DISCUSSION: The Committee briefly discussed the Unique Special Provision Approval Process in IDM Chapter 19, which was introduced in Design Memorandum No. 09-07. The Unique Special Provision Review Process is effective beginning with the August 12, 2009 letting.

B. CONCEPTUAL PROPOSAL ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

1. Instrumentation of Bridge Decks to Monitor Curing of Concrete 5

DISCUSSION: This proposal involves inclusion of instrumentation in concrete bridge decks to monitor temperature at regular time intervals to accurately indicate when protection of the curing concrete from cold weather is warranted. The instrumentation is about the size of a nickel and costs about $20.00 per unit.

Mr. Heustis asked what equipment is required to read the instrumentation and process information, what the cost is of any associated equipment, and if this equipment would be property of the Department or the Contractor.

The Committee discussed that a laptop or a special hand-held reader could be used to retrieve information from the instrumentation.

Mr. Walker indicated that this technology has been used successfully by INDOT in the past.

ACTION: The Committee requested Mr. Jim Reilman to form an ad-hoc committee to develop this concept and include representation from industry. No time constraints were discussed.

2. Development of Drilled Shaft Special Provision 6

DISCUSSION: Mr. Heustis commented that Mr. Milligan has been working on this assignment and suggested that Mr. Milligan be involved with development of this concept.

ACTION: The Committee requested that Mr. Malek Smadi and Mr. Milligan assemble an ad-hoc committee with involvement of relevant INDOT personnel, consultants and industry to produce a final draft of a drilled shaft specification. No time constraints were discussed.

C. STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS PROPOSED ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

Item No. 01 05/21/09 (2010 SS)	Mr. Andrewski	8
408.02	Materials	
408.05	Routing and Filling Cracks and Joints	
507.02	Materials	
507.02(a)	Routing, Cleaning and Sealing	
507.02(b)	Cleaning and Filling	
ACTION:	Passed as revised	
Item No. 02 05/21/09 (2010 SS)	Mr. Bowman	13
Standard Drawing	802-SNGP-01	
ACTION:	Withdrawn	
Item No. 03 05/21/09 (2010 SS)	Mr. Bowman	16
Standard Drawings	806-SGFB-03 and 04	
806	~~BLANK~~ *FLASHING BEACONS*	
ACTION:	Withdrawn	
Item No. 04 05/21/09 (2010 SS)	Mr. Bowman	26
Standard Drawing	807-LTPD-01	
920.01(b)1	High Mast Poles	
920.01(b)2	Welding	
ACTION:	Withdrawn	
Item No. 05 05/21/09 (2010 SS)	Mr. Heustis	31
620-R-483	~~BLANK~~ *SOUND BARRIER SYSTEMS*	
ACTION:	Passed as revised	

D. DESIGN MANUAL

Item No. 06 05/21/09 (2010 SS)	Mr. Andrewski	51
Design Manual	Figure 52-13F PCCP Section with PCC Shoulder	
	Figure 52-13P PCCP with Underdrain	
ACTION:	Passed as revised	

cc: Committee Members (11)
FHWA (2)
ICA (1)

Mr. Walker
Date: 05/21/09

CONCEPTUAL PROPOSAL

1. Instrumentation of Bridge Decks to Monitor Curing of Concrete.

CONCEPTUAL

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: There are uncertainties that the Department is receiving or can enforce the correct cure durations on bridge decks. Temperatures may be dropping below specification limits inside the enclosure. If this occurs at the wrong time during the cure cycle, the durability of the concrete can be negatively affected.

PROPOSED SOLUTION: Require the Contractor to install small programmable sensors at various specified locations throughout the concrete in the deck. These sensors can be programmed to record a time & temperature reading every 15 minutes. The data can then be downloaded to a PC and analyzed to evaluate the amount of time the concrete temperature is above 50º.

APPLICABLE STANDARD SPECIFICATIONS: 702, 704

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: None

APPLICABLE SECTION OF GIFE: New 702 or 704

APPLICABLE RECURRING SPECIAL PROVISIONS: None

Submitted By: Ron Walker (for Tony Zander)

Title: Manager, Office of Materials Management

Organization: INDOT

Phone Number: 610-7251 x204

Date: April 16, 2009

APPLICABLE SUB-COMMITTEE ENDORSEMENT? propose to create small ad hoc committee of Tony Zander, Jim Reilman, and offer to ICA to have one contractor participate. After ad hoc committee develops proposed specification, forward to 700 subcommittee for review & consideration.

Mr. Walker
Date: 05/21/09

CONCEPTUAL PROPOSAL

2. Development of Drilled Shaft Special Provision

CONCEPTUAL

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: We have several versions of the drilled shaft special provision that are being used and have been used on various INDOT and LPA contracts. The problem resulted in having different versions that have been implemented from one project to another since 1998.

PROPOSED SOLUTION: Prepare a single document that can be a part of the Standard Specifications and which can be used for all contracts. Review the current special provisions for drilled shafts and produce a comprehensive and detailed version that can be used by all parties. The review will include addition of all new requirements based on the latest developments in design and construction of drilled shafts. The review will also address changes to include recommendations that will be based on feedback received from various contracts since 1998.

In order to accomplish this task we need to form a sub-committee that includes experts from Industry, Design Consultants, Contractors and Engineers from INDOT.

APPLICABLE STANDARD SPECIFICATIONS: None

APPLICABLE STANDARD DRAWINGS:

APPLICABLE DESIGN MANUAL SECTION:

APPLICABLE SECTION OF GIFE:None

APPLICABLE RECURRING SPECIAL PROVISIONS:

Submitted By: Malek Smadi (Thru Ron Walker)

Title: Geotechnical Design Team Leader

Organization:

Phone Number:

Date:

APPLICABLE SUB-COMMITTEE ENDORSEMENT? N/A

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Revised specification. Current spec was written in March 2003, revised in March 2004 with the latest revision appearing in September 2005 and has not been revised/updated since.

PROPOSED SOLUTION: Revised spec will allow the use of routing equipment more common to the operation, and increase the maximum width of the rout to incorporate the use of more readily available equipment and follow current INDOT and industry practices.
The addition of the PG 64-22 binder for sealing material will allow an option that is compatible with certain surface treatments (microsurface).

APPLICABLE STANDARD SPECIFICATIONS: Section 408 and Section 507

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: 52-11.0

APPLICABLE SECTION OF GIFE: Unknown

APPLICABLE RECURRING SPECIAL PROVISIONS: 411-R-432

Submitted By: Dave Andrewski

Title: Manager, Office of Pavement Engineering

Organization: INDOT

Phone Number: 317-232-5452

Date: April 21, 2009

APPLICABLE SUB-COMMITTEE ENDORSEMENT?
This revision was done with a small committee consisting of Todd Shields, Dave Andrewski, Jeff James, Tom Carrow, Ron Huestis, Mike Prather, Mike Milligan, and Scott Trammell.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 408, BEGIN LINE 9, INSERT AS FOLLOWS:

408.02 Materials

Materials shall be in accordance with the following:

Asphalt Emulsion for
Crack Sealing, AE-90, AE-90S, AE-150.....902.01(b)
Asphalt Binder for Crack Sealing, PG 64-22~~-AC~~.....902.01(a)
Fine Aggregates, No. 23 or 24.....904
Joint Sealing Materials.....906.02

SECTION 408, BEGIN LINE 30, DELETE AND INSERT AS FOLLOWS:

408.05 Routing and Filling Cracks and Joints

Cracks and joints shall be routed when specified, with a ~~vertical-spindle router with carbide-tipped or diamond router bits~~ *routing machine capable of cutting a uniform shape* to form a reservoir not exceeding ~~0.5~~ *0.75* in. (~~13~~ *19* mm) wide with a minimum depth of 0.75 in. (19 mm). The operation shall be coordinated such that routed materials do not encroach on pavement lanes carrying traffic and all routed materials are disposed of in accordance with 104.07. Cracks and joints shall be filled with asphalt rubber to within 0.25 in. (7 mm) of the surface in accordance with the manufacturer's recommendations.

SECTION 507, BEGIN LINE 9, DELETE AND INSERT AS FOLLOWS:

507.02 Materials

Materials shall be in accordance with the following:

Asphalt Emulsion AE-90, AE-90S, AE-150.....902.01(b)
Asphalt Binder for Crack Sealing, PG 64-22~~-AC~~.....902.01(a)
Dowel Bars.....910.01(b)10
Fine Aggregates, Size No. 23 or 24.....904
Joint Sealing Materials.....906.02
Rapid Set Patching Materials.....901.07

SECTION 507, BEGIN LINE 28, DELETE AND INSERT AS FOLLOWS:

(a) Routing, Cleaning and Sealing

Cracks in PCCP shall be routed and cleaned when specified. Cracks shall be routed with a ~~vertical-spindle router with carbide-tipped or diamond router bits~~ *routing machine capable of cutting a uniform shape* to form a reservoir not exceeding ~~0.5~~ *0.75* in. (~~13~~ *19* mm) wide with a minimum depth of 0.75 in. (19 mm). The operation shall be coordinated such that routed materials do not encroach on pavement lanes carrying traffic and all routed materials are disposed of in accordance with 104.07. The cracks shall be cleaned with compressed air or by other suitable means. Air compressors shall be capable of producing a minimum air pressure of 100 psi (690 kPa). Water blasting shall not be utilized.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 507, BEGIN LINE 49, DELETE AND INSERT AS FOLLOWS:

(b) Cleaning and Filling

The cracks shall be cleaned by blowing with compressed air or by other suitable means when specified. Air compressors shall be capable of producing a minimum air pressure of 100 psi (690 kPa). Water blasting shall not be utilized.

Cracks shall be filled with asphalt ~~emulsion~~ *material*. The cracks shall be completely filled or overbanded not to exceed 5 in. (125 mm), or as required. Asphalt ~~emulsion~~ *material* shall be placed utilizing a "V" shaped wand tip, to allow the penetration of the materials into the cracks. The filled cracks shall be covered with sufficient fine aggregate to prevent tracking of the asphalt ~~emulsion~~ *material*. All excess cover material shall be removed from the pavement.

Application of asphalt ~~emulsion~~ *material* shall be completed without covering existing pavement markings. When traffic is to be maintained within the limits of the section, temporary traffic control measures in accordance with 801 shall be used. Treated areas shall not be opened to traffic until the asphalt ~~emulsion~~ *material* has set.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 507, CONTINUED.

DISCUSSION: Mr. Heustis asked if the specification should clarify that AE emulsions are not compatible with micro-surfacing.

Mr. James stated that micro-surfacing specification was the proper place to address this incompatibility.

The Committee discussed the need to verify that wording exists in the micro-surfacing specification concerning the incompatibility of AE emulsions for crack sealing with micro-surfacing application.

Other sections containing specific cross references:

Motion: Mr. Andrewski
Second: Mr. Keefer
Ayes: 10
Nays: 0

Action: Passed as revised

Recurring Special Provisions affected:

_x_ 2012 Standard Specifications Book

_x_ Create RSP (No. 408-R-564)
Effective July 2009 Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Sheets affected:

Standard Drawing Effective _____

___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y_x_ N___
By - Revision

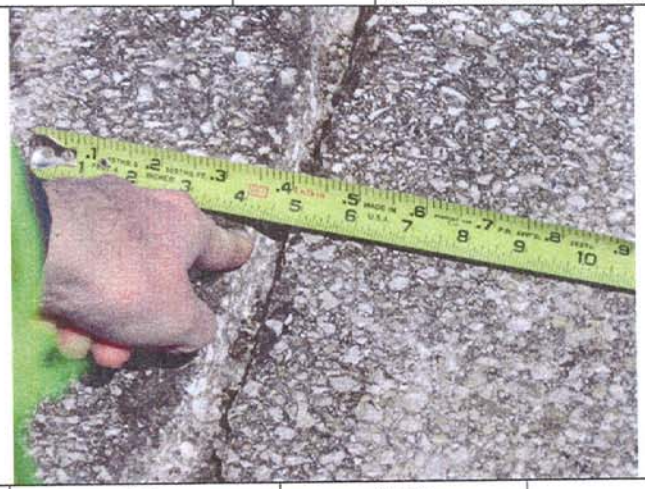
Frequency Manual Update Req'd? Y___ N_x__
By - Addition or Revision

Withdrawn ____

Received FHWA Approval? Yes

Spec 408 and 507 Crack Sealing Router and Material Revisions – Comments

Comment Received	By	Comment responses
¾" x ¾" indicates a square cut	Carrow	Yes it does, and that is intended – up to ¾" wide, minimum ¾" deep.
Proposed changes look good	Milligan	Thanks
Fine with proposed changes	Prather	Thanks
Looks okay to me – Q: How will we ensure that PG 64-22 is used if microsurface is to follow? It seems the contractor would have the choice of AE or PG material.	Heustis	The contractor would have a choice of what material to use. Since microsurface is warranted, the contractor will assume any risk associated with the material they select.
Incorporate the statement, "If the contract includes a surface treatment, the crack seal material shall be compatible with the surface treatment". Also, believe both specs have several issues that need clarification.	James	May not be appropriate in a crack seal spec. Perhaps adding language in the surface treatment special provisions would be more appropriate. The spec changes are mainly for allowing the contractor to apply the crack seal material without affecting the warranty of the treatment. We can deal with the other issues at another time.
Believes ¾" will create "tire slap" noises. Would like to see reasoning/data behind this choice.	Andrewski	Currently, ¾" routing width is already being used by INDOT due to constructability and performance. Personal observation of ¾" rout width did not experience "tire slap" noise, or ride. Also, ¾" router wheel is a standard size and readily available.



