INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room N925 - CM
Indianapolis, Indiana 46204

PHONE: (317) 232-5456
FAX: (317) 232-5551

Michael R. Pence, Governor
Brandye L. Hendrickson, Commissioner

APPROVED MINUTES

August 18, 2016 Standards Committee Meeting

MEMORANDUM

November 01, 2016

TO: Standards Committee

FROM: Scott Trammell, Secretary

RE: Minutes from the August 18, 2016 Standards Committee Meeting

The Standards Committee meeting was called to order by Mr. Goldner, sitting as chair for Mr. Miller, at 09:02 a.m. on August 18, 2016 in the N955 Bay Window Conference Room. The meeting was adjourned at 10:19 a.m.

The following committee members were in attendance:

Rob Goldner*, Chairman, Construction Technical Support
Bob Cales, Contract Administration Division
Dave Boruff, Traffic Engineering Division
Elizabeth Phillips, Bridges Division
Greg Pankow, State Construction Engineer
Matthew Beeson, Materials Engineer, Materials Management
Michael Koch, Fort Wayne District Area Engineer
Wes Smith**, Road Services
Joe Bruno***, Traffic Engineering Division

**Proxy for Mark Miller*
***Proxy for Peter Yao*
****Proxy for Rob Goldner*

Also in attendance were the following:

Joel Salinas, INDOT
Melinda Schwer, INDOT
Steve Fisher, INDOT
Steve Smart, County Materials Co.
Josh Coulter, The Hoosier Co.
Scott Trammell, INDOT
Mike Beuchel, INDOT
Dimas Prasetya, FHWA
John Crist, EJ Americas
John C. Susong, IKOCPA

The following items were listed for consideration:

A. GENERAL BUSINESS ITEMS

OLD BUSINESS

(No items were listed)

NEW BUSINESS

1. Approval of the Minutes from the July 21, 2016 meeting

DISCUSSION: Mr. Goldner requested a motion to approve the minutes from the July 21, 2016 meeting.

Motion: Mr. Cales
Second: Ms. Phillips
Ayes: 8
Nays: 0

ACTION: PASSED AS SUBMITTED

2. Mr. Goldner stated that due to a scheduling conflict, the September 15 Standards Committee meeting will be canceled.

3. Mr. Goldner addressed the new RSP 103-C-253 for GOOD FAITH EFFORTS PRIOR TO AWARD, *which was implemented on 8/10/2016, and has an effective date of November 1, 2016. Mr. Bruno recommend removing the hyphen in e-mail, so it now reads email. All in attendance agreed.*

B. CONCEPTUAL PROPOSAL ITEMS

OLD BUSINESS

(No items were listed)

NEW BUSINESS

(No items were listed)

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

OLD BUSINESS

(No items were listed)

NEW BUSINESS

Item No. 1 (2016 SS) — Mr. Pankow — pg 4
801.18 — Basis of Payment

ACTION: PASSED AS SUBMITTED

Item No. 2 (2016 SS) — Ms. Phillips — pg 8
Recurring Special Provision:
720-R-XXX — *~~TYPE 15~~ CURB INLET CASTING*

ACTION: PASSED AS REVISED

Standard Drawings:

805-SGCO-01	SIGNAL SERVICE & CONTROLLER MOUNTED ON WOOD POLE
805-SGCO-02	SIGNAL SERVICE & CONTROLLER MOUNTED ON STEEL POLE
805-SGCO-03	SIGNAL SERVICE ON WOOD POLE
~~805-SGCO-04~~	~~SIGNAL INDICATION MOUNTED ON STEEL OR WOOD POLES~~
805-SGCO-04A	SIGNAL INDICATION MOUNTED ON STEEL POLE
805-SGCO-04B	SIGNAL INDICATION MOUNTED ON WOOD POLES
805-SGCO-05	PEDESTAL MOUNTED SIGNAL INDICATIONS
805-SGCO-06	CONTROLLER CABINET TYPE G ON PEDESTAL
805-PPBA-01	*PEDESTRIAN PUSHBUTTON ASSEMBLY DETAILS*
805-PPBA-02	*TYPICAL PEDESTRIAN PUSHBUTTON ASSEMBLY LOCATIONS*
805-PPBA-03	*TYPICAL PEDESTRIAN PUSHBUTTON ASSEMBLY LOCATIONS*

ACTION: PASSED AS REVISED

cc: Committee Members
FHWA
ICI

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The identified sentence is redundant.

PROPOSED SOLUTION: Delete the indicated sentence. The prior sentence applies to all CZ units and states that the back-up unit will only be paid for if the damaged unit is not repairable.

APPLICABLE STANDARD SPECIFICATIONS: 801.18

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: None

APPLICABLE SECTION OF GIFE: None

APPLICABLE RECURRING SPECIAL PROVISIONS: None

PAY ITEMS AFFECTED: Will have no impact on payment for the Energy Absorbing Terminal, CZ

APPLICABLE SUB-COMMITTEE ENDORSEMENT: N/A

IMPACT ANALYSIS (attach report):

Submitted By: Greg Pankow

Title: State Construction Engineer

Organization: INDOT

Phone Number: 317-232-5502

Date: July 29, 2016

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD SPECIFICATIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? No

Construction time? Yes

Customer satisfaction? No

Congestion/travel time? No

Ride quality? No

Will this proposal reduce operational costs or maintenance effort? No

Will this item improve safety:

For motorists? No

For construction workers? No

Will this proposal improve quality for:

Construction procedures/processes? Yes

Asset preservation? No

Design process? No

Will this change provide the contractor more flexibility? No

Will this proposal provide clarification for the Contractor and field personnel? Yes

Can this item improve/reduce the number of potential change orders? No

Is this proposal needed for compliance with:

Federal or State regulations? No

AASHTO or other design code? No

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: This change eliminates redundant language and reduces confusion on a payment process for single model of CZ unit.

REVISION TO STANDARD SPECIFICATIONS

SECTION 801 - TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS
801.18 BASIS OF PAYMENT

The Standard Specifications are revised as follows:

SECTION 801, BEGIN LINE 921, DELETE AS FOLLOWS:

801.18 Basis of Payment

The accepted quantities of construction signs, detour route marker assemblies, detour route marker assemblies-multiple routes, temporary worksite speed limit sign assemblies, road closure sign assemblies, permanent road closure sign assemblies and temporary raised pavement markers will be paid for at the contract unit price per each. Payment for temporary worksite speed limit assemblies, PCMS, and Aries Field Processors will be made for the maximum number of such assemblies in place at any one time during the life of the contract. Type III-A, type III-B, and permanent type III barricades will be paid for at the contract unit price per linear foot.

Temporary traffic barrier and anchored temporary traffic barrier will be paid for at the contract unit price per linear foot per the type specified. Payment will be made only once, regardless of the number of times the barrier is moved to accommodate different phases of traffic maintenance or construction operations as shown in the contract. End treatments used on a type 2 or type 4 temporary traffic barrier will be paid for on a linear basis as part of the barrier.

Construction zone energy absorbing terminal, CZ, when used with type 1 or type 3 temporary traffic barriers will be paid for at the contract unit price per each for energy absorbing terminal, CZ, of the test level placed. Each unit will be paid for only once regardless of how many times it is moved. Construction zone energy absorbing terminal, CZ, when used with type 2 or type 4 temporary traffic barriers will be paid for at the contract unit price per linear foot of type 2 or type 4 temporary traffic barrier. Back-up units will be paid for as energy absorbing terminal, CZ, of the test level placed, if they are placed in service due to non-repairable damage to the units already in service. ~~Due to the nature of the TRACC-350 unit, the Engineer will need to agree that the in-service unit has been damaged to the extent that it is non-repairable before a standby TRACC-350 unit will be considered for payment.~~

COMMENTS AND ACTION

801.18 BASIS OF PAYMENT

DISCUSSION:
Mr. Pankow introduced and presented this item stating that this proposed revision is intended to eliminate redundant language and reduce confusion for the payment process for a single model of CZ unit.

There was no discussion and this item passed as submitted.

Motion: Mr. Pankow Second: Ms. Phillips Ayes: 8 Nays: 0 FHWA Approval: YES	Action: __X__ Passed as Submitted _____ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: 801.18 pg 762. Recurring Special Provision affected: NONE Standard Drawing affected: NONE Design Manual Sections affected: NONE GIFE Sections cross-references: NONE	__X__ 2018 Standard Specifications _____ Revise Pay Items List _____ Create RSP (No._____) Effective _____ Letting RSP Sunset Date: _____ Revise RSP (No._____) Effective _____ Letting RSP Sunset Date: _____ Standard Drawing Effective _____ Create RPD (No. _____) Effective _____ Letting _____ GIFE Update _____ SiteManager Update

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO SPECIAL PROVISIONS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Several requests from industry to allow the use of a monolithic Type 15 inlet curb casting in lieu of a separate frame and curb box.

PROPOSED SOLUTION: Immediate solution: Create brief RSP to allow use of a monolithic casting where 6" curb height is specified.
Longterm solution: Add note to Standard Drawings that allows use of monolithic casting where 6" curb height is specified.

A monolithic casting can be a more cost-effective, but is set at a fixed 6" curb height.

APPLICABLE STANDARD SPECIFICATIONS: n/a

APPLICABLE STANDARD DRAWINGS: series 720-ICCA (19 drawings) Inlet Curb Castings

APPLICABLE DESIGN MANUAL SECTION: n/a

APPLICABLE SECTION OF GIFE: n/a

APPLICABLE RECURRING SPECIAL PROVISIONS: n/a

PAY ITEMS AFFECTED: n/a

APPLICABLE SUB-COMMITTEE ENDORSEMENT: none. Feedback requested from all District Construction Directors

IMPACT ANALYSIS (attach report):

Submitted By: Elizabeth Phillips

Title: Standards and Policy Manager

Organization: Bridges Division

Phone Number: 232-6775

Date: June 16, 2016

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO SPECIAL PROVISIONS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? n

Will approval of this item affect the Approved Materials List? n

Will this proposal improve:

Construction costs? y

Construction time? n

Customer satisfaction? n

Congestion/travel time? n

Ride quality? n

Will this proposal reduce operational costs or maintenance effort? n

Will this item improve safety:

For motorists? n

For construction workers? n

Will this proposal improve quality for:

Construction procedures/processes? n

Asset preservation? y

Design process? n

Will this change provide the contractor more flexibility? y

Will this proposal provide clarification for the Contractor and field personnel? n

Can this item improve/reduce the number of potential change orders? n

Is this proposal needed for compliance with:

Federal or State regulations? n

AASHTO or other design code? n

Is this item editorial? n

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda:

REVISION TO SPECIAL PROVISIONS

PROPOSED NEW 720-R-XXX ~~TYPE 15~~ CURB INLET CASTING

720-R-XXX ~~TYPE 15~~ CURB INLET CASTING

(Adopted xx-xx-16)

~~Where a 6 in. curb is specified, a monolithic Type 15 curb inlet casting is acceptable for use in lieu of the separate frame, grate, and curb box Type 15 casting shown on the Standard Drawings.~~

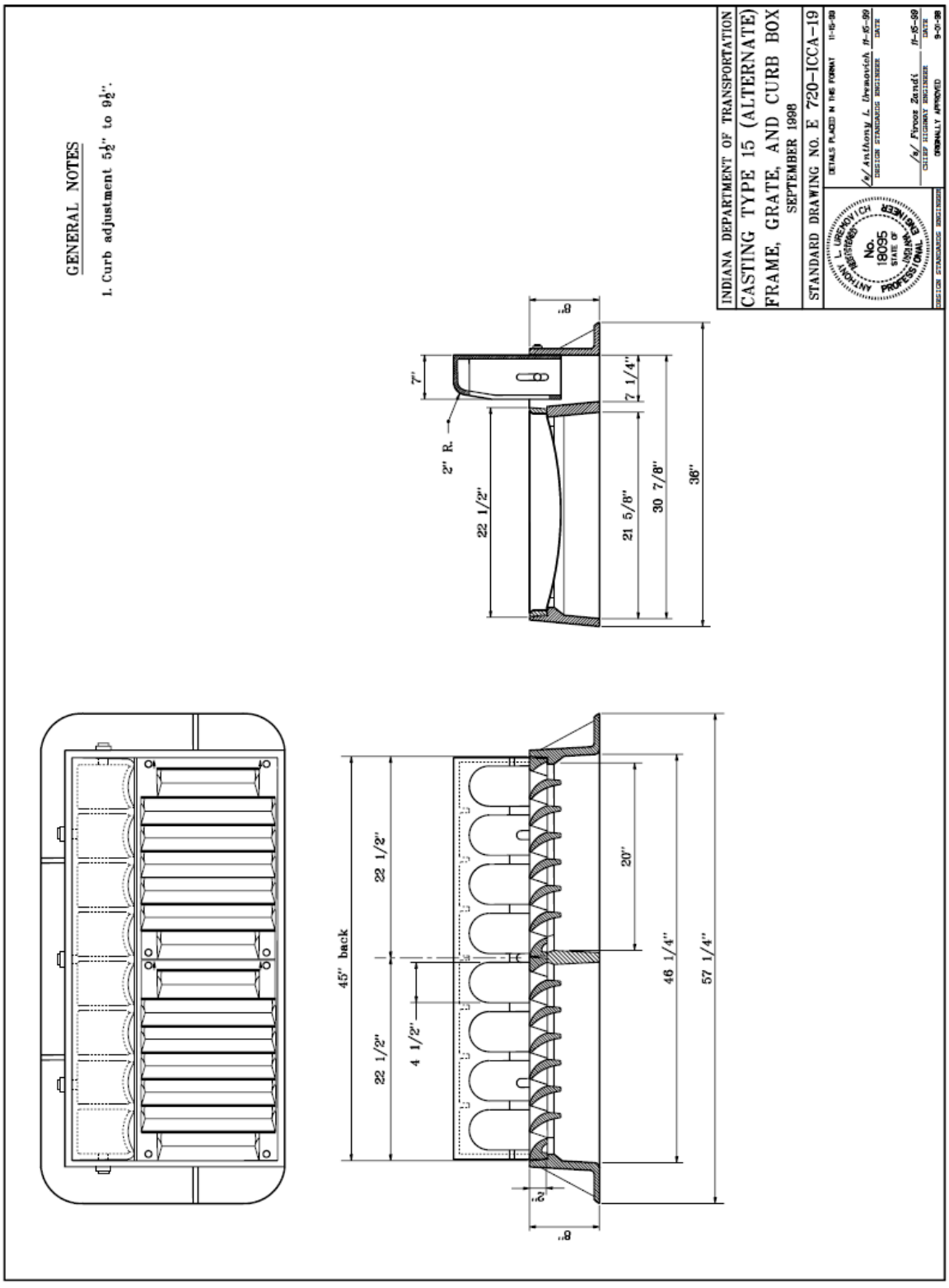
The Standard Specifications are revised as follows:

SECTION 910, AFTER LINE 407, INSERT AS FOLLOWS:

Where a 6 in. curb height is specified, a monolithic frame and curb box may be used in place of one with modular components, provided the monolithic casting's dimensions match those shown on the plans.

BACKUP 01

STANDARD DRAWING E 720-ICCA-19 CASTING TYPE 15 (ALTERNATE) FRAME, GRATE, AND CURB BOX



COMMENTS AND ACTION

720-R-XXX ~~TYPE 15~~ CURB INLET CASTING

DISCUSSION:
This item was introduced and presented by Ms. Phillips who proposes to create a Recurring Special Provision to allow the use of a monolithic casting where a 6 inch curb is specified. Ms. Phillips stated that there have been several requests from industry to allow the use of a monolithic Type 15 inlet curb casting in lieu of a separate frame and curb box.

Ms. Phillips also proposed to add a note to the standard drawings that will allow the use of monolithic castings when 6 inch curbs are specified. Ms. Phillips noted that monolithic castings can also be more cost effective.

Ms. Phillips asked that the word “grate” be struck from the RSP since it is not included in the monolithic casting.

Mr. Koch asked about replacing the casting when the teeth get knocked out and Ms. Phillips responded that those normally do not get replaced and is not an issue at this time.

Mr. Crist, of EJ Americas Company (formerly East Jordan Iron Works), asked about including type 10 castings. Ms. Phillips stated that she is not opposed to including the type 10 casting in the RSP, but needs to look at the drawing series to make sure. Including other types of castings can happen in the future. Mr. Pankow recommended this not go into the 2018 book at this time.

(post meeting) In addition to the Type 10 casting mention by Mr. Crist, the Type 8 casting also includes an adjustable curb box. After review of both the Type 10 and the Type 8, Ms. Phillips proposed removing the specific callout to the Type 15 casting and adding the revised language to 910. The committee and FHWA unanimously concurred via email.

Motion: Ms. Phillips Second: Mr. Cales Ayes: 8 Nays: 0 FHWA Approval: YES	Action:	
	____	Passed as Submitted
	X	Passed as Revised
	__ __	Withdrawn
Standard Specifications Sections referenced and/or affected: SECTION 720 pg 660 thru 667.	____	2018 Standard Specifications
	____	Revise Pay Items List
Recurring Special Provision affected: NONE	X	Create RSP (No.720-R-646) Effective Jan. 01, 2017 Letting RSP Sunset Date:
Standard Drawing affected: NONE	____	Revise RSP (No.____) Effective ____ Letting RSP Sunset Date:
Design Manual Sections affected: NONE	____	Standard Drawings Effective
GIFE Sections cross-references: NONE	~~X~~	Create RPD (No.~~720-R-646d~~) Effective ~~Jan. 01, 2017~~ Letting
	____	GIFE Update

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD DRAWINGS

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: After updating the 604-SWCR and SWDK Series (curb ramps and sidewalks, respectfully), the next step is to provide more details for Pedestrian Pushbutton Assemblies for both an Accessible Pedestrian Signal (APS) and a Non-APS system. An APS and Non-APS pedestrian pushbutton assembly needs to comply with the Public Rights-of-Way Accessibility Guidelines (PROWAG), the *Indiana Manual of Uniform Traffic Control Devices* (IMUTCD), and Recurring Special Provision (RSP) 805-T-201. More detail needs to be added to the *Standard Drawings* and Indiana Design Manual (IDM) for APS and Non-APS pedestrian pushbutton assemblies. For example, side reach distances and general placement of a pedestrian pushbutton assembly along the Pedestrian Access Route (PAR).

PROPOSED SOLUTION: Update existing standard drawings (E 805-SGCO Series), add new standard drawings (E 805-PPBA Series), and revise the IDM to comply with the PROWAG, IMUTCD, and RSP 805-T-201.

APPLICABLE STANDARD SPECIFICATIONS: There is already a RSP, 805-T-201

APPLICABLE STANDARD DRAWINGS: E 805-SGCO Series (Revised), E 805-PPBA Series (NEW)

APPLICABLE DESIGN MANUAL SECTION: 51-1.06 (with Design Memo 16-12), 502-3.03(02), 502-3.03(03) Item #2, 502-3.03(05) Item #4, 502-3.03(07), 502-3.04(04) Item #2 and #3, 502-3.04(05), 502-3.04(07) Item #2 and #4b, 502-3.04(10) Item #1d

APPLICABLE SECTION OF GIFE: N/A

PAY ITEMS AFFECTED: N/A

APPLICABLE SUB-COMMITTEE ENDORSEMENT: Elizabeth Phillips, Katherine Smutzer, David Boruff, and Prakash Patel.

IMPACT ANALYSIS (attach report): No

Submitted By: Katherine Smutzer for Elizabeth Phillips

Title: Standards Engineer Organization: Division of Bridges

Phone Number: 317-297-3714

Date: 5/24/2016

Ms. Phillips
Date: 08/18/16

STANDARD SPECIFICATIONS, SPECIAL PROVISIONS AND STANDARD DRAWINGS

REVISION TO STANDARD DRAWINGS

IMPACT ANALYSIS REPORT CHECKLIST

Explain the business case as to why this item should be presented to the Standards Committee for approval. Answer the following questions with Yes, No or N/A.