State	Missouri	Illinois	Michigan	Ohio	Indiana
Name	o Bituminous Pavement Crack Sealing/Filling	o Crack Sealing Bituminous Pavement	o Overband Crack Fill	o Crack Sealing, Hot Applied	o Sealing Cracks and Joints
Routing	o Minimum width of 1/2 in. (13 mm) o Minimum depth of 1/2 in. (13 mm)	o 20 mm (3/4 in.) wide o 20 mm (3/4 in.) deep		o Maximum width of 3/4 in. (19 mm) o Maximum depth of 1 in. (25 mm)	o Maximum width of 1/2 in. (13 mm) o Minimum depth of 3/4 in. (19 mm)

SPECIFICATION REVISIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

During the last meeting with District Traffic Engineers a question was raised about this Standard Drawing and it was pointed out that this present Standard Drawing 802-SNGP-01 does not give the details about the minimum height of the panel sign above the ground in case of up slope or elevated ground. This Standard Drawing gives the details about mounting height of the panel sign for down slopes only.

PROPOSED SOLUTION:

I am proposing a change in this Standard Drawing. The change being proposed is only an addition in the notes stating that "in case of up slope or elevated ground, the bottom of the outer edge of the panel sign shall be 7 ft. min. above ground."

APPLICABLE STANDARD SPECIFICATIONS:

APPLICABLE STANDARD DRAWINGS: 802-SNGP-01

APPLICABLE DESIGN MANUAL SECTION:

APPLICABLE SECTION OF GIFE:

APPLICABLE RECURRING SPECIAL PROVISIONS:

Submitted By: Lalit Garg thru Mike Bowman

Title: HE-2

Organization: INDOT

Phone Number: 317-232-5241

Date: 3/24/2009

APPLICABLE SUB-COMMITTEE ENDORSEMENT?

Item No. 02 05/21/09 (2010 SS)
Mr. Bowman
Date: 05/21/09

REVISION TO STANDARD DRAWING

802-SNGP-01 SIGN PLACEMENT

Other sections containing specific cross references:

None

Recurring Special Provisions affected:

None

Standard Sheets affected:

Proposed 802-SNGP-01

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

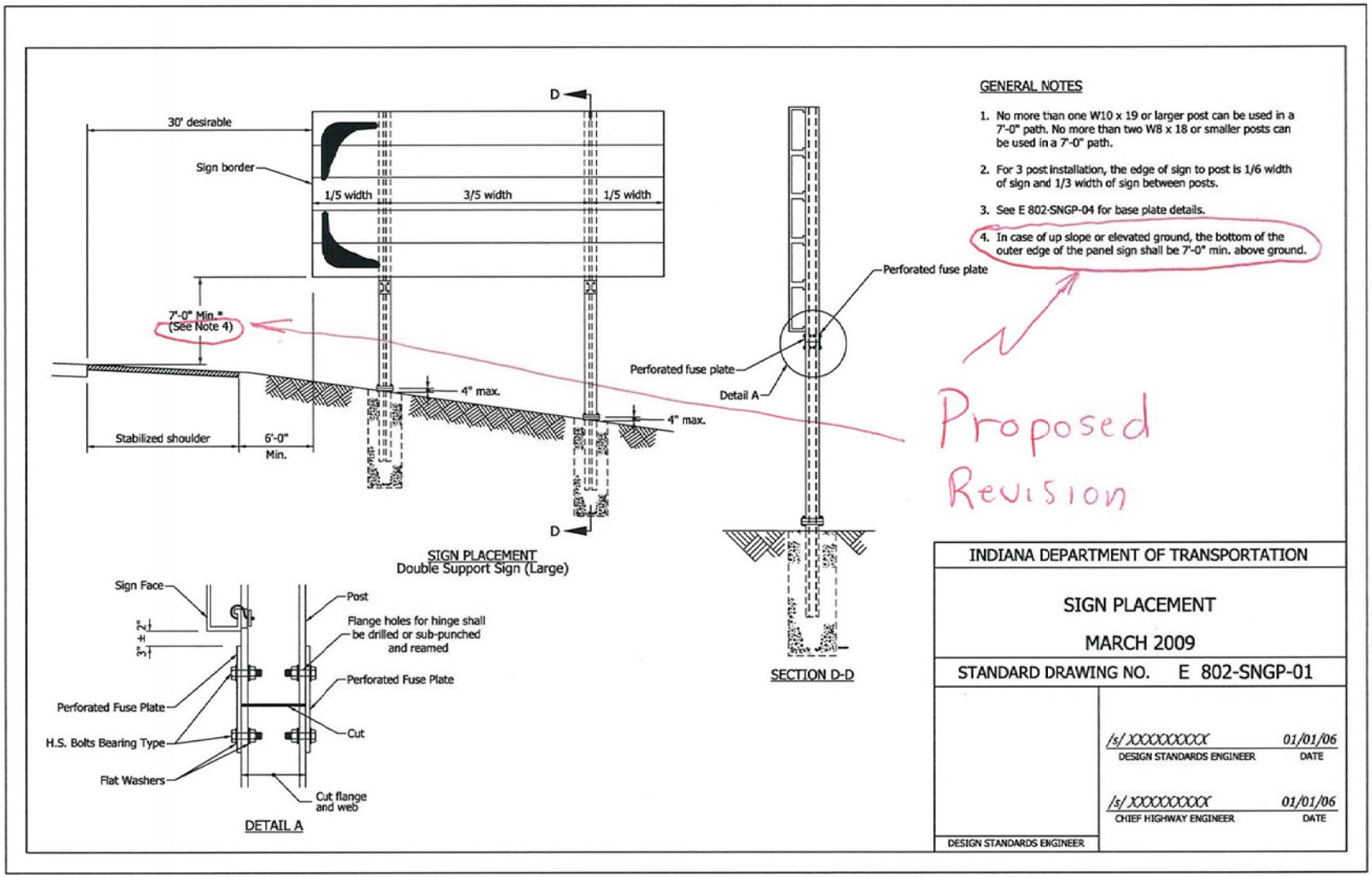
___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N___
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N___
By - Addition or Revision

Withdrawn __x__

Received FHWA Approval? ____


30' desirable
Sign border
1/5 width
3/5 width
1/5 width
D
7'-0" Min.*
(See Note 4)
4" max.
4" max.
Stabilized shoulder
6'-0"
Min.
D
SIGN PLACEMENT
Double Support Sign (Large)
Perforated fuse plate
Perforated fuse plate
Detail A
SECTION D-D
GENERAL NOTES
1. No more than one W10 x 19 or larger post can be used in a 7'-0" path. No more than two W8 x 18 or smaller posts can be used in a 7'-0" path.
2. For 3 post installation, the edge of sign to post is 1/6 width of sign and 1/3 width of sign between posts.
3. See E 802-SNGP-04 for base plate details.
4. In case of up slope or elevated ground, the bottom of the outer edge of the panel sign shall be 7'-0" min. above ground.
Proposed
Revision
Sign Face
Post
2"
H
3"
Flange holes for hinge shall be drilled or sub-punched and reamed
Perforated Fuse Plate
Perforated Fuse Plate
Cut
H.S. Bolts Bearing Type
Flat Washers
Cut flange and web
DETAIL A
INDIANA DEPARTMENT OF TRANSPORTATION
SIGN PLACEMENT
MARCH 2009
STANDARD DRAWING NO. E 802-SNGP-01
/s/ XXXXXXXXX 01/01/06
DESIGN STANDARDS ENGINEER DATE
/s/ XXXXXXXXX 01/01/06
CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER

SPECIFICATION REVISIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:
Due to the increasing use of solar-powered flashing beacons in rural areas, the district traffic engineers requested that a specification and standard drawing be developed for this type of traffic control device.

PROPOSED SOLUTION:
The proposed solution involves two standard drawings and four additional specifications to the 800's section of the spec book.

APPLICABLE STANDARD SPECIFICATIONS:
The proposed standard specifications are 806.01 – 806.04. Other relevant standards specifications are 702, 805, 904, 922.

APPLICABLE STANDARD DRAWINGS:
The proposed Standard Drawings are 806 SGFB 03 and 806 SGFB 04. Three other standard drawings would be renamed under the proposal, 805 SGFB 01, 805 SGFB 01A, and 805 SGFB 02, would be renamed 806 SGFB 01, 806 SGFB 01A, and 806 SGFB 02, respectively. Four other relevant standard drawings are, 802 SNPL 02, 805 SGCF 03, 805 SGGR 03, and 805 SGCO 05.

APPLICABLE DESIGN MANUAL SECTION: 77-3.01.

APPLICABLE SECTION OF GIFE: No applicable section known.

APPLICABLE RECURRING SPECIAL PROVISIONS: No applicable section known.

Submitted By: Michael D. Bowman, P.E.

Title: Director, Highway Operations Division

Organization: Indiana Department of Transportation

Phone Number: (317) 232-5508

Date: 3/2/2009

APPLICABLE SUB-COMMITTEE ENDORSEMENT? The 805 Sub-committee is inactive, so there is no applicable Sub-committee endorsement at this time.

Item No. 03 05/21/09 (2010 SS)
Mr. Bowman
Date: 05/21/09

PROPOSED NEW STANDARD DRAWINGS

806-SGFB-03 PEDESTAL MOUNTED SOLAR POWERED SCHOOL FLASHER
806-SGFB-04 PEDESTAL MOUNTED SOLAR POWERED WARNING FLASHER

Other sections containing specific cross references:

None

Recurring Special Provisions affected:

None

Standard Sheets affected:

Proposed New 806-SGFB-03
Proposed New 806-SGFB-04

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

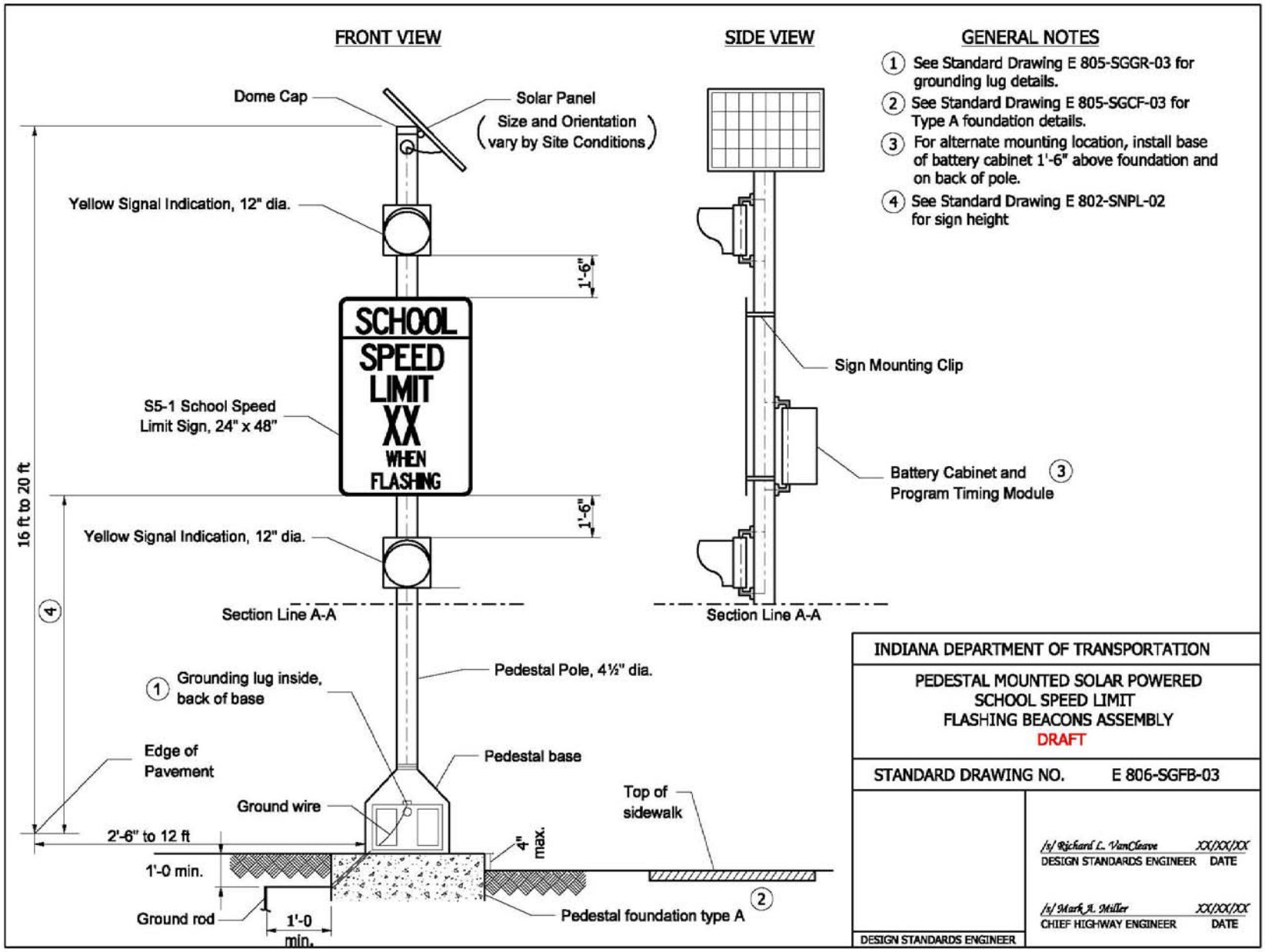
___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

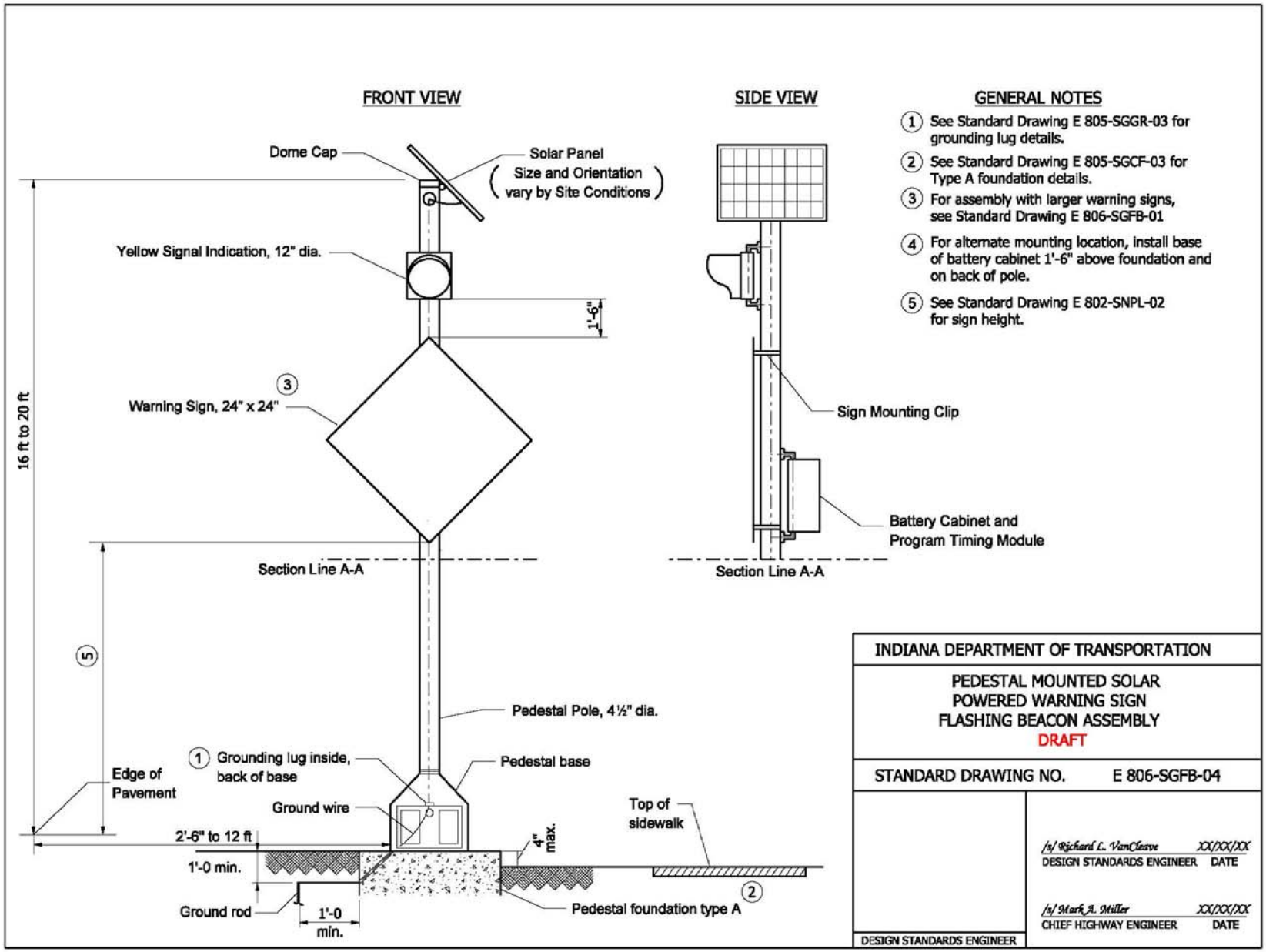
GIFE Update Req'd.? Y___ N___
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N___
By - Addition or Revision

Withdrawn _x__

Received FHWA Approval? ____


FRONT VIEW
SIDE VIEW
GENERAL NOTES
1 See Standard Drawing E 805-SGGR-03 for grounding lug details.
2 See Standard Drawing E 805-SGCF-03 for Type A foundation details.
3 For alternate mounting location, install base of battery cabinet 1'-6" above foundation and on back of pole.
4 See Standard Drawing E 802-SNPL-02 for sign height
Dome Cap
Solar Panel
Size and Orientation vary by Site Conditions
Yellow Signal Indication, 12" dia.
1'-6"
SCHOOL
SPEED
LIMIT
XX
WHEN
FLASHING
S5-1 School Speed Limit Sign, 24" x 48"
Sign Mounting Clip
Battery Cabinet and Program Timing Module 3
16 ft to 20 ft
4
Yellow Signal Indication, 12" dia.
1'-6"
Section Line A-A
Section Line A-A
1 Grounding lug inside, back of base
Pedestal Pole, 4½" dia.
Edge of Pavement
Pedestal base
Ground wire
Top of sidewalk
2'-6" to 12 ft
4" max.
1'-0 min.
Ground rod
1'-0 min.
Pedestal foundation type A
2
INDIANA DEPARTMENT OF TRANSPORTATION
PEDESTAL MOUNTED SOLAR POWERED SCHOOL SPEED LIMIT FLASHING BEACONS ASSEMBLY
DRAFT
STANDARD DRAWING NO. E 806-SGFB-03
/s/ Richard L. VanCleave XX/XX/XX
DESIGN STANDARDS ENGINEER DATE
/s/ Mark A. Miller XX/XX/XX
CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER


FRONT VIEW
SIDE VIEW
Dome Cap
Solar Panel
Size and Orientation
vary by Site Conditions
Yellow Signal Indication, 12" dia.
1'-6"
16 ft to 20 ft
3
Warning Sign, 24" x 24"
Sign Mounting Clip
Battery Cabinet and
Program Timing Module
Section Line A-A
Section Line A-A
5
Pedestal Pole, 4½" dia.
1 Grounding lug inside,
back of base
Pedestal base
Edge of
Pavement
Ground wire
Top of
sidewalk
2'-6" to 12 ft
4"
max.
1'-0 min.
2
Ground rod
1'-0
min.
Pedestal foundation type A
GENERAL NOTES
1 See Standard Drawing E 805-SGGR-03 for grounding lug details.
2 See Standard Drawing E 805-SGCF-03 for Type A foundation details.
3 For assembly with larger warning signs, see Standard Drawing E 806-SGFB-01
4 For alternate mounting location, install base of battery cabinet 1'-6" above foundation and on back of pole.
5 See Standard Drawing E 802-SNPL-02 for sign height.
INDIANA DEPARTMENT OF TRANSPORTATION
PEDESTAL MOUNTED SOLAR
POWERED WARNING SIGN
FLASHING BEACON ASSEMBLY
DRAFT
STANDARD DRAWING NO. E 806-SGFB-04
/s/ Richard L. VanCleave XX/XX/XX
DESIGN STANDARDS ENGINEER DATE
/s/ Mark A. Miller XX/XX/XX
CHIEF HIGHWAY ENGINEER DATE
DESIGN STANDARDS ENGINEER

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, BEGIN LINE 1 DELETE AND INSERT AS FOLLOWS:

SECTION 806 – ~~BLANK~~ *FLASHING BEACONS*

806.01 Description

This work shall consist of furnishing miscellaneous materials, not furnished by the Department, and installing flashing beacons in accordance with 105.03.

MATERIALS

806.02 Materials

Materials shall be in accordance with the following:

Castings for Handhole .....910.05(b)
Coarse Aggregate, Class E or Higher, Size No. 8 904
Concrete, Class A, B, or C 702
Signal Materials and Equipment.....922

The proposed work shall be examined in order to determine what materials not furnished by the Department are required to complete the contract. Unless otherwise specified, the Contractor shall furnish all materials required to complete an operating installation. If applicable, the Department will furnish only the materials specified in the Department Furnished Materials special provision.

CONSTRUCTION REQUIREMENTS

806.03 General Requirements

Flashing beacons shall flash at a rate for each beacon of 50 to 60 times per minute with the illuminated period from 1/2 to 2/3 of the total cycle.

806.04 School Speed Limit Beacons

Yellow beacons shall be 12 in. (300 mm) in size. School speed limit beacons shall have 1 beacon that is 18 in. (450 mm) above the sign and 1 beacon that is 18 in. (450 mm) below the sign. The 2 school speed limit beacons shall flash alternately. The controller for the school speed limit beacons shall have all solid state components that meet NEMA Standard Publication TS-1983, Section 8, Type 3. Backing members with hardware shall be compatible with the method of support.

806.05 Warning Beacons

Yellow beacons shall be 12 in. (300 mm) in size. The warning beacon shall have at least 1 beacon that is mounted 18 in. (450 mm) above the warning sign. If a second beacon is specified, it shall be mounted 18 in. (450 mm) below the warning sign and flash alternately with the beacon mounted above the sign. Warning beacons that are suspended over the roadway shall have a clearance of at least 17 ft (4.7 m) but no more than 19 ft (4.8 m). If there are visual obstructions which require lowering a flashing beacon, a flashing beacon suspended over the roadway shall have a clearance of at least 15 ft (4.6 m). The controller for warning beacons shall have all solid state components that meet

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, CONTINUED.

NEMA Standard Publication TS-1983, Section 8, Type 3. Backing members with hardware shall be compatible with the method of support.

806.06 Final Clean-Up

When the installation is complete, all disturbed areas shall be cleaned in accordance with 104.08. All cutting in the sidewalk and pavement areas shall be done with a saw. Sidewalk removal and replacement shall be to the nearest tool joint. Unless otherwise directed, cuts in pavement areas shall be no greater than 12 in. (300 mm) in width.

806.07 Method of Measurement

Flashing beacon head, controller cabinet foundation, steel strain pole, beacon wood pole, beacon cantilever structure, beacon support foundation, beacon service, disconnect hanger, magnetometer detector, microloop detector, loop detector delay amplifier, beacon handhole, beacon detector housing, span catenary and tether for flasher will be measured by the number of units installed.

Conduit of the type specified will be measured by the linear foot (meter) from outside to outside of the foundations. Beacon cable and beacon interconnect cable will be measured by the linear foot (meter).

The accepted quantities for electrical signal or loop lead-in cable will be the quantities shown in the Schedule of Pay Items. Such quantities may be corrected if they are in error by more than 25%.

Saw cut for roadway loop detector and sealant will be measured by the linear foot (meter) for the full depth of slot cut in the pavement as shown on the plans or as directed.

If class X material is encountered during foundation excavation, measurement will be made in accordance with 206.10.

Flashing beacon installation or modernization, miscellaneous equipment for flashing beacons, and final cleanup in accordance with 806.07, will not be measured for payment.

Flashing beacon equipment removal and transportation of salvageable beacon equipment will not be measured.

806.08 Basis of Payment

Flashing beacon head, controller cabinet foundation, steel strain pole, beacon wood pole, beacon cantilever structure, beacon support foundation, beacon service, disconnect hanger, magnetometer detector, microloop detector, loop detector delay amplifier, beacon handhole, beacon detector housing, span catenary and tether for flasher will be paid by the number of units installed.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, CONTINUED.

Conduit of the type specified will be paid by the linear foot (meter) from outside to outside of the foundations. Beacon cable and beacon interconnect cable will be paid by the linear foot (meter).

The accepted quantities for payment for electrical signal or loop lead-in cable will be the quantities shown in the Schedule of Pay Items. Such quantities may be corrected if they are in error by more than 25%.

Saw cut for roadway loop detector and sealant will be paid by the linear foot (meter) for the full depth of slot cut in the pavement as shown on the plans or as directed.

If class X material is encountered during foundation excavation, payment will be made in accordance with 206.11.

Flashing beacon installation or modernization, miscellaneous equipment for flashing beacons, and final cleanup in accordance with 806.07, will not be measured for payment.

Flashing beacon equipment removal and transportation of salvageable beacon equipment will not be measured.

Payment will be made under:

Pay Item Pay Unit Symbol

Controller and Cabinet, Flasher, _____,…….....EACH
Type
Controller Cabinet Foundation, _____,……...…….EACH
Type
Disconnect Hanger ……EACH

Flasher Cable, _____, No. _____ Copper, _____ C/ _____ ……..LFT (m)
Type conductors/size
Flasher Installation, Location No. _____ ……LS
Flasher Modernization, Location No. _____ ……LS
Flashing Beacon Cantilever Structure, Mast Arm _____ft (m) …….EACH
length
Flashing Beacon Detector Housing ……EACH
Flashing Beacon Equipment, Remove ……...LS
Flashing Beacon Head, _____ Way, _____ Section, _____ ……..EACH
No. No. lens sizes & colors
Flashing Beacon Installation _____, Location No. _____ ……..……LS
Type
Flashing Beacon Modernization, _____, Location No. _____ ……..LS
Type

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, CONTINUED.

Flashing Beacon Pedestal, _____ ft (m) ……..……..LFT (m)
length
Flashing Beacon Pole, Wood, _____, _____ ft (m) ……..EACH
class length
Flashing Beacon Service ……EACH
Flashing Beacon, Solar Powered, _____…….……EACH
Type
Flashing Beacon Strain Pole, Steel _____ ft (m) ……..……..LFT (m)
length
Flashing Beacon Support Foundation, _____ in. (mm) x____ in. (mm)
x _____ in. (mm) ……EACH
Handhole, Flasher ……EACH
Loop Detector Delay Amplifier, _____ Channel ……..……..EACH
No.
Magnetometer Detector ……EACH
Microloop Detector ……EACH
Miscellaneous Equipment for Flashing Beacons …….……LS
Pedestrian Push Button ……EACH
Saw Cut for Roadway Loop and Sealant ……LFT (m)
Signal Interconnect Cable, _____, No. _____
Type
Copper, _____ C/ _____ ……..LFT (m)
conductor/size
Span and Catenary for Flasher ……EACH
Transportation of Salvageable Flasher Equipment ……LS

The cost of all wiring, hardware, anchor bolts, and associated equipment required to operate the intersections shall be included in the cost of controller and cabinet, flasher.

The cost of flasher face hook-up wire, pole plates and arms for side mounts, mid-mast arm mount, pipe arms, beacon brackets, visors, louvers, bulbs, span hanger, backplates, balance adjuster, weatherhead, and all additional hardware required to assemble a combination of signal faces as shown on the plans shall be included in the cost of the flashing beacon head.