Does this item appear in any other specification sections? No

Will approval of this item affect the Approved Materials List? No

Will this proposal improve:

Construction costs? Yes
Construction time? Yes
Customer satisfaction? Yes
Congestion/travel time? N/A
Ride quality? N/A

Will this proposal reduce operational costs or maintenance effort? N/A

Will this item improve safety:

For motorists? N/A
For construction workers? N/A
Will this proposal improve quality for:
Construction procedures/processes? Yes
Asset preservation? N/A
Design process? Yes

Will this change provide the contractor more flexibility? No

Will this proposal provide clarification for the Contractor and field personnel? Yes

Can this item improve/reduce the number of potential change orders? Yes

Is this proposal needed for compliance with:

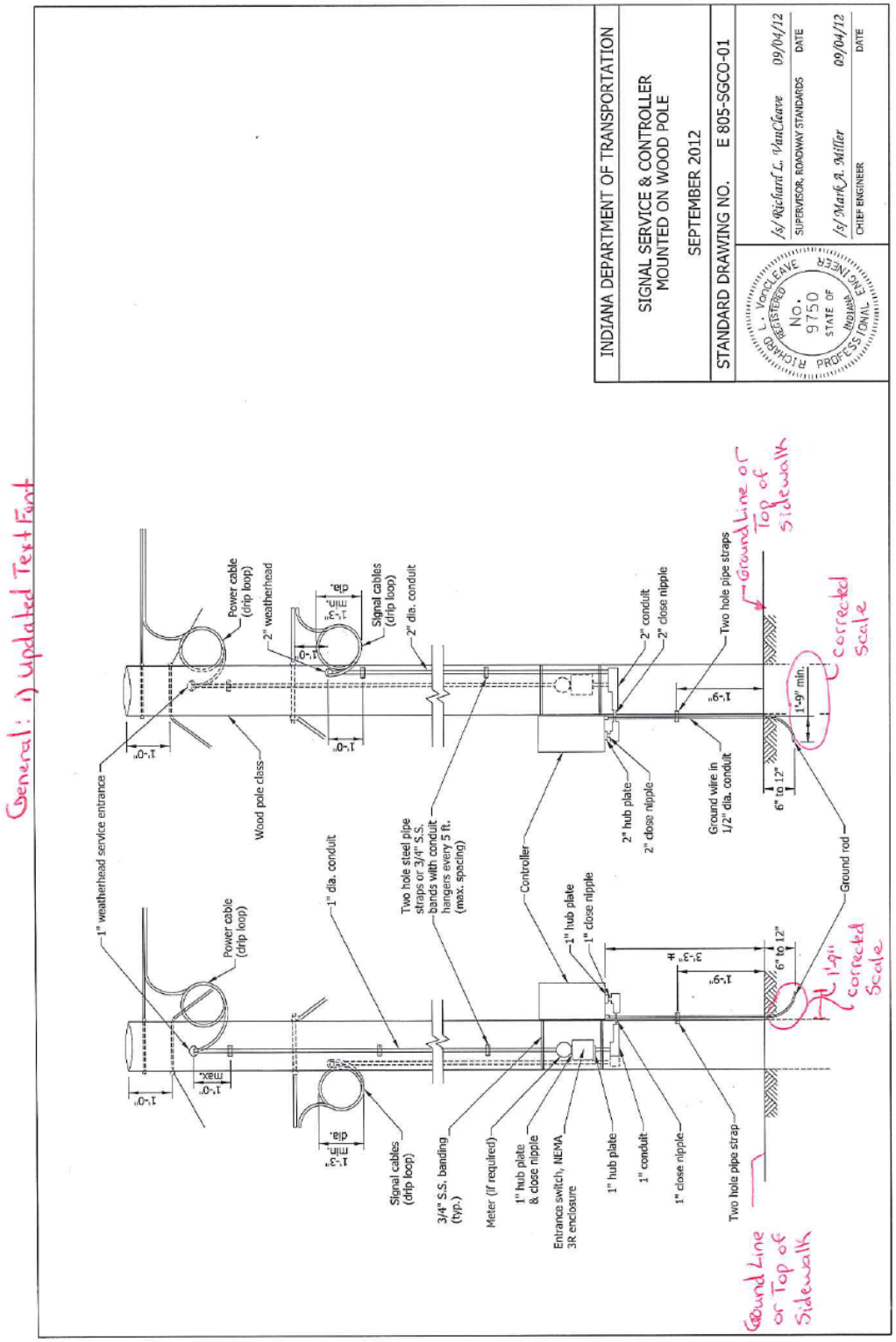
Federal or State regulations? Yes
AASHTO or other design code? N/A

Is this item editorial? No

Provide any further information as to why this proposal should be placed on the Standards Committee meeting Agenda: Creating a clear understand of the APS and Non-APS pushbutton assembly placement will help enforce the PROWAG, IMUTCD, and RSP 805-T-201 and eliminate confusion between the plans, PROWAG, IMUTCD and RSP 805-T- 201.

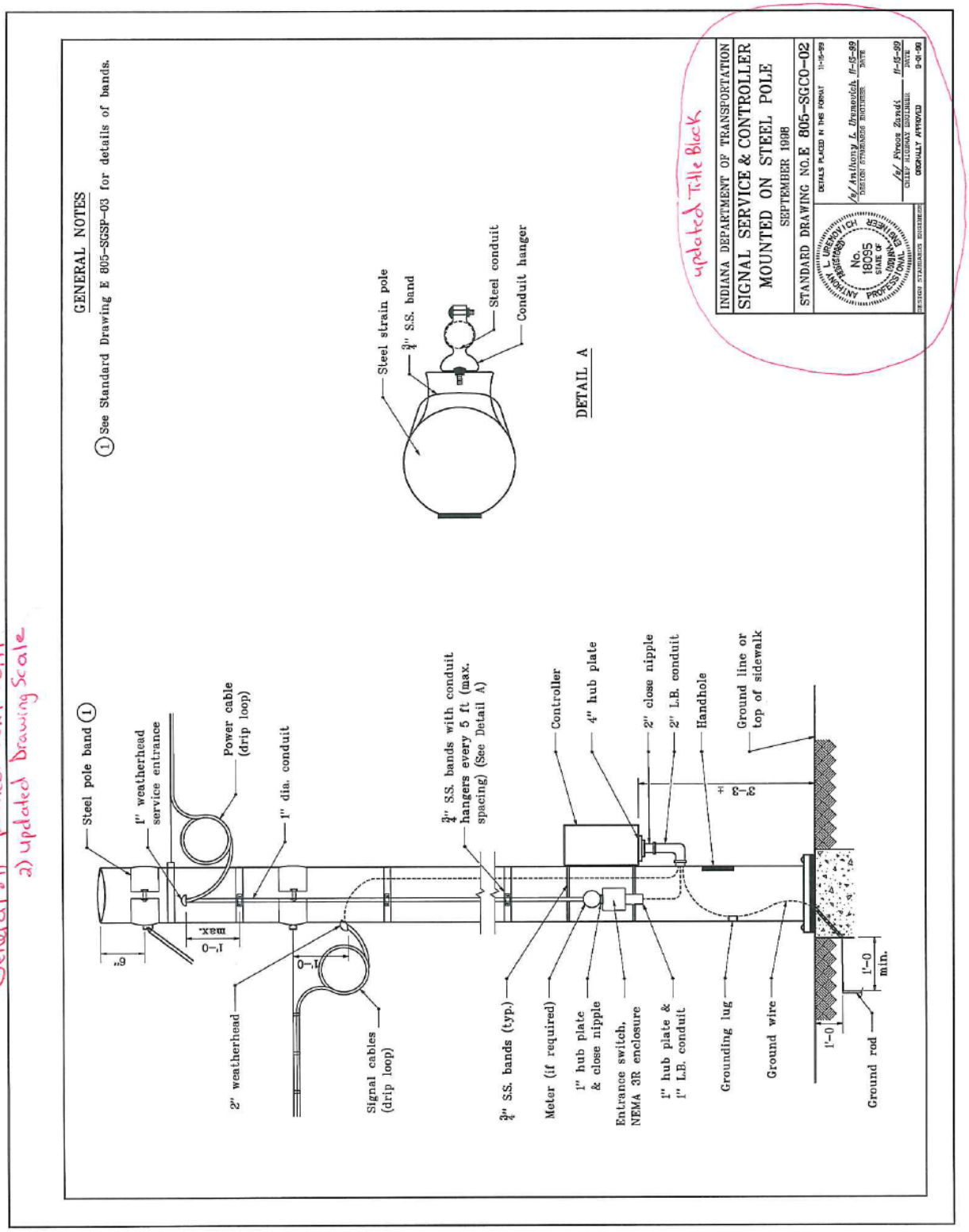
REVISION TO STANDARD DRAWINGS

805-SGCO-01 SIGNAL SERVICE & CONTROLLER MOUNTED ON WOOD POLE (WITH MARKUPS)