The cost of the push button, pedestrian actuated sign, and all hardware required to complete the installation shall be included in the cost of pedestrian push button.

The cost of concrete, conduits, grounding bushings, ground rod, ground wire, drainage, and all hardware required to complete the installation shall be included in the cost of controller cabinet foundation.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, CONTINUED.

The cost of the base plate, metal skirt base plate, anchor bolts, handhole and cover grounding lug, 2 in. (50 mm) pipe cable entrance, J hook, and top cover as shown on the plans shall be included in the cost of the flashing beacon strain pole, steel.

The cost of downguys, anchor rods, downguy guards, and hub-eyes as shown on the plans, and all hardware required to complete the installation shall be included in the cost of flashing beacon pole, wood.

The cost of concrete, reinforcing steel, conduits, ground rod, ground wire, grounding bushings, and all hardware required to complete the installation shall be included in the cost of flashing beacon support foundation.

The cost of the pedestal metal base, pedestal pole, pole cap when necessary, anchor bolts, and all hardware required to complete the installation shall be included in the cost of the flashing beacon pedestal.

The cost of weatherhead, 1 in. (25 mm) conduit riser, entrance switch, 1 in. to 2 in. (25 mm to 50 mm) conduit reducer, ground rod, ground wire, and all hardware required to complete the installation, including the meter base when required and supplied by the utility company shall be included in the cost of the flashing beacon service.

The cost of the detector unit, lead-in cable, and all work necessary for proper installation shall be included in the cost of the magnetometer detector or microloop detector.

The cost of the slot cut on the pavement, sash cord, backer rod, loop sealant, and all testing in accordance with 805.09 shall be included in the cost of saw cut for roadway loop and sealant.

The cost of all work and hardware required to properly install overhead or underground beacon cable as shown on the plans or as directed shall be included in the cost of flasher cable and signal interconnect cable.

The cost of the independent shelf mount unit or card-rack unit, and power module shall be included in the cost of loop detector delay amplifier.

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 806, CONTINUED.

Other sections containing specific cross references:

None

Recurring Special Provisions affected:

Standard Sheets affected:

Proposed New 806-SGFB-03
Proposed New 806-SGFB-04

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N___
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N___
By - Addition or Revision

Withdrawn __x_

Received FHWA Approval? ____

SPECIFICATION REVISIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED:

PROPOSED SOLUTION: Following changes are being proposed in our 2010 Standard Specifications in order to use Galvanized Steel in place of Weathering Steel in High Mast Lighting Towers. Changes being proposed are only in the material of Poles, Welding Procedure, Inspection and finishing of the Poles, section 920.01(b) 1 & 2.

APPLICABLE STANDARD SPECIFICATIONS:

APPLICABLE STANDARD DRAWINGS:

APPLICABLE DESIGN MANUAL SECTION:

APPLICABLE SECTION OF GIFE:

APPLICABLE RECURRING SPECIAL PROVISIONS:

Submitted By:

Title:

Organization:

Phone Number:

Date:

APPLICABLE SUB-COMMITTEE ENDORSEMENT?

Item No. 04 05/21/09 (2010 SS)
Mr. Bowman
Date: 05/21/09

REVISION TO STANDARD DRAWING

807-LTPD-01 HIGH MAST POLES

Other sections containing specific cross references:

None

Recurring Special Provisions affected:

None

Standard Sheets affected:

Proposed 807-LTPD-01

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N___
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N___
By - Addition or Revision

Withdrawn _x__

Received FHWA Approval? ____

Proposed

POLE DATA SCHEDULE

POLE HEIGHT (E.M.H.)	POLE SHAFT (INCHES)						ALTERNATE POLE SHAFT (INCHES)						MAXIMUM NO. OF SECTIONS	BASE PLATE			ANCHOR BOLT		
	SEC.	BASE DIAMETER	TOP DIAMETER	WALL THK.	SECTION LENGTH IN FEET	MIN. SLIP REQUIRED	SEC.	BASE DIAMETER	TOP DIAMETER	WALL THK.	SECTION LENGTH	MIN. SLIP REQUIRED		LG x NO. OR SQUARE	BOLT CIRCLE	THICK-NESS	NO. REQ'D	DIAMETER	LENGTH
100'-0	A	21.50	14.21	0.2500	52.50		A	20.79	17.26	0.250	35'-3"		3	36" x 33"	31.5"	2"	6	2.25"	90"
	B	15.00	7.68	0.1875	50.89	22.50	B	18.04	12.30	0.179	41'-0"	27.06							
	C						C	13.01	7.59	0.179	38'-9"	19.52							
	D						D												
105'-0	A	22.00	14.46	0.2500	53.87		A	22.19	17.12	0.250	36'-3"		3	36" x 33"	31.5"	2"	6	2.25"	90"
	B	15.25	7.68	0.1875	54.11	22.88	B	18.04	12.30	0.179	41'-0"	27.06							
	C						C	13.01	8.29	0.179	33'-9"	19.52							
	D						D												
110'-0	A	22.50	16.67	0.2500	41.65		A	22.19	17.12	0.250	36'-3"		3	36" x 33"	31.5"	2"	6	2.25"	90"
	B	17.50	11.76	0.1875	41.00	26.25	B	18.04	12.30	0.179	41'-0"	27.06							
	C	12.50	7.85	0.1875	33.21	18.75	C	13.01	7.59	0.179	38'-9"	19.52							
	D						D												
115'-0	A	23.00	17.16	0.2500	41.71		A	23.59	17.12	0.250	46'-3"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	18.00	12.25	0.1875	41.09	27.00	B	18.04	12.30	0.179	41'-0"	27.06							
	C	13.00	7.65	0.1875	38.21	19.50	C	13.01	8.29	0.179	33'-9"	19.52							
	D						D												
120'-0	A	24.00	18.14	0.2500	41.84		A	23.59	17.12	0.250	46'-3"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	19.00	13.23	0.1875	41.21	28.50	B	18.04	12.30	0.179	41'-0"	27.06							
	C	14.00	7.95	0.1875	43.21	21.00	C	13.01	7.59	0.179	38'-9"	19.52							
	D						D												
125'-0	A	25.00	19.13	0.2500	41.96		A	24.30	20.17	0.250	29'-6"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	20.00	14.21	0.1875	41.34	30.00	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.00	8.25	0.1875	48.21	22.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	8.29	0.179	33'-9"	19.52							
130'-0	A	26.50	19.62	0.2500	42.02		A	24.30	20.17	0.250	29'-6"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	20.50	14.21	0.1875	44.91	30.75	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.00	8.05	0.1875	49.64	22.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	7.59	0.179	38'-9"	19.52							
135'-0	A	26.00	20.11	0.3125	42.09		A	25.70	20.17	0.250	39'-6"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	21.00	14.21	0.1875	48.48	31.50	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.00	7.85	0.1875	51.07	22.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	8.29	0.179	33'-9"	19.52							
140'-0	A	26.50	20.60	0.3125	42.15		A	25.70	20.17	0.250	39'-6"		4	36" x 33"	31.5"	2"	6	2.25"	90"
	B	21.50	14.21	0.1875	52.05	32.25	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.00	7.65	0.1875	52.50	22.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	7.59	0.179	38'-9"	19.52							
145'-0	A	27.50	21.09	0.3125	45.78		A	27.10	20.17	0.250	49'-6"		4	36" x 36"	33.5	2"	8	2.25"	90"
	B	22.00	14.70	0.1875	52.11	33.00	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.50	7.95	0.1875	53.93	23.25	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	8.29	0.179	33'-9"	19.52							
150'-0	A	28.00	20.60	0.3125	52.86		A	27.10	20.17	0.250	49'-6"		4	36" x 36"	33.5"	2"	8	2.25"	90"
	B	21.50	14.21	0.1875	52.05	32.25	B	21.31	15.96	0.250	38'-3"	31.97							
	C	15.00	7.75	0.1875	51.79	22.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D						D	13.01	7.59	0.179	38'-9"	19.52							
155'-0	A	28.50	23.06	0.3125	38.89		A	28.50	21.57	0.250	49'-6"		4	36" x 36"	33.5"	2"	8	2.25"	90"
	B	24.00	18.14	0.1875	41.84	36.00	B	22.74	15.81	0.250	49'-6"	34.11							
	C	19.00	13.23	0.1875	41.21	28.50	C	16.88	12.30	0.250	32'-9"	25.32							
	D	14.00	7.93	0.1875	43.39	21.00	D	13.01	8.29	0.179	33'-9"	19.52							
160'-0	A	28.80	24.04	0.3125	34.01		A	28.50	21.57	0.250	49'-6"		4	36" x 36"	33.5"	2"	8	2.25"	90"
	B	25.00	18.63	0.1875	45.47	37.50	B	22.74	15.81	0.250	49'-6"	34.11							
	C	19.50	13.23	0.1875	44.78	29.25	C	16.88	12.30	0.250	32'-9"	25.32							
	D	14.00	7.53	0.1875	46.25	21.00	D	13.01	7.59	0.179	38'-9"	19.52							

GENERAL NOTES

1. High Mast pole shall meet the design requirements shown on the pole data schedule.
2. If any other pole shaft design is chosen, the pole shaft dimensions, thickness and maximum deflection calculations shall be submitted for review and approval. The base plate thickness, anchor bolt number, diameter and length shall remain the same as shown.
3. Maximum deflection allowed shall not be more than 10% of the pole height.
4. For Pole Heights greater than 160' up to 200' the Contractor shall submit a special design.

INDIANA DEPARTMENT OF TRANSPORTATION

HIGH MAST POLES

APRIL 2009

STANDARD DRAWING NO. E 807-LTPD-01

DESIGN STANDARDS ENGINEER

DESIGN STANDARDS ENGINEER DATE

CHIEF HIGHWAY ENGINEER DATE

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 920, BEGIN LINE 223, DELETE AND INSERT AS FOLLOWS:

1. High Mast Poles

The poles shall be ~~made of steel in accordance with ASTM A 871 (A 871M). The steel shall have a minimum yield strength of 59,500 psi (410 MPa)~~ *a low deflection tapered shaft having poly-sided or circular cross sections. The pole shaft cross section at the top shall be not less than 7.5 in. (190 mm) in diameter. The pole shaft sections shall be slip fitted and shall provide at least 1 in. (25 mm) radial clearance from all interior devices. The shaft cross section at the bottom shall not be greater than that which is compatible with the base plate bolt circle specified. The minimum wall thickness of the bottom portion of the tower shaft shall be 3 gauge (6.073mm).*

All tower shaft components shall be fabricated from high strength, low alloy, steel according to AASHTO M 270; ASTM A 595 (A 595M), Grade A or B; ASTM A 572 (A 572M), Grade 55; ASTM A 1011 (A 1011M); ASTM A 606 (A 606M), or ASTM A 808 (A 808M) with a minimum yield strength of 50,000 psi (345,000 kPa).

After fabrication the pole shall be thoroughly cleaned and galvanized. Each tower shaft shall be constructed of not more than the following slip fitted sections.

Tower Height In feet	*Maximum Number of Sections*
130, 140, 150, 160	*4*
90, 100, 110, 120	*3*
80	*2*

Sections which are slip fitted shall have slip joints with a minimum overlap of 1.5 times the diameter of the bottom of the upper section at the slip joint. Towers having slip joint construction shall be prefitted and match marked at the factory and shall be shipped disassembled for assembly at the job site. Slip joints shall be marked to ensure the 1.5 times diameter insertion is provided.

All steel used in the base plate and shaft shall meet an impact property of 15 ft·lbs (20.3 J) at 40°F (4.5°C) in the longitudinal direction using the Charpy V-Notch test. This shall be an average of 3 tests per mill heat with no test below 10 ft·lbs (13.6 J). A copy of the certified mill test reports for this steel and the Charpy V-Notch test results shall be submitted. Sufficient information shall be furnished to demonstrate that this material is traceable to the mill heat number shown on the test report.

~~The tapered pole shall be multi-sided or circular in shape. The pole shaft sections shall be welded together or slipfitted. The minimum diameter of the pole top shall be 7.5 in.(190 mm) and shall provide at least 1 in. (25 mm) radial clearance from all interior devices.~~

~~The exterior of the pole shall be thoroughly shotblasted or otherwise cleaned to a near white finish to remove all oily and foreign matter. The interior of the pole shall be cleaned of all mill scale and foreign matter by a pickling process or shotblasting.~~

SECTION 920, CONTINUED.

All tower shaft ~~H~~hardware, *such as ground lugs, hardware for the handhole door and the latch mechanism,* shall be stainless steel in accordance with ASTM A 276, type 304 or 305, except where otherwise specified.

~~For the slipfit design, the pole shall be made up of not more than four sections for poles up to and including 120 ft (36.6 m) in length. For the poles between 120 ft (36.6 m) and 150 ft (45.7 m), five sections will be permitted. For poles over 150 ft (45.7 m) and up to 200 ft (61 m), six sections will be permitted. The inside edge of the lower section of the slip joint shall be beveled to prevent the transition joint assembly from catching on the edge. Slip joints shall have a minimum overlap of 1 1/2 times the diameter of the bottom of the upper section. The sections shall be pre-fitted and matchmarked at the factory.~~

All connection details shall be designed and detailed such that the fatigue design loads are less than the fatigue thresholds limitations specified in the current edition of the AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Galvanized Steel Towers shall be hot dip galvanized according to AASHTO M 232. The hand hole, handhole door, base plate, mounting plate and all other elements welded to the shaft shall be hot-dip galvanized according to AASHTO M 111.

Material that will be hot dip galvanized shall be properly prepared and fluxed prior to immersion in the zinc bath in order to ensure a uniform, uncontaminated and adherent coating. All organic contaminants such as dirt, paint, markings, greases and oil shall be removed using a caustic cleaner prior to pickling. All scale and rust shall be removed by pickling.

2. Welding

The Contractor shall submit the manufacturer's welding procedure to the Engineer for approval prior to fabrication. The welding symbols and complete information regarding location, type, size, welding sequence, and welding procedure specifications shall be shown on all shop drawings.

Welds shall be smooth and thoroughly cleaned of flux and spatter in accordance with AWS procedure. Minimum preheats for welds shall be 100°F (65°C) for seams, and 225°F (110°C) for circumferential welds.

All welds shall be performed at the factory. Circumferential welds shall be backed-up welds with 100% penetration. Longitudinal welds shall have a minimum of 60% penetration except within 2 ft (0.6 m) of either side of the circumferential joint, the welds shall be backed-up and of 100% penetration. Base plate welds shall be 100% penetration. Circumferential welds and 100% penetration longitudinal welds shall be 100% ultrasonically inspected. The 60% penetration longitudinal welds shall be 100% ultrasonically or radiographically inspected for soundness. Welding shall be performed in

REVISION TO 2010 STANDARD SPECIFICATIONS

SECTION 920, CONTINUED.

accordance with *AWS D1.5 and* 711.32. *Weld filler shall provide Charpy V Notch equal to or greater than 20 ft·lbs (27.1 J) at 0°F (-17.77°C).*

a. Inspection

The manufacturer shall provide quality control inspection. The inspector shall be an AWS Certified Welding Inspector, CWI, in accordance with AWS D1.5. The NDT inspector shall be an independent non destructive testing inspector, certified as level II in RT, UT, or MT as applicable. Copies of the inspection reports and NDT reports shall be provided to the Engineer.

The method for testing full penetration and partial penetration welds by the independent welding inspector shall be same as specified above.

Other sections containing specific cross references:

Recurring Special Provisions affected:

Standard Sheets affected:

Proposed 807-LTPD-01

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N___
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N___
By - Addition or Revision

Withdrawn _x_

Received FHWA Approval? ____

REVISED RECURRING SPECIAL PROVISION

620-R-483 SOUND BARRIER SYSTEMS

620-R-483 SOUND BARRIER SYSTEMS

(Revised 04-23-09)

The Standard Specifications are revised as follows:

SECTION 620, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 620 – ~~BLANK~~ *SOUND BARRIER SYSTEMS*

620.01 Description

This work shall consist of furnishing materials and placement of a sound barrier system and a coping in accordance with 105.03.

620.02 General Design Requirements

The sound barrier system shall be either wall mounted, bridge mounted or ground mounted, and shall consist of wall attachments or post foundations, vertical support posts, and sound barrier panels. For the purposes of this section, "panel" is defined as the reflective or absorptive component mounted between the posts, piers or columns.

All appurtenances behind, in front of, under, over, mounted upon, or passing through the wall, including drainage structures, fire hydrant access openings, highway signage, emergency access openings, utilities or other appurtenances shown on the plans, shall be accounted for in the design of the sound barrier system.

If the sound barrier manufacturer needs additional information to complete the design, the Contractor shall be responsible for obtaining such information. The Contractor shall be responsible for field verifying wall locations in areas of all existing traffic poles, utility poles, roadway lighting poles, drainage pipes, underdrain outlets, and bridge expansion joints and all other locations where the sound barrier system may conflict with existing conditions. The wall shall be realigned and designed to box out openings where conflicts occur with existing light poles and traffic control devices. The Contractor shall establish and account for the existing locations of all underdrain outlets, drainage pipes, and bridge expansion joints in the final wall plans. If the Contractor discovers that overhead utilities will be within 6 ft (2 m) of the sound barrier, the Contractor shall notify the Engineer in accordance with 104.02 and 105.16.

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The sound barrier wall design shall follow the general dimensions of the wall envelope as shown on the plans. The top of the sound barrier shall be at or above the acoustical profile line shown, unless noted. Changes in elevation shall be accomplished by stepping the sound barrier sections at the vertical support posts. Steps shall not exceed 3 ft (1 m) vertically unless otherwise specified in the plans. Barrier heights shall be selected in groups of no fewer than three successive panels, except where barriers are to be stepped down for barrier termination. The ends of the sound barrier shall be tapered or stepped down to a height of 8 ft (2.6 m) within the sound barrier end transitions or as shown on the plans. The bottom of ground mounted sound barrier shall be embedded a minimum of 6 in. (150 mm) into the ground. The bottom of wall mounted or bridge mounted sound barrier shall follow within 3 in. (75 mm) a profile 6 in. (150 mm) below the top of the existing concrete barrier railing or wall.

Caisson footings, vertical support posts, and connections for ground mounted sound barrier shall be designed as specified by the manufacturer, with minimum post spacing of 15 feet (5 m). Exceptions will be allowed due to site-specific conditions such as access doors, drainage requirements or utility accommodations. These shall be reviewed and approved through the shop drawing process. The foundation design shall use the COM 624P or LPILE Program. The foundation design shall be based on the soil model shown on the plans based on cyclic loading and shall consider the effects of a sloping ground surface. The post deflection shall be limited to L/100, measured from the top of the caisson to the top of the wall. The foundation depth shall not be less than 7.5 ft (2.2 m) and shall not exceed the depth of the soil model except where the Contractor elects to drill deeper borings to extend the model. The foundation diameter shall not be less than 18 in. (450 mm) and shall not be less than 6 in. (150 mm) larger than the diagonal dimension of the post being used. The foundation shall be designed by the sound barrier manufacturer. Vertical support posts shall be attached to caisson footings by means of anchor bolts, or embedded wide flange steel posts.

A sound barrier system shall be selected for the type specified from those which are on the Department's list of approved Sound Barrier Systems. The materials used in the fabrication of the sound barrier system shall be the same as those used for approval of the sound barrier system.

The structural design of the sound barrier system shall be in accordance with the AASHTO Guide Specifications for Structural Design of Sound Barriers, except as otherwise directed. The sound barrier system shall be designed to withstand wind pressure as shown on the plans, as applied perpendicular to the barrier, in each direction.

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The post spacing for sound barriers mounted on any structure or safety barrier shall be limited to a distance that does not overstress the existing structure or safety barrier. The spacing shall also be limited to a distance that allows the sound barrier to conform to the existing horizontal and vertical alignments. The allowable loads on a structure or barrier will be shown on the plans. If no allowable loads are shown, the Contractor shall contact the project designer for this information.

When sound barriers are to be installed on a bridge structure, design calculations shall be submitted to the Engineer that demonstrate structure loading limits, as shown in the plans, will not be exceeded. ~~Masonry block systems for bridge mounting must be approved by the Department.~~

All materials shall have a minimum predicted maintenance free structural and acoustical lifespan of 20 years. All colorings and coatings shall have a minimum predicted maintenance free lifespan of 10 years.

The types of acoustic sound barrier systems that are accepted are as follows:

Type 1, single sided absorptive, sound barrier systems and their components shall be designed to achieve a sound transmission loss equal to or greater than 20 decibels at all frequencies when tested in accordance with ASTM E 90. Type 1 sound barrier systems shall be designed to have a minimum noise reduction coefficient of ~~0.80~~ 0.70 on the roadway side. Type 1 sound barrier systems shall be tested in accordance with ASTM C 423. Material samples for this test shall be provided with the coating applied, so as to determine that the color coating does not inhibit the acoustic performance. The sample shall be mounted in accordance with ASTM E 795, type A.

Type 2, double sided absorptive, sound barrier systems and their components shall be designed to achieve a sound transmission loss equal to or greater than 20 decibels at all frequencies when tested in accordance with ASTM E 90. Type 2 sound barrier systems shall be designed to have a minimum noise reduction coefficient of ~~0.80~~ 0.70 on the roadway ~~side,~~ and ~~a minimum noise reduction coefficient of 0.70 on the~~ non-roadway sides. Type 2 sound barrier systems shall be tested in accordance with ASTM C 423. To determine that the color coating does not inhibit the acoustic performance, material samples for this test shall be provided with the coating applied. The sample shall be mounted in accordance with ASTM E 795, type A.

Type 3, reflective, sound barrier systems and their components shall be designed to achieve a sound transmission loss equal to or greater than 20 decibels at all frequencies when tested in accordance with ASTM E 90.

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A type 2 barrier system may be substituted for a type 1 barrier system at the Contractor's discretion. A type 1 or a type 2 barrier system may be substituted, with written approval, for a type 3 barrier system. ~~Masonry block sound barrier systems shall not be mounted on a bridge structure.~~

All molded finishes shall have a 1.0 in. (25 mm) minimum relief. All rolled finishes shall have a minimum 0.75 in. (19 mm) relief. Relief is defined by material that is provided in excess of the minimum wall thickness required to meet the Noise Reduction Coefficient required for the absorptive surfaces. Fluted finishes shall be coped at each end to avoid cracking. ~~Each wall shall have the selected finish used throughout the wall on the roadway and non-roadway sides~~.

Corrugations, ribs, or battens on sound barrier panels shall be oriented vertically when erected. The sound barrier shall be designed to prevent entrapment and ponding of water. The sound barrier shall not be designed with openings promoting the perching or nesting of birds, or the collection of dirt, debris, or water. The sound barrier shall not be designed with hand holds or grips promoting scaling or climbing of the system.

Fire hydrant access points shall be designed with additional reinforcement or bracing and protective coating around the opening as necessary to maintain structural integrity.

Closure plates shall be provided where new sound barrier is constructed adjacent to existing sound barrier. Where bridge mounted walls cross over expansion joints, expansion closure plates shall be used. The wall manufacturer shall provide expansion closure plates for each expansion joint unless directed otherwise. The minimum thickness of closure plates shall be 0.1875 in. (4.5 mm).

The calculations for sound barriers which also retain earth must show that the walls are adequate for earth retention. The earth retention areas shall be shown on the plans. The exposed face of the sound barrier earth retaining panel will match the adjacent panel's color and texture.

(a) Precast Panel Design Criteria

Base-plated or embedded reinforced precast concrete posts may be substituted for wide flanged steel posts with the approval of the Department. Proposed substitutions for wide flanged steel posts shall be shown on shop drawings submitted for approval.

Support posts must match the adjoining wall in color unless directed by the Engineer. Embedded reinforced precast concrete posts must also match the adjoining wall in texture. Sound barrier systems utilizing stacked panels shall have ship-lapped or tongue and groove horizontal joints or other approved design which blocks the passage of light.

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(b) Masonry Design Criteria

Reinforced masonry vertical support posts shall be faced to match the adjoining wall in color and texture unless directed by the Engineer.

Steel support posts shall match the adjoining wall in color unless directed by the Engineer.

620.03 Submittals

The Contractor shall submit a minimum of three alternative textured finishes for the wall to the Engineer. These shall include the following colors:

(a) light grey (federal standard color #~~–~~36492),
(b) light brown (federal standard color #~~–~~30450),
(c) light tan (federal standard color #~~–~~37769),

The colors ~~shall~~ will be presented to the public for their input in accordance with 620.05. The final wall pattern and color ~~shall~~ will be approved before production of the wall panels may begin.

The Contractor shall submit one copy of the design calculations for approval. If the calculations are computer generated, one sample set of hand calculations, for one wall location shall also be submitted. Calculations for sound barriers on bridge structures shall include an analysis of the bridge structure that demonstrates the additional loads imposed by the sound barrier, including dead load and wind load, will not exceed the structural capacity of the bridge. The Contractor shall submit four sets of design drawings for approval after design calculations are approved and before beginning wall construction operations. Design calculations and design drawings shall be signed and sealed by a professional engineer. Design calculations and drawings shall meet the following minimum requirements:

(a) Design calculations shall include all structural design calculations and vertical support post design calculations.

(b) Design calculations for bridge mounted installations shall include the design unit weight and mass of the sound barrier and support systems.

(c) Design calculations for bridge mounted installations shall demonstrate that the structural loading limits of the structure, as shown in the plans, will not be exceeded.

(d) Design drawings shall include all details, dimensions, quantities and cross sections necessary to construct the sound barrier systems and shall include, but not be limited to the following:

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1. *A plan and elevation sheet or sheets for each sound barrier systems location.*

2. *An elevation view of the sound barrier systems which shall include the elevation at the top of the wall at all horizontal and vertical break points at least every 50 ft (15 m) along the face of the wall.*

3. *A plan view of the wall that indicates the offsets from the construction centerline to the face of the wall at all changes in horizontal alignment. A plan view and elevation view which detail the placing position.*

4. *A typical cross section or cross sections showing elevation relationship between ground conditions and the sound barrier systems locations.*

5. *All general notes required for constructing the wall.*

6. *Each sheet shall show the complete project identification number.*

7. *All horizontal and vertical curve data affecting the wall.*

8. *A listing of the summary of quantities on the elevation sheet for each wall.*

9. *A list of manufacturer's recommendations with respect to maintenance, including repair of graffiti and other damages.*

10. *Typical sections and elevation views for bridge mounted installations.*

(e) Design drawings shall include a detailed plan of aesthetic treatment for the entire sound barrier system, manufacture recommended installation requirements and sequence of construction, manufacturer recommended repair requirements for damage caused by vandalism or graffiti prior to final acceptance, and a detailed bill of materials.