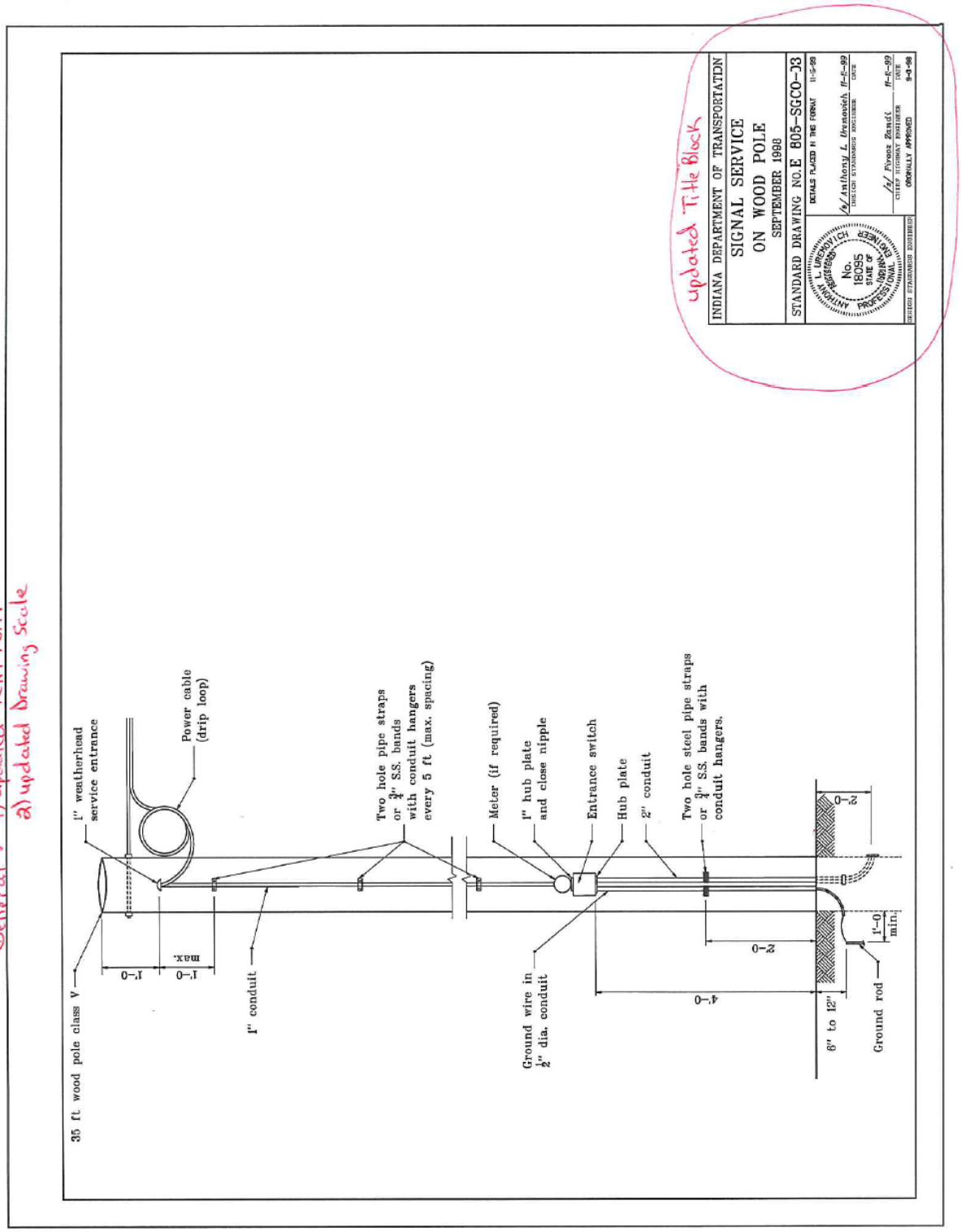
REVISION TO STANDARD DRAWINGS

805-SGCO-02 SIGNAL SERVICE & CONTROLLER MOUNTED ON STEEL POLE (WITH MARKUPS)



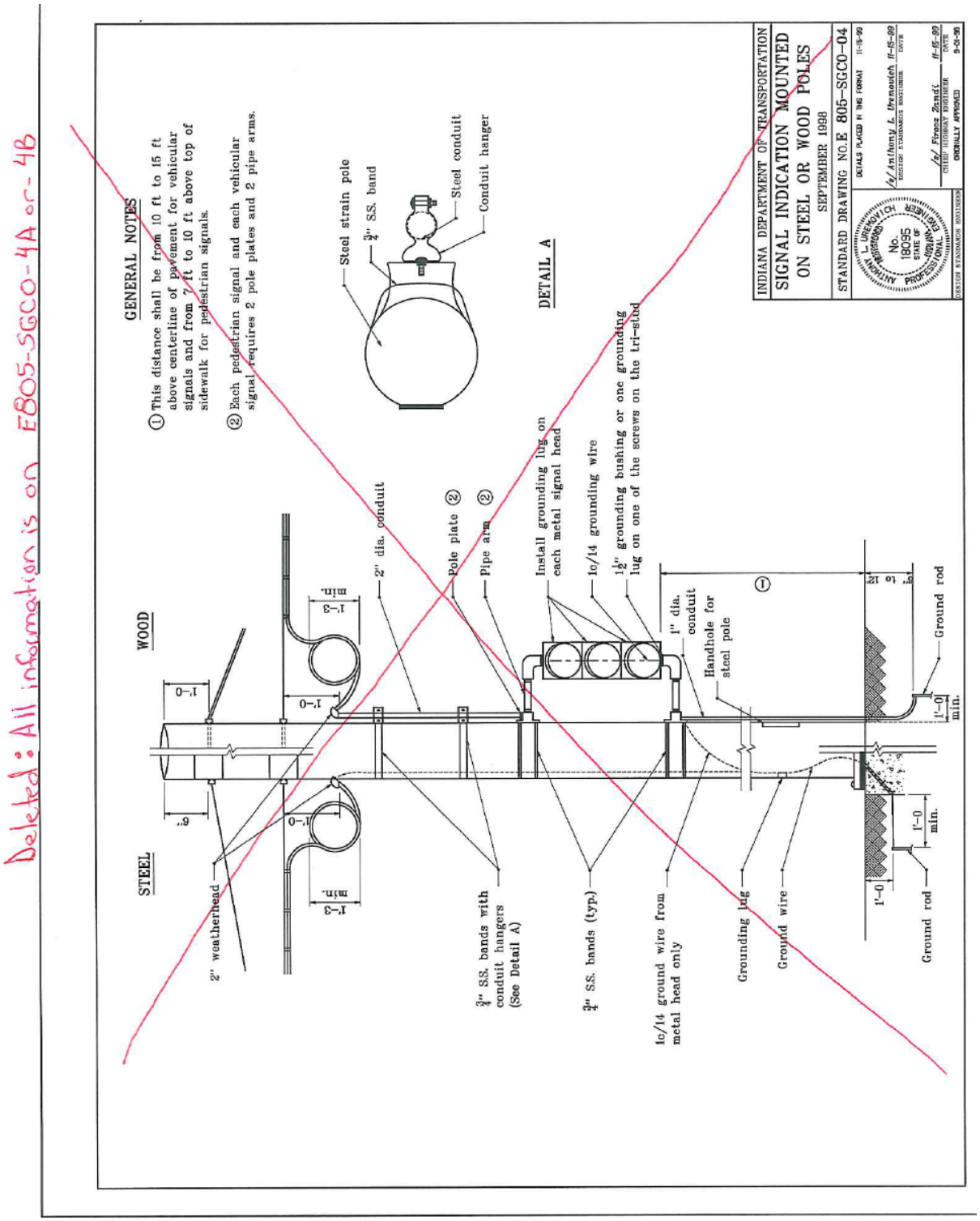
REVISION TO STANDARD DRAWINGS

805-SGCO-03 SIGNAL SERVICE ON WOOD POLE (WITH MARKUPS)



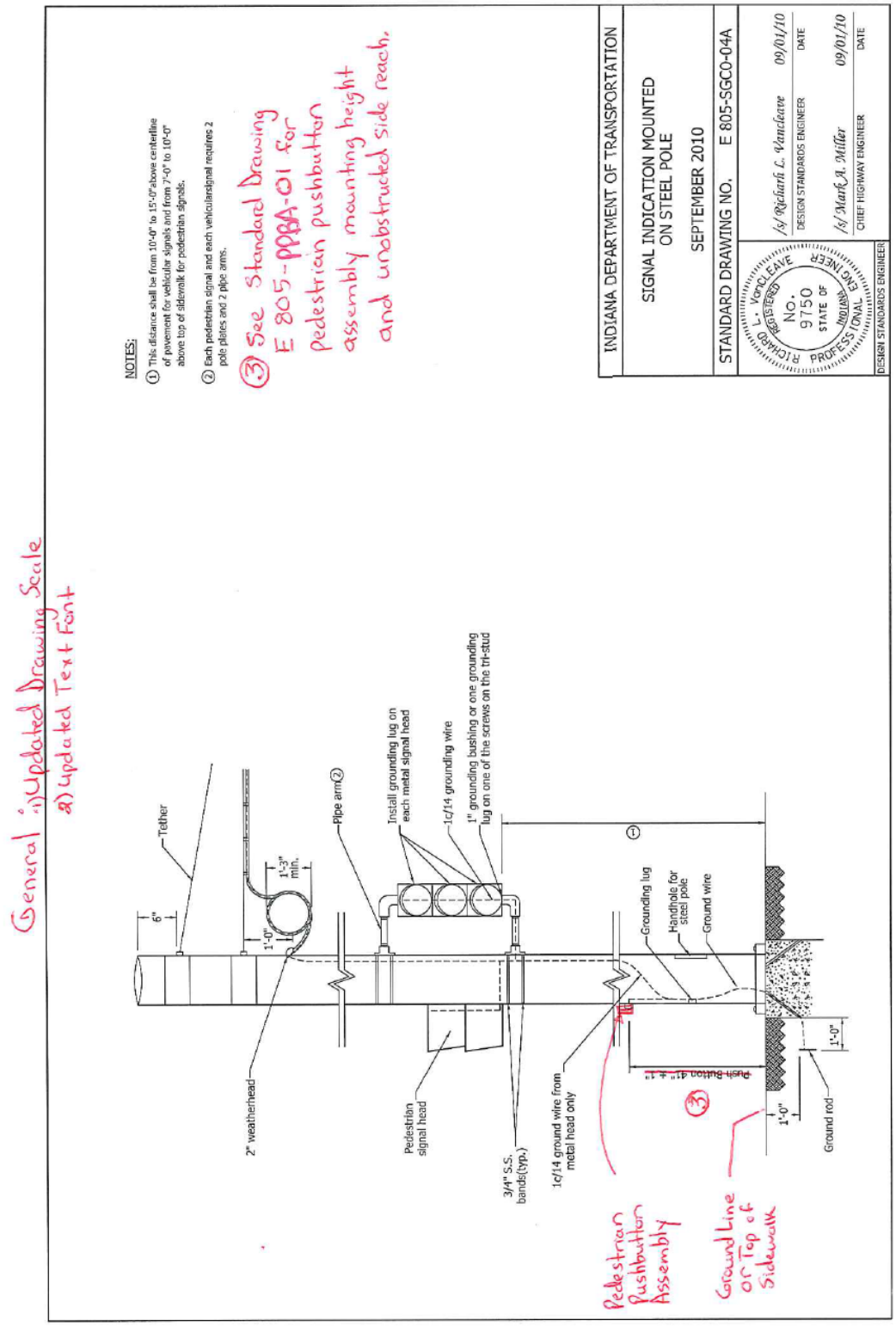
REVISION TO STANDARD DRAWINGS

805-SGCO-04 SIGNAL INDICATION MOUNTED ON STEEL OR WOOD POLES (PROPOSED TO DELETE)