MATERIALS

620.04 Materials

Materials shall be in accordance with the following:

Cast-in Place Portland Cement Concrete, Class A 702
Coarse Aggregate, Class D or Higher, Size No. 5.....904
Coarse Aggregate, Class D or Higher, Size No. 8.....904
Coarse Aggregate, Class A or Higher, Size No. 91 904

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Fine Aggregate, Size No. 23.....904
Paint.....909.02
Portland Cement.....901.01(b)
Precast Portland Cement Concrete.....707
Reinforcing Steel.....910.01
Structural Aluminum Posts.....910.14(d)
Structural Steel.....910
Water.....913.01
Concrete Masonry Units.....905.06
Joint Mortar.....901.08, 906.03

Steel structural components shall be in accordance with ASTM A 36. Structural steel components shall be hot dipped galvanized in accordance with ASTM A 123, coating grade 100 or painted in accordance with 619.11 and 619.12. Exposed surfaces of galvanized components shall be coated in accordance with 619.09(b). The galvanized surfaces shall be prepared using a light brush-off blast cleaning in accordance with SSPC SP7/NACE No. 4. The surface profile shall be 15 to 30 microns in accordance with ASTM D 4417, prior to painting.

All structural steel hardware shall be in accordance with ASTM A 325 and shall be hot dipped galvanized in accordance with ASTM A 153 or shall be made of nonferrous material or stainless steel. All other non-structural fastening devices shall be made of nonferrous metal or stainless steel. Plastic members shall be connected with either screws or bolts. Aluminum members shall be connected with stainless steel fasteners. Anchor bolts shall be of the size shown with a minimum of 10 in. (250 mm) of 7NC threads on the upper end. Anchor bolts shall be in accordance with ASTM F 1554. The threads, nuts, and washers shall be galvanized in accordance with ASTM A 153 or be mechanically galvanized and conform to the coating thickness, adherence, and quality requirements of ASTM A 153, where required.

~~*Filler Material used to increase sound absorption shall be manufactured in accordance with ASTM C 612. Mineral wool shall have a minimum density of 6 lb/ft^3 (96 kg/m^3), shall absorb less than 1% of water when tested in accordance with ASTM C 553, and shall be noncorrosive and nonhygroscopic. The filler material shall be fastened to the sound barrier system so as to prevent sagging when in a saturated condition. Test reports shall be submitted from an appropriate independent agency verifying that the filler material does not sag if separated after saturation and draining of the sound barrier system when in service, and that the acoustic qualities of the material are in accordance with the requirements herein after completion of testing.*~~

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Solid Portland cement concrete or composite concrete shall be coated or contain an integral pigment, as specified by the manufacturer, and shall meet the specified color requirements. Integral pigment shall be certified to be in accordance with ASTM C 979. The coating shall be tested for accelerated weathering in accordance with ASTM D 6695. The test panel substrate shall be of the same Portland cement concrete or composite concrete material used in the sound barrier system component. Cured coating or integral pigment shall not contain heavy metals that exceed the requirements of 40 CFR 261.24.

Concrete class A for the coping shall be in accordance with the applicable requirements of 702, except the coarse aggregate for pre-cast units may be Size No. 91 in accordance with 904. Reinforcing steel in the coping shall be in accordance with the applicable requirements of 703. The coping may be precast or cast-in-place.

Masonry block shall be tested in accordance with ASTM C 90 and as follows:

(a) The average compressive strength of three units shall be a minimum of 3000 psi (21 MPa) with no single unit being less than 2700 psi (19 MPa).

(b) The units shall be tested for water absorption in accordance with ASTM C 140. The maximum absorption shall be 7%.

(c) Joint reinforcement for masonry block systems shall be in accordance with ASTM A 951.

(d) Mortar for masonry block systems shall be in accordance with ASTM C 270; type S, Table 1 proportion requirements.

(e) Portland cement-lime or mortar cement may be used. Masonry cement shall not be used. Grout for masonry shall be in accordance with ASTM C 476.

(f) Aggregate for masonry grout shall be in accordance with ASTM C 404.

Masonry blocks shall be coated or contain an integral pigment, as specified by the manufacturer, and shall meet the specified color requirements. The integral pigment shall be certified to be in accordance with ASTM C 979. The coating ~~or integral pigment~~ shall be tested for Accelerated Weathering in accordance with ASTM D 6695. The test panel substrate shall be of the same masonry blocks used in the sound barrier system component. Cured coating or integral pigment shall not contain heavy metals that exceed the requirements of 40 CFR 261.24.

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Certifications shall be provided for each of the materials to be supplied for the sound barrier system. Certifications shall be in accordance with a type C in accordance with 916, unless noted otherwise. A type A certification in accordance with 916 shall be provided for compressive strength and absorption test values for masonry block, sampled and tested in accordance with ASTM C 140. All test reports required to substantiate compliance shall be in accordance with the test method/material requirements cited herein. A Department approved laboratory shall conduct the testing.

CONSTRUCTION

620.05 ~~Public~~ Information for Public Input ~~Meeting~~

~~The Contractor is responsible for planning and holding a public meeting to display and discuss the recommended sound barrier wall finishes and colors with the public. The meeting shall be arranged for in a locally available facility in or near the affected areas of the barrier walls at convenient times for the affected areas to review. The Contractor and the wall manufacturer shall be present at the meetings along with representatives from the Department.~~

~~The Contractor shall coordinate all meeting activities with the Department's hearings manager. The hearings manager will make all local media contacts two weeks prior to the meeting. The Contractor shall also notify the adjacent property owners and businesses, neighborhood associations, and local planning agencies two weeks prior to the meeting.~~ ~~The use of~~ Colored flyers with appropriate graphics shall be developed by the Contractor and ~~coordinated with the hearings manager prior to distribution~~ furnished to the Department.

Wall color~~s~~ photos shall be ~~presented~~ submitted for each color in accordance with 620.03 along with photos of each available texture alternative. A minimum of three wall samples of ~~both~~ the ~~roadway side and~~ non-roadway side textures shall be presented. All samples of the wall textures shall be a minimum of 3 square feet ~~sq ft~~ (0.27 square meters ~~m~~^{2}) in area, with a clearly distinguishable pattern.

Based on comments received ~~during the meeting~~, the Department will select the final finishes and colors for each wall. Each wall shall have the selected color used throughout the entire wall on the roadway and the non-roadway sides. The Contractor shall coordinate all sound barrier wall issues with the Engineer prior to ordering any materials.

620.06 Construction Requirements

Sound barrier components shall not be stored on the right-of-way unless written permission is given by the Department. Requests for permission to store materials on the right-of-way will not be accepted until after the contract has been awarded.

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620-R-483 SOUND BARRIER SYSTEMS, CONTINUED.

The sound barrier supplier shall provide technical instruction, guidance in preconstruction activities including the preconstruction conference, and on-site technical assistance during construction. The Contractor is responsible for following installing instructions from the supplier unless otherwise directed in writing by the Engineer.

Clearing and grading shall be in accordance with 201 and 202 as required.

The foundations for ground mounted sound barrier systems shall be constructed as shown on the shop drawings. Holes for footings shall be drained of free water prior to installing any components. Placing concrete shall be in accordance with 702.

The integrity of the sound barrier system continuity shall be such that no will be visible through any vertical joint between sound barrier panel and vertical support post, through any horizontal joint between sound barrier panels, between the bottom of any ground mounted sound barrier and the adjacent ground, or between the bottom of any wall mounted sound barrier and the top of the adjacent wall. Exceptions may be allowed as necessary for drainage as indicated on the plans.

Sound barrier wall posts shall be placed vertical with a tolerance of 1/2 in. per 10 ft (13 mm per 3 m) on each axis. Sound barrier wall posts shall be placed at the distance indicated on the plans with a tolerance of 1 in. (25 mm) from centerline to centerline. Sound barrier wall posts shall be aligned to within 1 in. (25 mm) when measured from a straight line from the two adjacent posts. Sound barrier wall posts shall be at the height as shown on the plans. The posts shall project above the top sound barrier wall panel by 1.5 in. ± 0.5 in. (37 mm ± 13 mm). The top of the sound barrier wall shall be at or above the acoustical profile. Steel posts embedded in concrete shall have bottom cover of 8 in. ± 4 in. (200 mm ± 100 mm). Field cut steel posts shall be primed with an organic zinc primer and painted in accordance with 619.

After post erection the area shall be backfilled to within 6 in. (150 mm) of the required final grade or as specified in the plans. The aggregate pad shall be placed as required. Positive drainage of the work area shall be maintained.

An aggregate pad of No. 5 or No. 8 coarse aggregate shall be included that extends 4 in. (100 mm) outside of each side of the panel and 4 in. (100 mm) below the bottom of the panel.

The sound barrier system and sound barrier system components shall be maintained until final acceptance. Elements of the sound barrier system that are damaged or destroyed, including due to graffiti or other vandalism, shall be repaired or replaced as directed by the Engineer. Repairs and repainting shall be conducted in accordance with the manufacturer's guidance and 620.02.

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After construction of the sound barrier system the site shall be restored to the original condition with grading, seeding and sodding in accordance with the plans.

(a) Construction Requirements for Precast Panels

Sound barrier wall panels shall be placed in accordance with the plans and centered between adjacent posts. The sound barrier wall panels shall be of sufficient length to span the entire length between posts less 1/2 the width of the smallest retaining flange.

Panels may be field cut to facilitate erection in accordance with the manufacturer's recommendation. Field cut panels shall be cut to have the least impact on any patterns present in the textured or colored finish. Field cut panels or other field cut components shall be painted in accordance with the manufacturer's guidance.

(b) Construction Requirements for Masonry

All grouting and reinforcing work for masonry block systems shall be performed by masonry craftworkers holding current International Masonry Institute (IMI) Grouting and Reinforcing Certification. Proof of certification shall be submitted prior to the beginning of work.

620.07 Acceptance

The Contractor shall submit 2 ft x 2 ft (0.6 m x 0.6 m) sound barrier panel samples or 5 masonry block units in the colors and textures proposed and a 2 ft (0.6 m) sample of painted support post, prior to the approval of the shop plans. Once approved, these samples will be used as a control sample to verify delivered products meet the aesthetic requirements. The sound barrier system will be accepted for color based on a visual comparison between the control sample and the color of the wall as constructed in place.

The sound barrier system will be accepted for quality based on a visual inspection of the components of the system by the Engineer. The sound barrier system shall be subject to rejection due to failure to be in accordance with the requirements specified herein. In addition, the following defects may also be sufficient cause for rejection.

(a) Defects that indicate imperfect fabrication

(b) Defects in physical appearance such as cracks, checks, dents, scrapes, chips, stains, or color variations.

The Engineer will determine whether defective sound barrier shall be repaired or shall be cause for rejection. Repair, if permitted, shall be completed by the Contractor and will be approved by the Engineer.

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~~***(a) Precast Panels***~~

~~*For precast wall panels, one verification sample will be required for each type of sound barrier system. The sample will be cut from a delivered panel and will be of sufficient size to provide for testing of sound absorption requirements in accordance with ASTM C 423 and for salt scaling resistance in accordance with ASTM C 672 and Item 13 of the Obtaining Approval Section of the Sound Barrier Systems Source Approval Criteria. The verification sample will be randomly selected for testing by the Engineer in accordance with ITM 802. Certification of the sample shall be provided in accordance with 620.04. A testing laboratory independent from the manufacturer, supplier, and the Contractor shall perform testing. This independent testing laboratory shall arrange for shipping and testing without the aid of the Contractor. The independent testing laboratory shall submit the test results to the Engineer, with a copy to the Contractor, upon completion. Failed materials will be adjudicated as a failed material in accordance with normal Department practice in accordance with 105.03.*~~

~~***(b) Masonry***~~

~~*For masonry blocks delivered to the site, one verification sample per contract, per source, will be required for testing freeze thaw durability in accordance with ASTM C 1262 Item 14 in the Obtaining Approval Section of the Sound Barrier Systems Source Approval Criteria. The verification sample will be randomly selected for testing by the Engineer in accordance with ITM 802. A testing laboratory independent from the manufacturer, supplier, and the Contractor shall perform testing. This independent testing laboratory shall arrange for shipping and testing without the aid of the Contractor. The independent testing laboratory shall submit the test results to the Engineer, with a copy to the Contractor, upon completion. Failed materials will be adjudicated as a failed material in accordance with normal Department practice in accordance with 105.03.*~~

620.08 Method of Measurement

Sound barrier panels and sound barrier erection will be measured by the square foot (square meter) of wall surface area. The pay quantity will be based on the limits of the sound barrier envelope as shown on the plans. The vertical and horizontal distance for each section of the wall defines the sound barrier envelope. The vertical distance extends from the elevation at the bottom of the lowest panel to the elevation of the acoustic profile for each section of the wall. The horizontal distance extends from centerline to centerline of adjacent posts for each section of wall. Coping will not be measured.

620.09 Basis of Payment

Wall mounted sound barrier panels, bridge mounted sound barrier panels, ground mounted sound barrier panels, wall mounted sound barrier erection, bridge mounted sound barrier erection, and ground mounted sound barrier erection will be paid for at the contract unit price per square foot (square meter).

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The Department may choose to acquire additional precast sound wall panels or masonry blocks in the colors and patterns selected on the project. A maximum of twelve panels of each type would be paid for at the invoice cost of the panels and shall be delivered to the District Office. If the Department elects to acquire additional precast sound wall panels or masonry blocks, the Contractor shall provide the material as extra work in accordance with 104.03.

Partial payment will be made for sound barrier panels stockpiled on the project site or at the Contractor's approved storage location within the State of Indiana. Partial payment will be based on the delivered cost of the sound barrier panels, as verified by invoices that includes freight charges. The Contractor shall furnish the invoices and all required certifications. Partial payment will not exceed 75% of the contract unit price for bridge mounted, ground mounted or wall mounted sound barrier panels. Prior to authorizing the partial payment, verification will be obtained that all required inspection has been made and that the panels are acceptable.

Payment for all costs associated with the collection of all information not shown on the plans, revisions due to conflicts, sound barrier system details, all additions or incidentals necessary to provide complete plans, any redesigning of plans or details, the public information meetings and public information planning and presentations will be paid for at the contract lump sum price for sound barrier design and layout.

Payment will be made under:

Pay Item	***Pay Unit Symbol***
Sound Barrier Design and Layout	*LS*
Sound Barrier Erection, _____ (mounting type,), _____ (type**)*	*SFT (m2)*
Sound Barrier Panels, _____ (mounting type,), _____ (type**)*	*SFT (m2)*

* *Type of sound barrier system: (BM) bridge mounted, (GM) ground mounted, (WM) wall mounted*
** *Type 1, 2, or 3.*

The cost of sound barrier panel materials including vertical support posts, coping, aggregate pad mortar, grout and joint reinforcement for masonry block, fasteners, closures, expansion plates, openings and incidentals shall be included in the cost of the sound barrier panels for the type of sound barrier panels.

Substituting type 2 wall for type 1 wall or substituting type 1 or type 2 wall for type 3 wall shall be at no cost to the Department.

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~~*The cost of services including the testing laboratory, delivery to the testing laboratory, certified testing personnel, and the testing and inspection of the sound barrier panels shall be included in the cost of sound barrier panels for the type of sound barrier panels.*~~

~~*The cost of sampling, shipping and testing of verification samples shall be included in the cost of the sound barrier panels for the type of sound barrier panels.*~~

The cost of the selected texture and selected color shall be included in the cost of the sound barrier panel for the type of sound barrier panels.

The cost of all labor and materials to prepare and erect the sound barrier shall be included in the cost of sound barrier erection for the type of sound barrier panels.

The cost of foundation preparation and construction with associated work shall be included in the cost of sound barrier, ground mounted.

The cost of removal or construction of concrete barrier walls is not included in the cost of sound barrier erection, wall mounted.

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SOUND BARRIER SYSTEMS SOURCE APPROVAL CRITERIA

Obtaining Approval

The supplier requesting approval of a sound barrier system and inclusion on the Department's list of approved Sound Barrier Systems shall comply with the following.

1. *The supplier shall send a letter to the office of Materials Management requesting approval of the sound barrier system. The letter shall include supporting documents, all of which shall be bound, organized and include the following, as applicable:*

   (a) a letter requesting approval of sound barrier system
   (b) list of sound barrier system installations
   (c) inspection report of sound barrier system
   (d) list of all materials, specification and manufacturer
   (e) test report of sound transmission loss
   (f) test report of sound absorption average~~, roadway side~~
   ~~(g) test report of sound absorption average, non-roadway side~~
   (~~h~~ g) test report for accelerated weathering
   (~~i~~ h) test report for flame index
   (~~j~~ i)test report concrete resistance to scaling
   ~~(k) test report steel resistance to corrosion~~
   ~~(l) test report for filler material~~

2. *The supplier shall ensure that all tests were performed within two years from the date of submission.*

3. *The supplier shall ensure that all tests were performed on samples selected from a production run of the product.*

4. *The supplier shall ensure that all tests were performed in an accredited independent testing laboratory. Each test report shall be accompanied with proof of accreditation.*

5. *The supplier shall provide evidence of prior construction of a sound wall system of the type to be approved; including location, date, and purchaser. The Department will consider new systems on an individual basis and may request additional test reports or other information to evaluate the predicted performance of the system and its materials.*

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6. *The supplier shall submit an inspection report detailing the condition of a sound barrier system of the type to be approved. The inspection report shall identify the location and type of the sound wall system, and provide comments on the structural integrity of each component and the condition of any surface coatings. The inspection report shall be prepared and signed by a registered professional engineer independent from the supplier. The field location of the sound barrier system shall be in an area with a climate similar to Indiana. The sound barrier system shall have been subjected to at least two winters of exposure.*

7. *The supplier shall submit a list of all materials used in the manufacture and construction of the type of sound barrier system to be approved. The list shall include the material specification which each material component meets, and the name of the manufacturer of each material component.*

8. *The supplier shall submit a test report that shows the sound barrier system has a sound transmission loss of 20 dbl or greater for each frequency in accordance with ASTM E 90.*

9. *For absorptive wall systems type 1 and 2 the supplier shall submit a test report that shows the sound barrier system has a sound absorption average of ~~0.80~~0.70 or greater ~~on the roadway side~~ in accordance with ASTM C 423 with specimens mounted in accordance with ASTM E 795, type A.*

~~*10. For absorptive wall systems type 2 the supplier shall submit a test report that shows the sound barrier system has a sound absorption average of 0.70 or greater on the non-roadway side in accordance with ASTM C 423 with specimens mounted in accordance with ASTM E 795, type A.*~~

~~*11*~~*10. The supplier shall submit a test report that shows the sound barrier system complies with the accelerated weathering requirements listed below when tested in accordance with ASTM D 6695 cycle 1. Four specimens shall be used in the test, one as a reference, one to be removed from the test and evaluated at 800, 1600 and 2400 hours. The color of the specimens shall be light tan, light brown, or light grey. The test report shall include a color photo of each specimen at the time of evaluation. The sample must show:*

REVISED RECURRING SPECIAL PROVISION

620-R-483 SOUND BARRIER SYSTEMS, CONTINUED.

(a) no checking in accordance with ASTM D 660
(b) no blistering in accordance with ASTM D 714
(c) no loss of adhesion in accordance with ASTM D 3359
(d) chalking of 7 or greater in accordance with ASTM D 4214, Method C
(e) color difference of 5 Δ NBS units or less as compared to the reference sample in accordance with ASTM D 2244

~~12~~11. The supplier shall submit a test report that shows the sound barrier system has a flame spread index of 15 or less at 10 minutes, a flame spread index of 25 or less at 30 minutes in accordance with ASTM E 84.

~~13~~12. For precast concrete panel systems, the supplier shall submit a test report that shows the concrete components of the sound barrier system have a mass loss 0.2 lb/1.0 ft^2 (91 g/0.0929 m^2) or less in accordance with ASTM C 672 and as follows. The specimens shall be from different production runs and shall have a testable surface area of 1.00 ft^2 (0.0929 m^2) or more. The specimens shall be sealed around the edges to retain the salt solution to a depth of at least 1/8 in. (6 mm) over the entire surface. Before the start of the test each specimen shall be brushed clean. After each five cycles of the test all salt solution and all rinse water from each specimen shall be collected. After each five cycles the surface of each specimen shall be thoroughly rinsed to remove all loose particles. The collected liquid shall be filtered and all particles removed. The retained particles shall be dried to a constant mass and the mass determined to the nearest 0.01 lb (1 g). The test report shall indicate the mass of particles after each five cycles and the total mass after 50 cycles for each specimen. The report shall include a color photo of each specimen before and after the test.

~~14~~13. For masonry block systems, the supplier shall submit a test report that shows the concrete masonry units have a mass loss of one percent material or less in accordance with ASTM C 1262 and as follows. The specimens shall be subjected to 100 cycles of freezing and thawing in a water test solution.

REVISED RECURRING SPECIAL PROVISION

620-R-483 SOUND BARRIER SYSTEMS, CONTINUED.

~~*15. The supplier shall submit a test report that shows the steel components of the sound barrier system comply with the following corrosion requirements when tested in accordance with ASTM D 1654 and salt spray exposure in accordance with ASTM B 117. Four pairs of specimens shall be used in the test, one pair as a reference, one pair to be removed from the test and evaluated at 800, 1600 and 2400 hours. One specimen from each pair shall be scribed and one specimen shall be un-scribed. Scribed specimens shall be evaluated in accordance with procedure A, method 1. Un-scribed specimens shall be evaluated in accordance with procedure B and D. A color photo of each specimen at the time of evaluation shall be provided. The test results must show:*~~

~~*(a) corrosion rating shall not be less than 10*~~
~~*(b) no checking in accordance with ASTM D 660*~~
~~*(c) no blistering in accordance with ASTM D 714*~~
~~*(d) no loss of adhesion in accordance with ASTM D 3359*~~
~~*(e) no other defects in accordance with the above methods*~~

~~*16*~~14. *The supplier shall submit an inspection* ~~*test*~~ *report that shows the filler material for sound barrier system in a dry and saturated state does not sag, separate, delaminate, deform or otherwise create voids that allow sound to penetrate the component.*

Maintaining Approved List

1. *The supplier shall manage the continued approval of their sound barrier system.*

2. *The supplier shall notify the Department of changes in material components.*

3. *The supplier shall ensure that all documents and test reports for their sound barrier system are current.*

4. *Sound barrier systems that have records at the office of Materials Management in compliance with this procedure will be maintained on the Department's list of approved Sound Barrier Systems.*

Removal from Approved List

1. *The office of Materials Management is responsible for removing sound barrier systems from the approved list.*

~~*2. Sound barrier systems that are not in compliance with this procedure will be removed from the approved list.*~~

REVISED RECURRING SPECIAL PROVISION

620-R-483 SOUND BARRIER SYSTEMS, CONTINUED.

~~2~~3. Sound barrier systems that exhibit poor field performance as determined by the office of Materials Management will be removed from the approved list in accordance with Department procedures.

DISCUSSION: Mr. Miller explained that purpose of this revision was to allow increased competition and reduce the cost of sound barrier systems.

Concern was expressed over the durability of masonry walls, especially on structures.

Mr. Miller explained that there are reinforced masonry systems which are more durable than a typical masonry wall.

The Committee discussed approval of sound wall systems.

The Committee discussed incorporating the Sound Systems Source Approval Criteria portion of this RSP eventually into ITM 806. The next ITM Committee meeting will be July 10, 2009. ITM 806 can be revised to include the approval criteria before the September 2009 Letting Effective Date of the revised RSP 620-R-483.

Mr. Miller discussed future development of alternate bidding (absorptive/reflective barrier systems) to further encourage competition.

Other sections containing specific cross references:

Motion: Mr. Heustis
Second: Mr. Andrewski
Ayes: 10
Nays: 0

Action: Passed as revised

Recurring Special Provisions affected:

620-R-483

___ 2012 Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

_x_ Revise RSP (No. 620-R-483)
Effective Sept. 1, 2009 Letting
RSP Sunset Date: _____

Standard Sheets affected:

Standard Drawing Effective _____

___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N_x_
By - Addition or Revision

Frequency Manual Update Req'd? Y___ N_x_
By - Addition or Revision

Withdrawn ____

Received FHWA Approval? Yes

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Revised IDM PCCP Typical Section. Executive Office efforts to reduce Construction costs resulted in the generation of Pavement Cost Savings Proposition #08002.

PROPOSED SOLUTION: Revised Typical Section will save approximately $64,000.00 per mile of 4 lane divided highway. Savings will be realized by minimizing aggregate wedge at edge of shoulder and by eliminating compacted aggregate placed for the sole purpose of providing a construction platform for the paver tracks and replacing it with Subgrade Treatment Type IIIA.

APPLICABLE STANDARD SPECIFICATIONS: None

APPLICABLE STANDARD DRAWINGS: N/A

APPLICABLE DESIGN MANUAL SECTION: Figures 52-13F and 52-13P

APPLICABLE SECTION OF GIFE: Unknown

APPLICABLE RECURRING SPECIAL PROVISIONS: None

Submitted By: Dave Andrewski

Title: Manager, Office of Pavement Engineering

Organization: INDOT

Phone Number: 317-232-5452

Date: April 23, 2009

APPLICABLE SUB-COMMITTEE ENDORSEMENT?
This revision was completed with a small committee consisting of Pankaj Patel, Dave Andrewski, Tom Carrow, John Wright, Athar Khan, Tony Zander, Mike Byers, and John Crone.

Item No. 06 05/21/09 (2010 SS)
Mr. Andrewski
Date: 05/21/09

PROPOSED REVISION TO DESIGN MANUAL

Figure 52-13F PCCP Section with PCC Shoulder
Figure 52-13P PCCP with Underdrain

DISCUSSION: Mr. Byers of ACPA discussed some Industry concerns and issues pertaining to construction of the draft revised typical section.

The Committee discussed constructability issues.

Mr. Keefer expressed concern that minimizing the aggregate wedge at the edge of shoulder would promote maintenance problems and expense concerning erosion.

ACTIONS: Mr. Andrewski will make revisions and forward to Mr. Uremovich. Mr. Uremovich will incorporate revisions into the Design Manual and issue a Technical Advisory. The Committee decided to make the changes effective with the February 2010 letting.