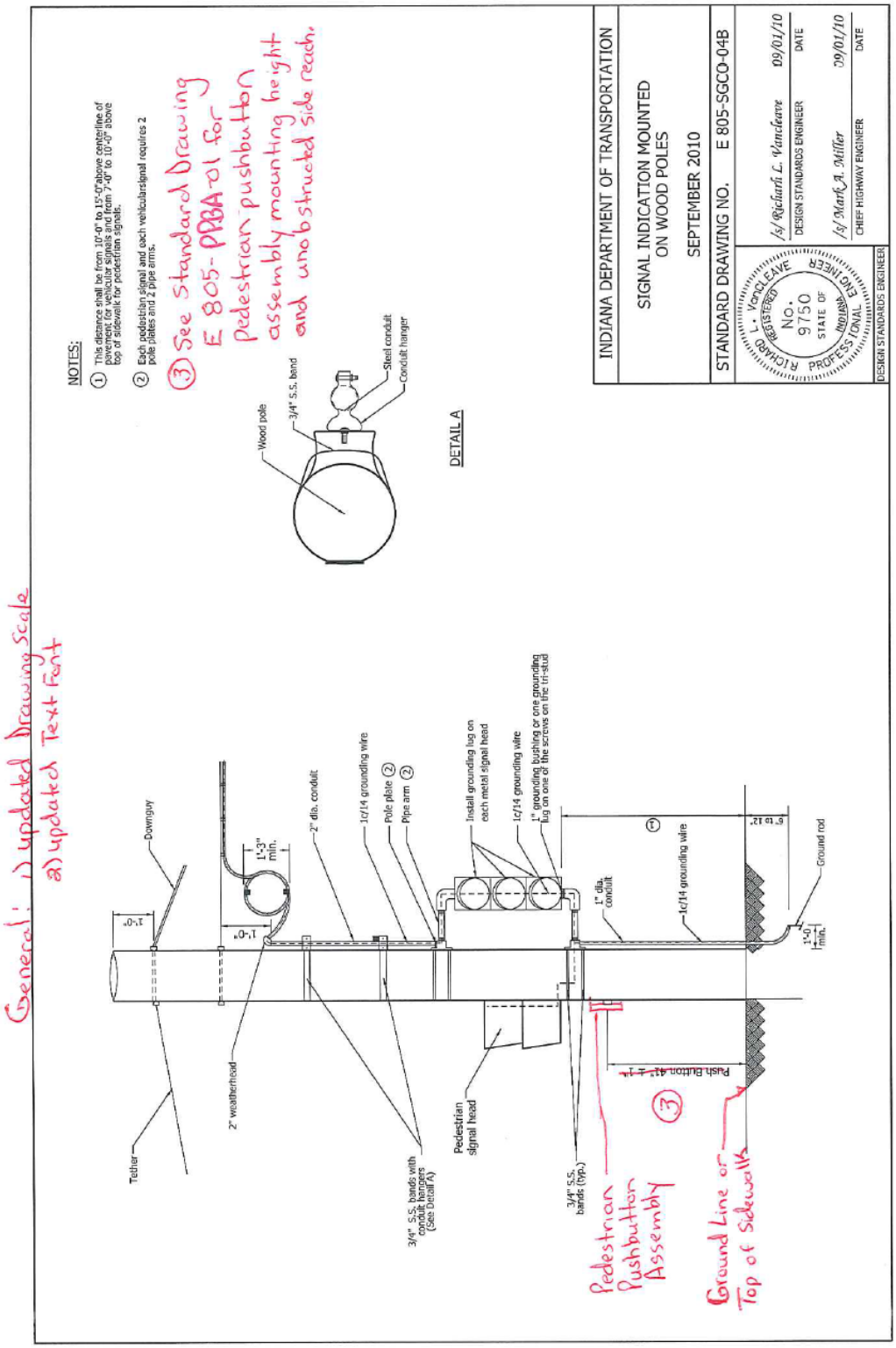
REVISION TO STANDARD DRAWINGS

805-SGCO-04A SIGNAL INDICATION MOUNTED ON STEEL POLE (WITH MARKUPS)



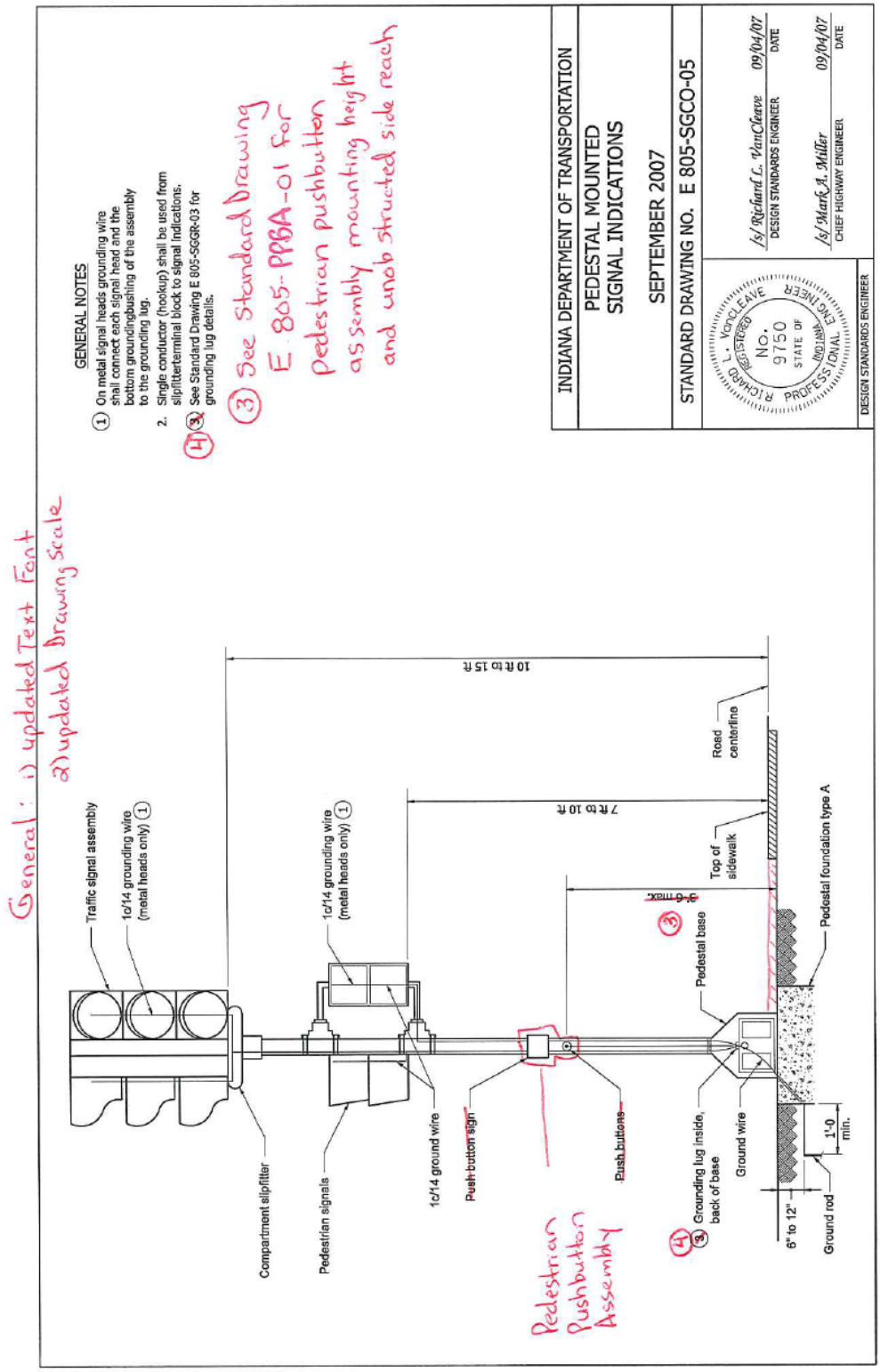
REVISION TO STANDARD DRAWINGS

805-SGCO-04B SIGNAL INDICATION MOUNTED ON WOOD POLE (WITH MARKUPS)



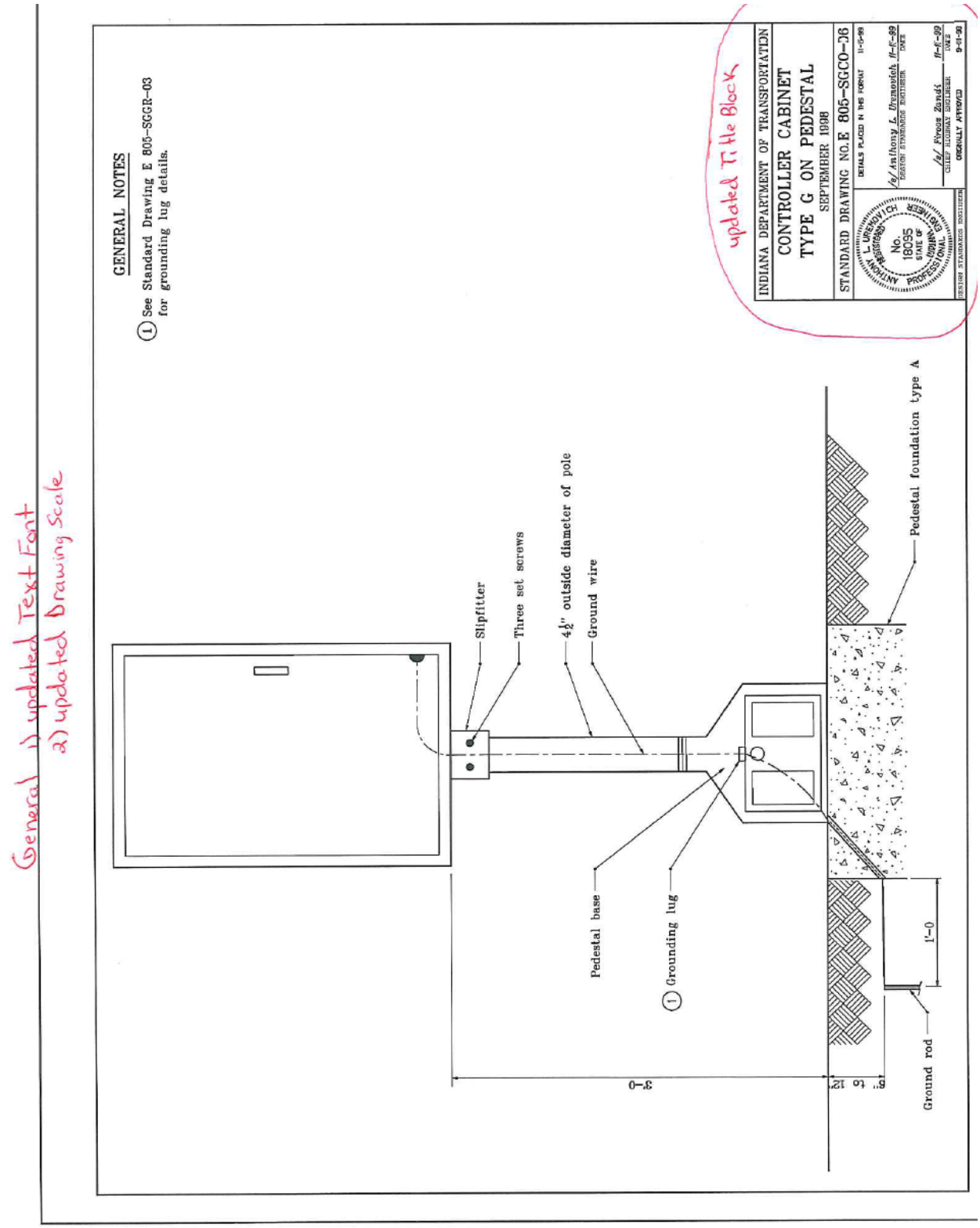
REVISION TO STANDARD DRAWINGS

805-SGCO-05 PEDESTAL MOUNTED SIGNAL INDICATIONS (WITH MARKUPS)