Other sections containing specific cross references:

None

Recurring Special Provisions affected:

None

Standard Sheets affected:

None

Motion: Mr. Andrewski
Second: Mr. James
Ayes: 8
Nays: 2

Action: Passed as revised

___ 20__ Standard Specifications Book

___ Create RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

___ Revise RSP (No. _____)
Effective _____Letting
RSP Sunset Date: _____

Standard Drawing Effective _____

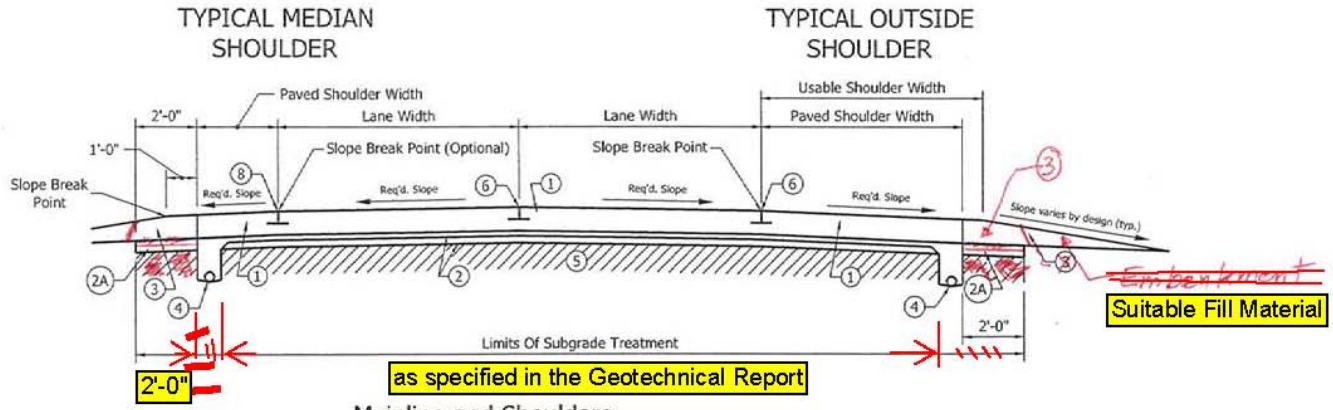
___ Create RPD (No. _____)
Effective _____Letting
___ Technical Advisory

GIFE Update Req'd.? Y___ N_x_
By - Addition or Revision

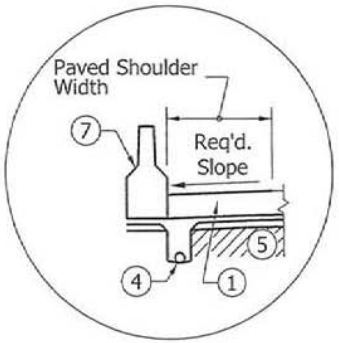
Frequency Manual Update Req'd? Y___ N_x_
By - Addition or Revision

Withdrawn ____

Received FHWA Approval? Yes



TYPICAL MEDIAN SHOULDER WITH BARRIER WALL



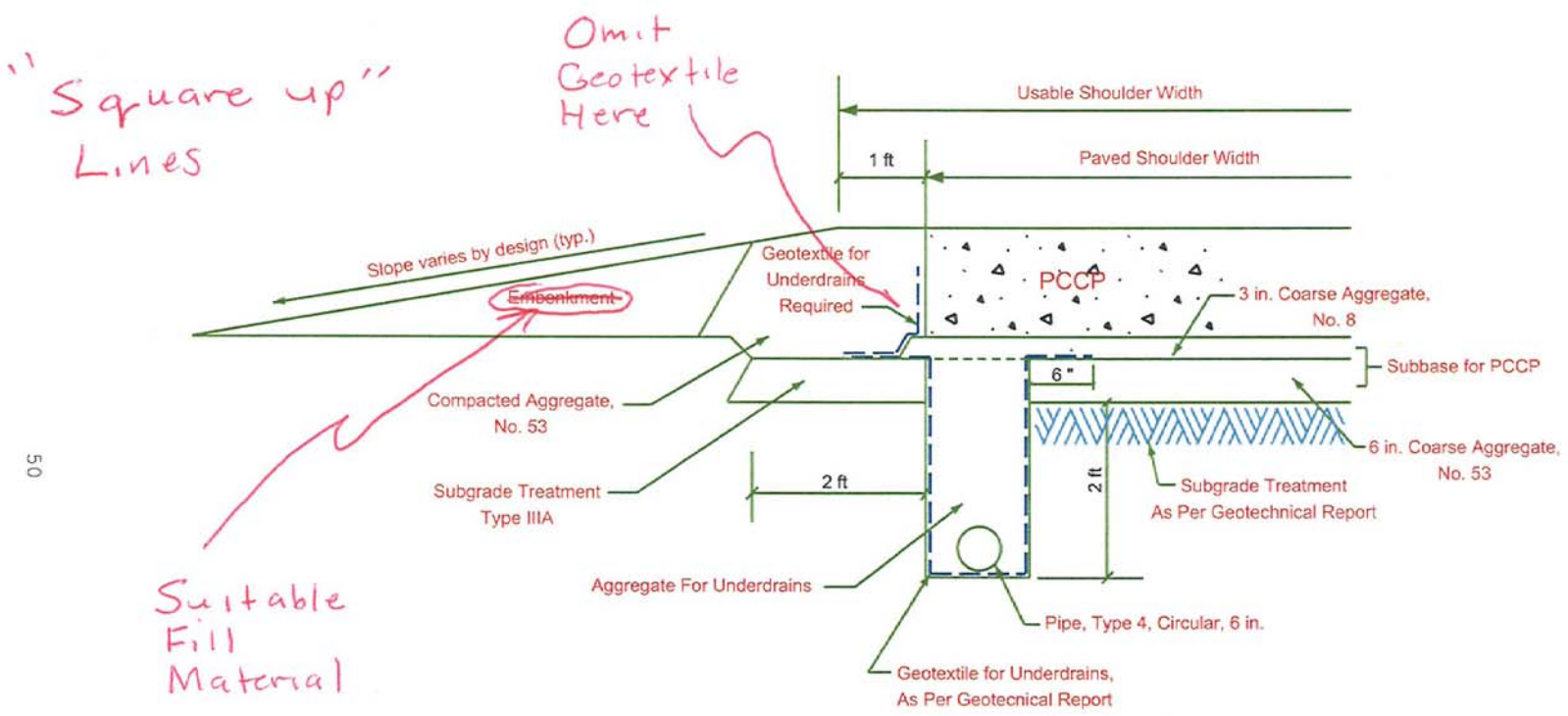
Mainline and Shoulders

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

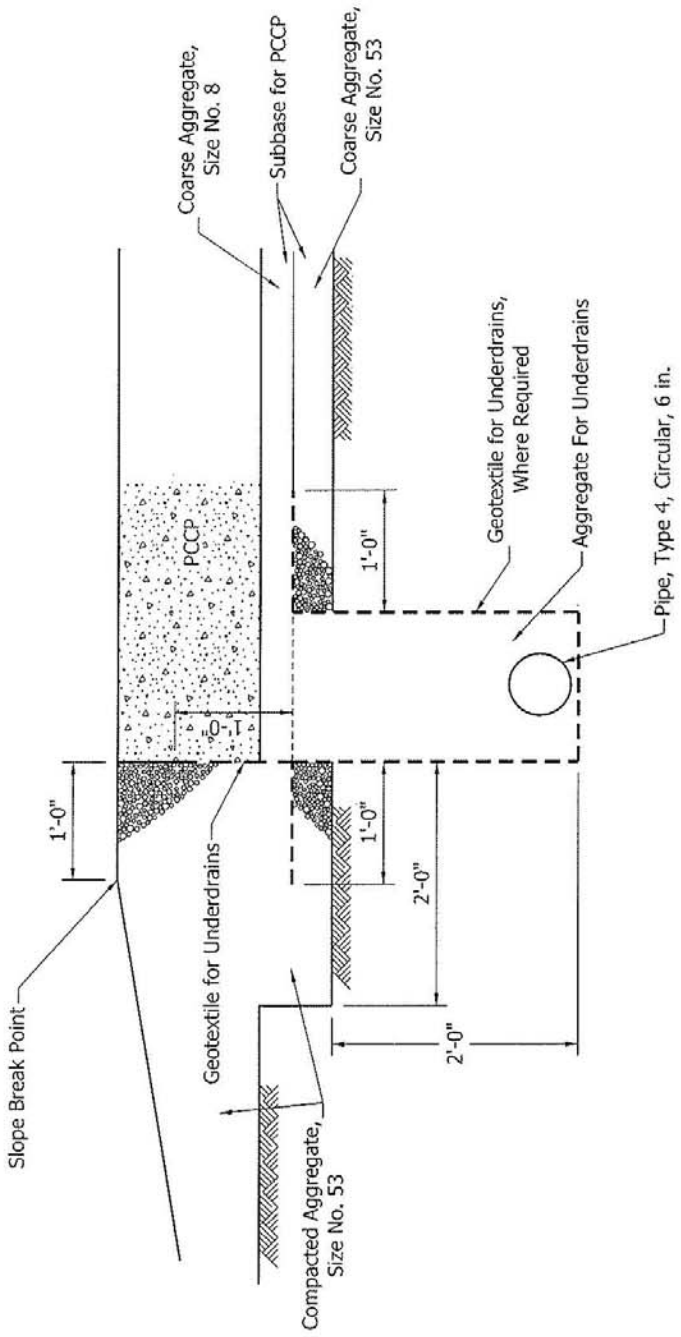
* Where underdrains are not required, Dense Graded Subbase should be used.

PCCP SECTION WITH PCC SHOULDER

Figure 52-13F



PCCP WITH UNDERDRAIN
Figure 52-13P



PCCP WITH UNDERDRAIN

Figure 52-13P

COST OF MODIFY SUBBASE AND SUBGRADE OUTSIDE UNDERDRAIN

(PCCP SECTION WITH PCC SHOULER)

4 Lanes divided highways, 4 miles long road
(Outside and Inside Shoulders)

1) Subgrade Treatment
   a) Assume "Type IA" (Remove)

$$\frac{2 \text{ ft} \times 4 \text{ miles} \times 5280 \text{ ft/mile}}{9}$$

$4{,}694 \times 4 = 18{,}776 \text{ yd}^2$

Cost = $18{,}776 \times \$6.35/\text{yd}^2 = \$119{,}228.00$

   b) "Type IIIA" (Replace at Subbase)

$$\frac{2 \text{ ft} \times 4 \text{ miles} \times 5280 \text{ ft/mile}}{9}$$

$4{,}694 \times 4 = 18{,}776 \text{ yd}^2$

Cost = $18{,}776 \times \$7.73/\text{yd}^2 = \$145{,}139.00$

2) Subbase for PCCP (Remove)

$$\frac{2 \text{ ft} \times 4 \text{ miles} \times 5280 \text{ ft/mile} \times 9 \text{ inch} \times 1/12 \text{ ft/inch}}{27}$$

$1{,}173.33 \times 4 = 4{,}693.33 \text{ yd}^3$

Cost = $4{,}693.33 \times \$36.58/\text{yd}^3 = \$171{,}682.00$

3) Compacted Aggregate, No. 53 (Remove 3" Coarse Agg. No. 8 & replace with CA)

2.0 ft x 4 miles x 5280 ft/mile x 3 inch x 1/12 ft/inch

$10{,}560 \times 4 = 42{,}240 \text{ ft}^3$

$42{,}240 \text{ ft}^3 \times 125 \text{ lb/ ft}^3$ (density) x 1/2000 TON/lb = 2,640

Cost = $2{,}640 \times \$19.71/\text{TON} = \$52{,}034.00$

4) Compacted Aggregate, No. 53 (Assume 6:1 slope) Remove

½ x 1.163 ft x 7 ft x 4 miles x 5280 ft/ml

85,969 ft^3 x 4 = 343,876 ft^3

343,876 ft^3 x 125 lb/ ft^3 (density) x 1/2000 TON/lb = 21,492 TON

Cost = 21,492 x $19.71/TON = $423,607.00

5) Borrow (Remove # 53 outside shoulder break point and replace with Borrow)

$$\frac{\text{½ x 1.163 ft x 7 ft x 4 miles x 5280 ft/ml}}{27}$$

3,184 x 4 = 12,736 yd^3

Cost = 12,736 x $18.04/ yd^3 = $229,757.00

6) Seeding, Mulch, and Fertilizer on Slope

Surface Area = 7.09 ft x 4 mile x 5280 ft/mile
= 149,741 ft^2 x 4
= 598,964 ft^2 x 1/43,560 acre/ft^2
= 13.75 acre

a) Seed Mixture, R = 13.75 acre x 170 lb/acre
= 2338 lb x $4.66/lb = $10,895.00

b) Mulching Material = 13.75 acre x 2 T/acre
= 27.5 T x $550/T = $15,125.00

c) Fertilizer = 13.75 acre x 0.4 T/acre
= 5.5 T x $789/T = $4,340.00

Total for Grass = $10,895.00 + $15,125.00 + $4,340.00 = $30,360.00

Total Saving = $119,228.00 - $145,139.00 + $171,682.00 - $ 52,034.00
+ $423,607.00 - $229,757.00 - $30,360.00

= $257,227.00 ($64,307.00/mile – 4 lanes)

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 701, CONTINUED.

Epoxy coated piles, prebored holes, and cored holes in rock will be measured by the linear foot (meter) complete in place of the diameter specified.

Concrete encasement, class A concrete, reinforcing bars, epoxy coating, reaction piles if not used as production piles, splices, end plates, predrilling, cleaning of drilled holes, drilling fluids, sealing materials, casing, jetting, followers, spudding, or other methods used to facilitating pile driving will not be measured for payment.

701.15 Basis of Payment

All treated timber piles, untreated timber piles, steel pipe piles, steel H piles, and concrete piles driven will be paid for by the linear foot (meter). Payment will be made only for the actual number of linear feet (meters) of piling complete in place. Extensions for concrete piles will be paid for in accordance with 109.05.

Driven piles used as indicator test piles or dynamic test piles that are left in place and subsequently used as production piles will be paid for by the linear foot (meter) as either production indicator test piles or production dynamic test piles. Reaction piles used in a static pile load test that are left in place and subsequently used as a production pile will be paid for by the linear foot (meter) as the type of production pile they represent. Driven piles used as indicator test piles, dynamic test piles, or static load test piles that are not used as production piles will be paid for by the linear foot (meter) as non-production dynamic, indicator, or static test piles respectively.

If the quantity of driven piling is less than the plan quantity or the quantity as ordered by the Engineer, the ~~Department will pay for the difference as piling, furnished but not used. Payment will be made for the material cost of the unused piling as shown on paid invoices provided by the Contractor. The~~ Department will ~~also~~ pay 50% of the cost to re-stock unused piling if the Contractor elects to re-stock piling and provides a paid invoice showing the re-stocking fee. Payment will be made for piling, restock.

Epoxy coated piles may be furnished and driven at lengths greater than those shown on the plans. These additional lengths of epoxy coated piles left in place and accepted will be paid for as either steel pipe piles or steel H piles.

Prebored holes and cored holes in rock will be paid for at the contract price in linear feet (meters).

Payment will be made under:

Pay Item	***Pay Unit Symbol***
Conical Pile Tip, _____ (pile size), _____ (type)	*EACH*
Cored Hole in Rock, _____ (diameter) in. (mm)	*LFT (m)*