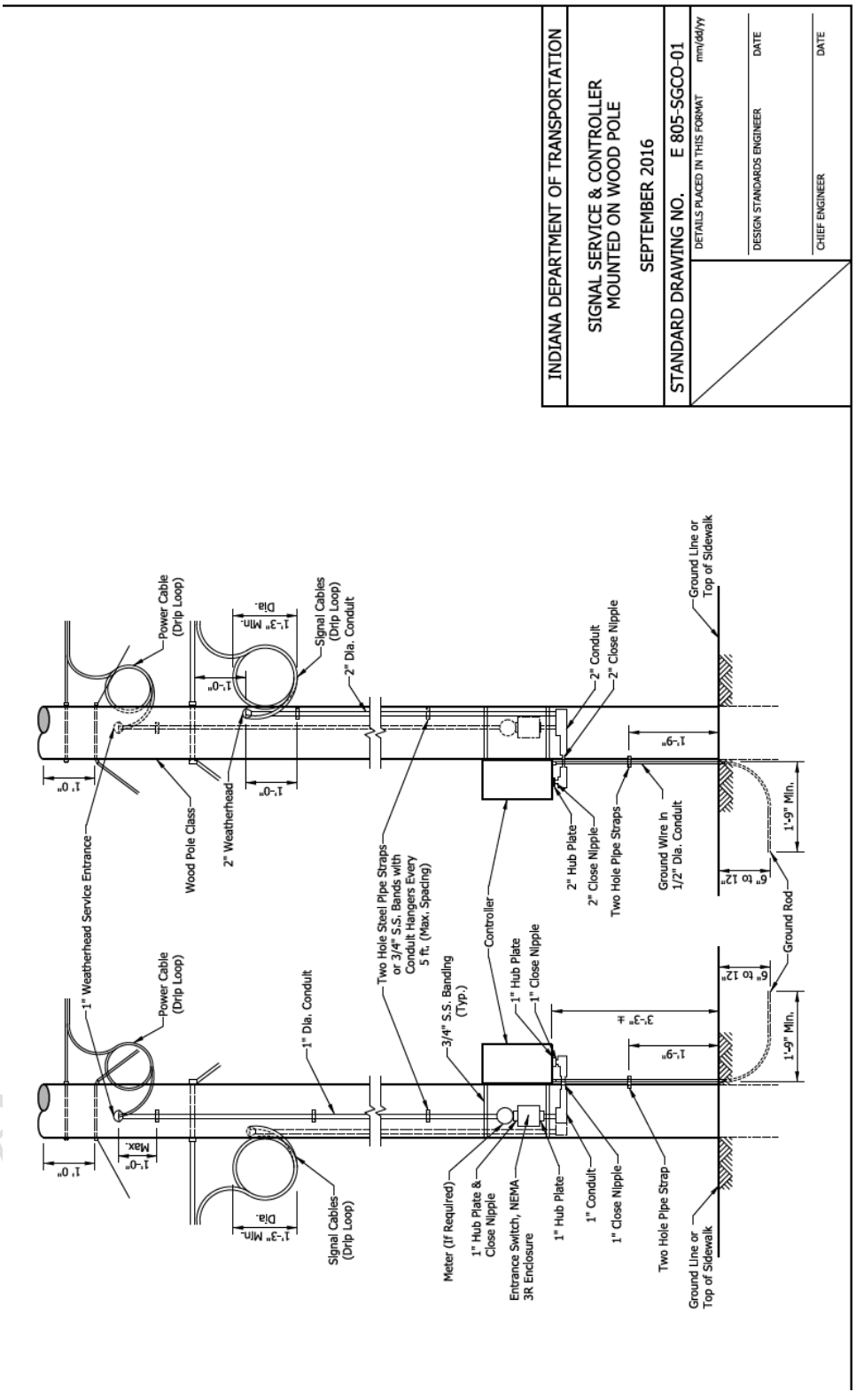
REVISION TO STANDARD DRAWINGS

805-SGCO-06 CONTROLLER CABINET TYPE G ON PEDESTAL (WITH MARKUPS)



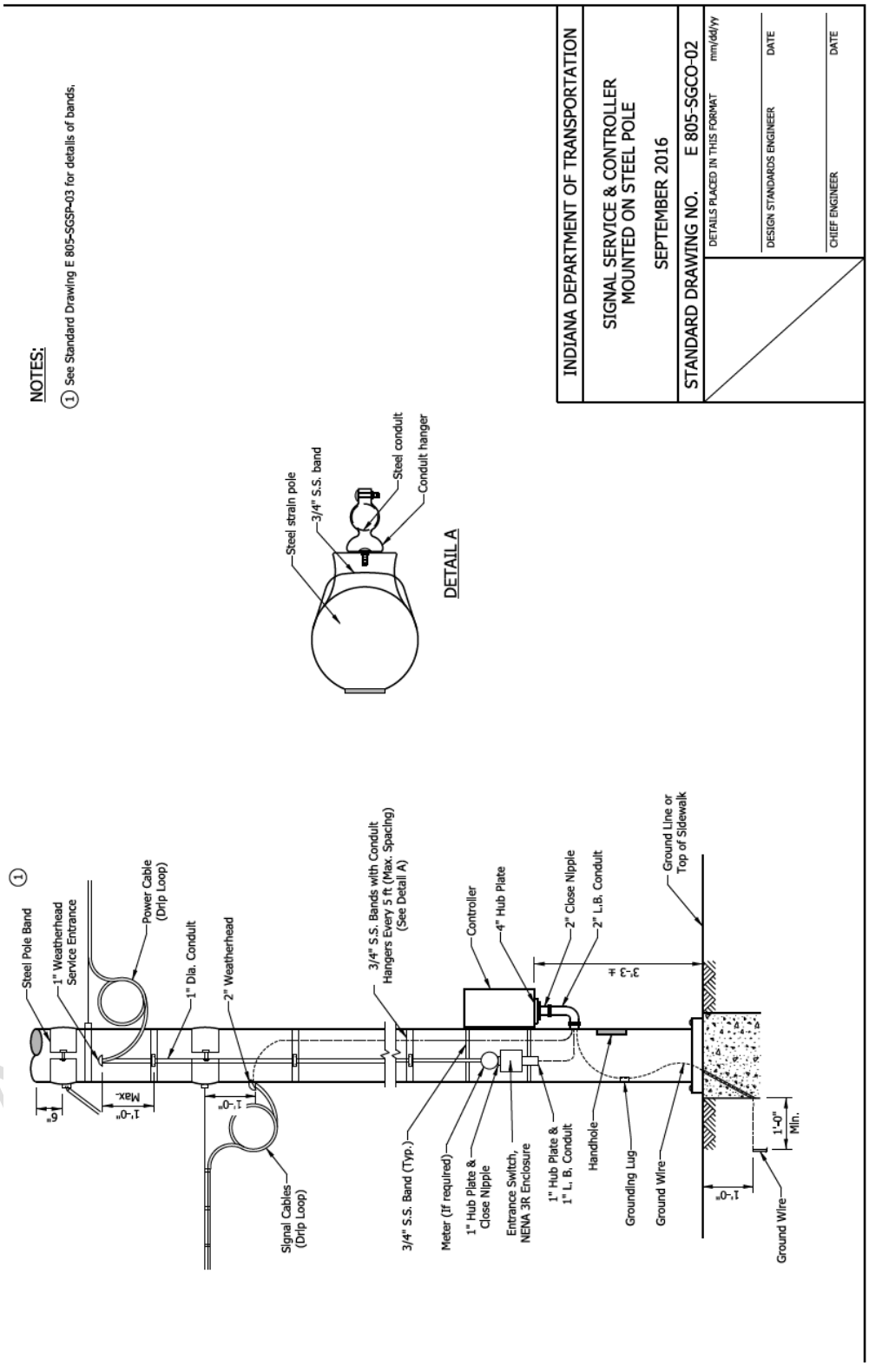
REVISION TO STANDARD DRAWINGS

805-SGCO-01 SIGNAL SERVICE & CONTROLLER MOUNTED ON WOOD POLE (DRAFT)



REVISION TO STANDARD DRAWINGS

805-SGCO-02 SIGNAL SERVICE & CONTROLLER MOUNTED ON STEEL POLE (DRAFT)



REVISION TO STANDARD DRAWINGS

805-SGCO-03 SIGNAL SERVICE ON WOOD POLE (DRAFT)

INDIANA DEPARTMENT OF TRANSPORTATION

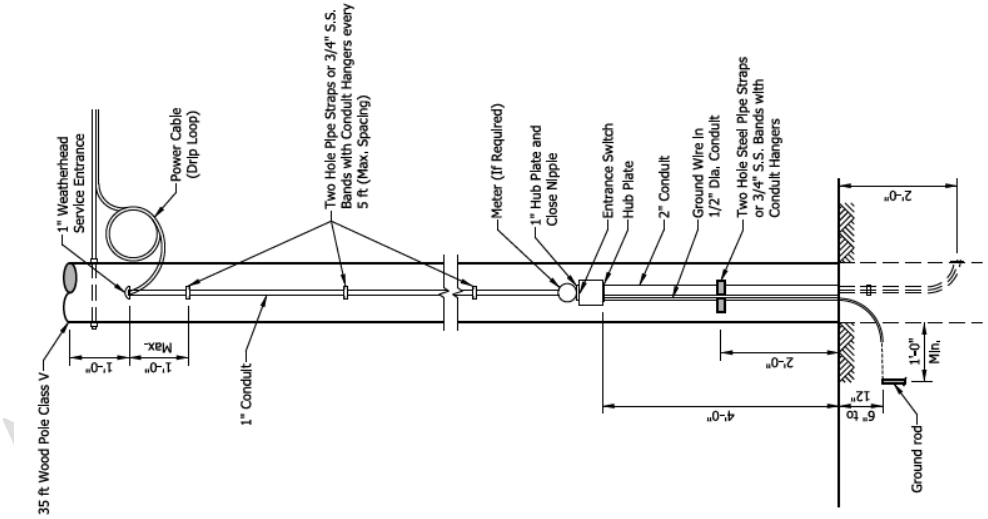
SIGNAL SERVICE
ON WOOD POLE
SEPTEMBER 2016

STANDARD DRAWING NO. E 805-SGCO-03

DETAILS PLACED IN THIS FORMAT mm/dd/yy

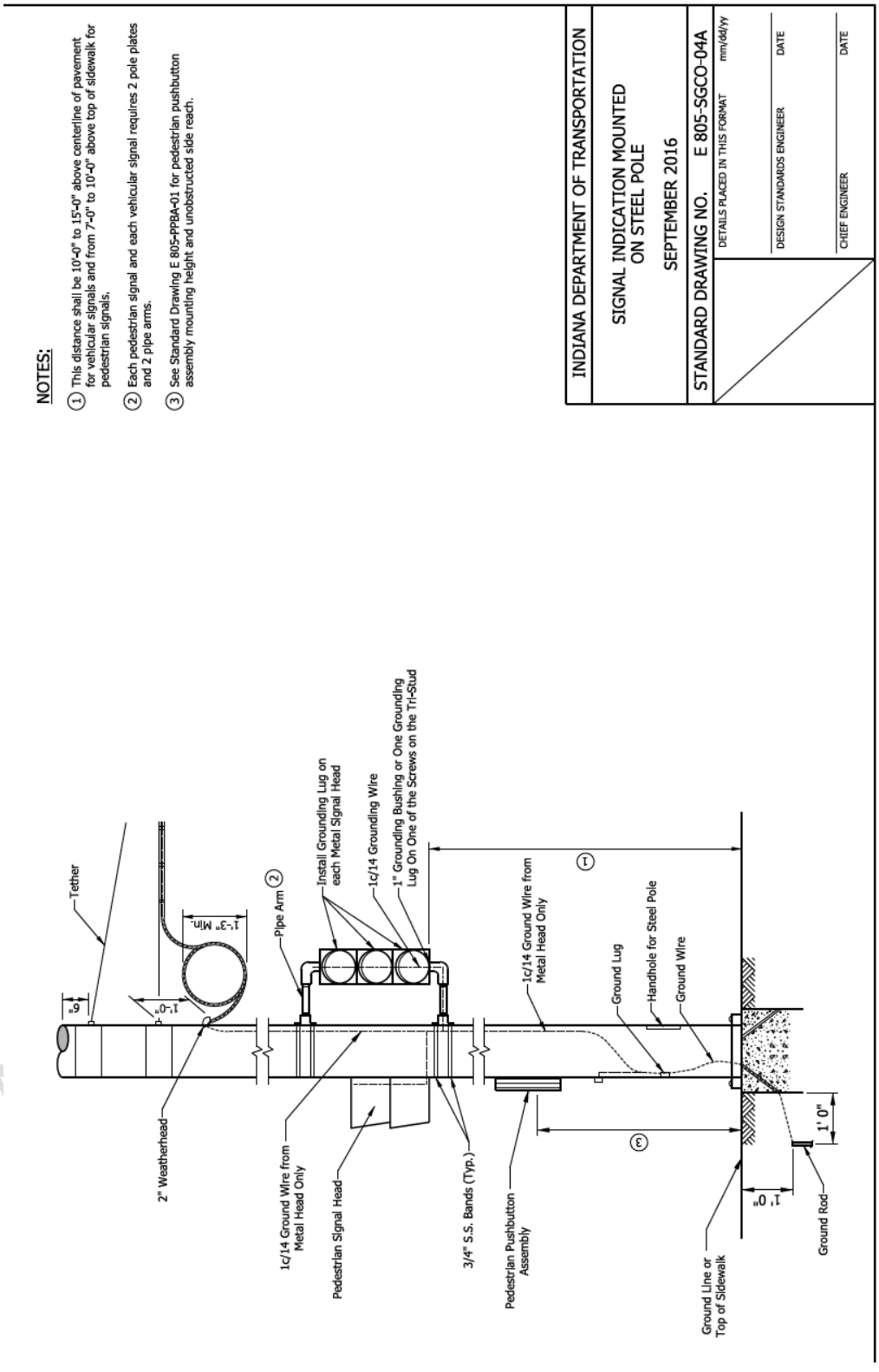
DESIGN STANDARDS ENGINEER DATE

CHIEF ENGINEER DATE



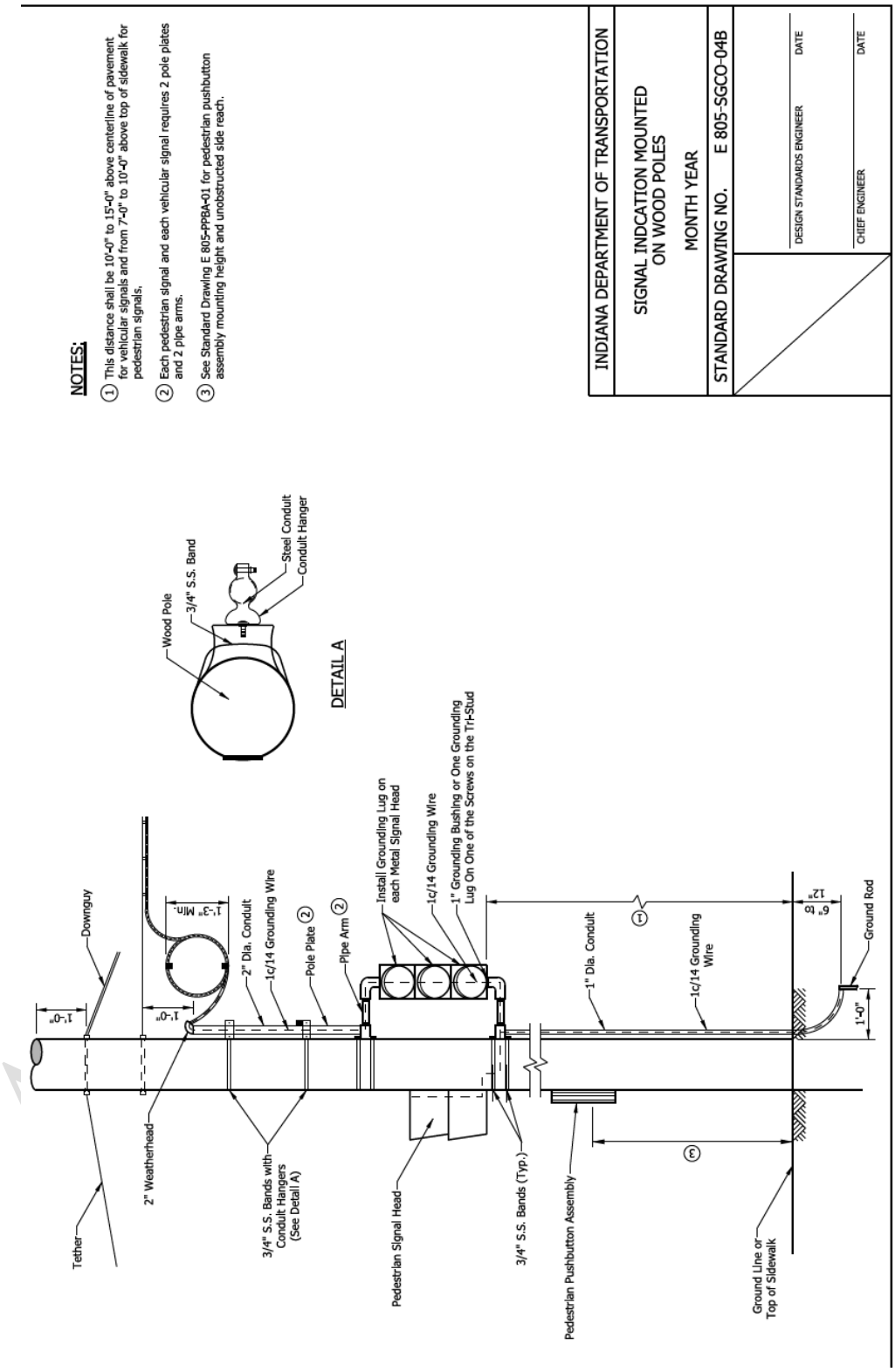
REVISION TO STANDARD DRAWINGS

805-SGCO-04A SIGNAL SERVICE ON STEEL POLE (DRAFT)



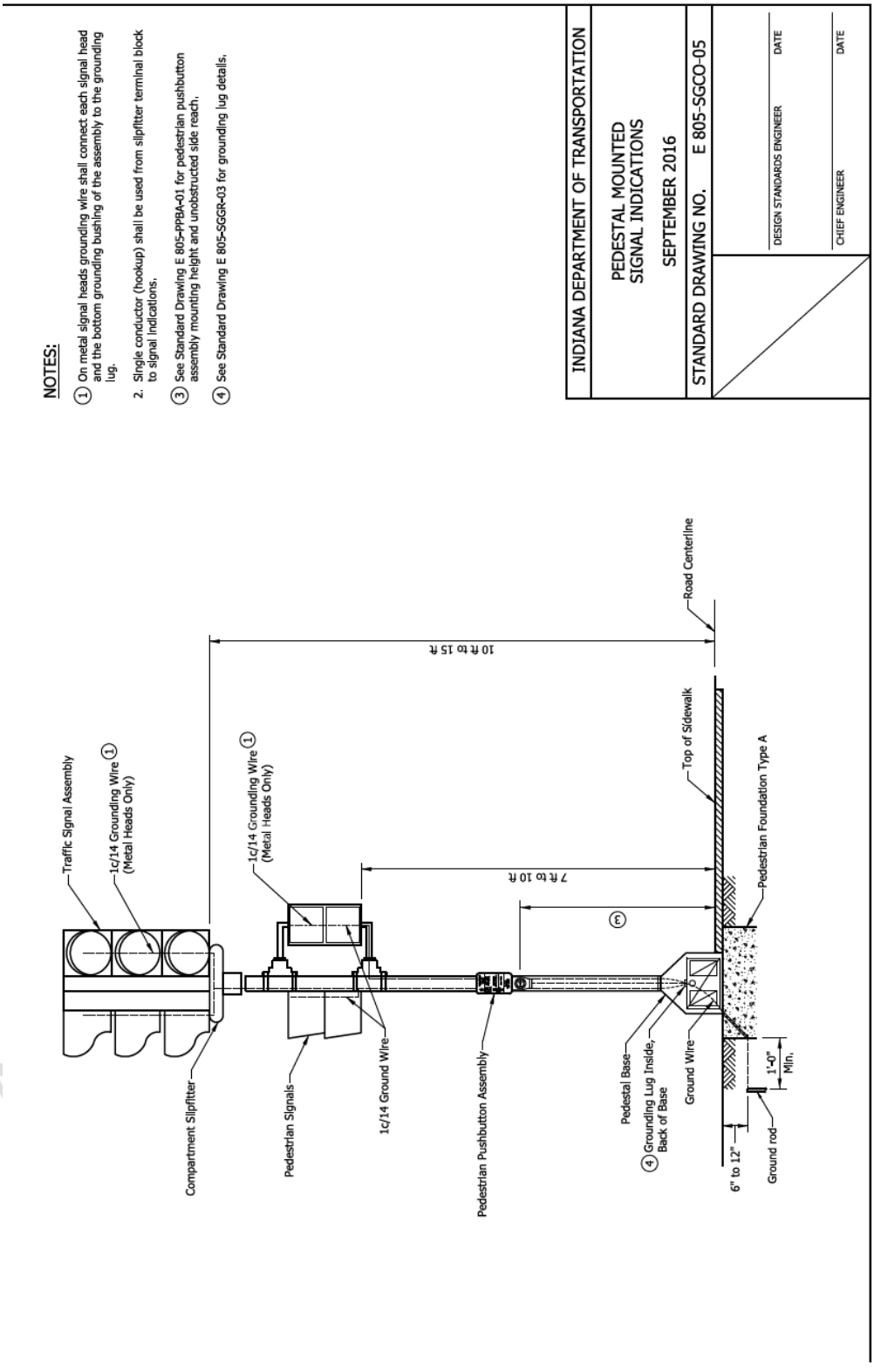
REVISION TO STANDARD DRAWINGS

805-SGCO-04B SIGNAL INDICATION MOUNTED ON WOOD POLE (DRAFT)



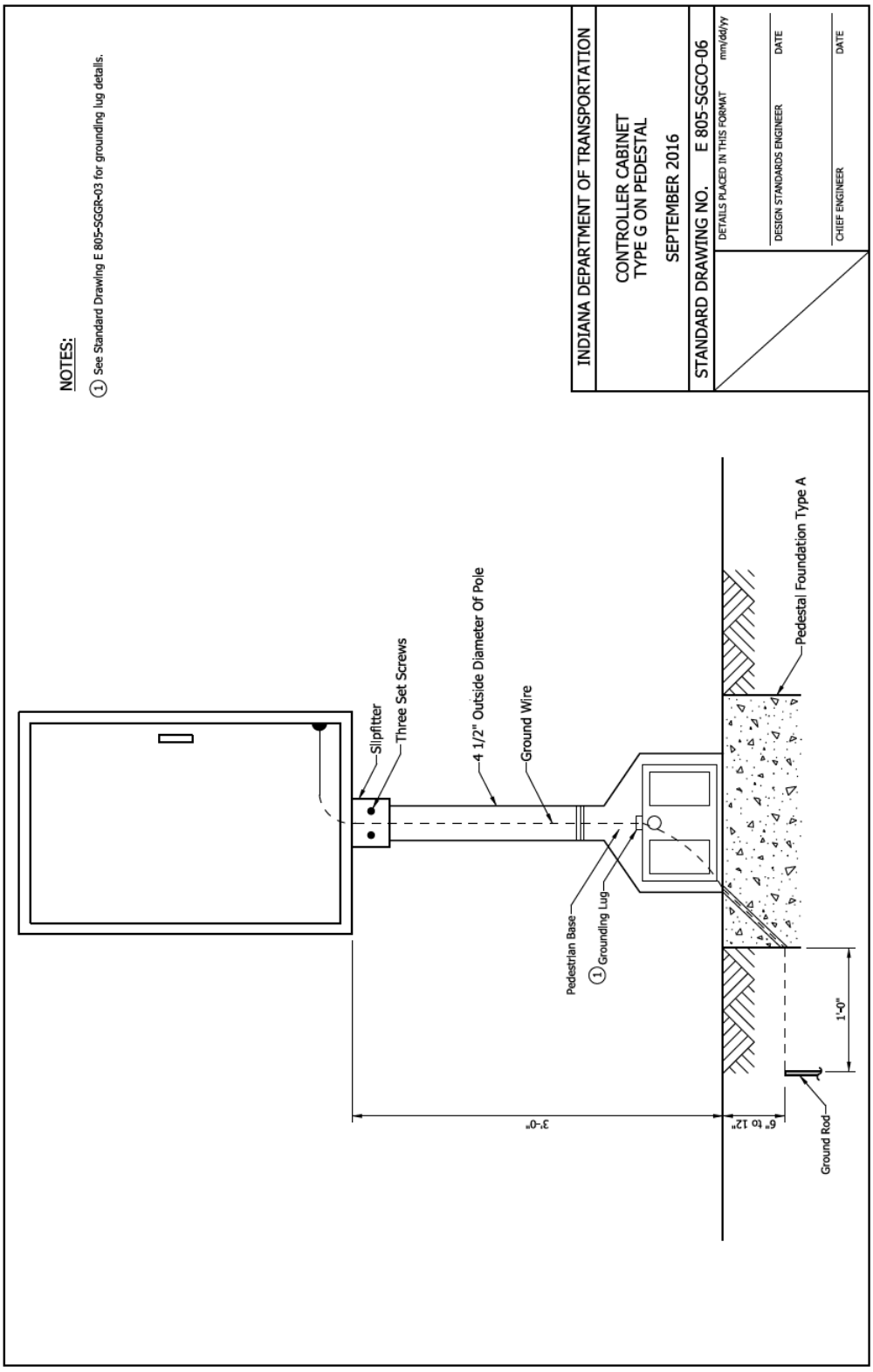
REVISION TO STANDARD DRAWINGS

805-SGCO-05 PEDESTAL MOUNTED SIGNAL INDICATIONS (DRAFT)



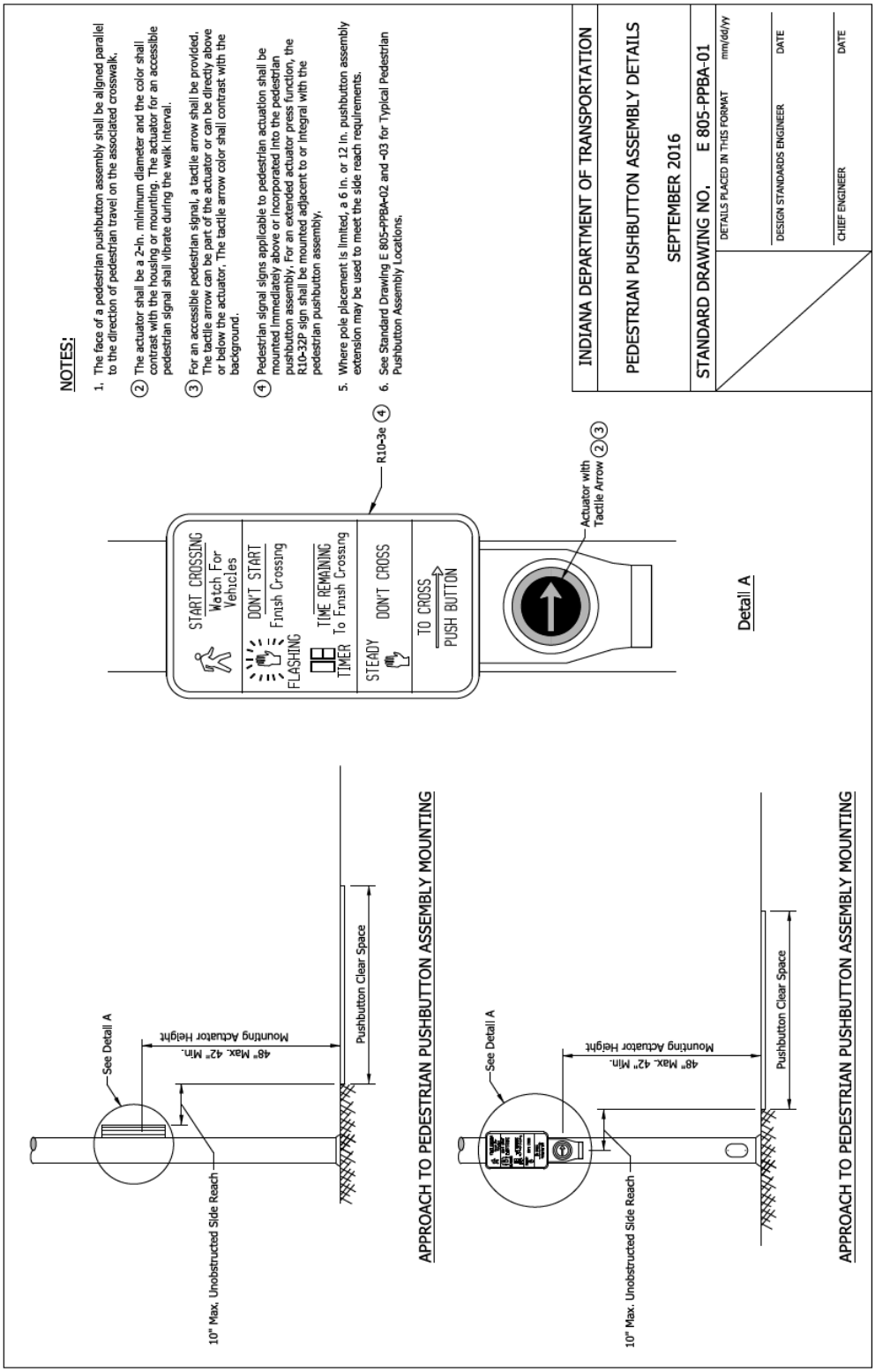
REVISION TO STANDARD DRAWINGS

805-SGCO-06 CONTROLLER CABINET TYPE G ON PEDESTAL (DRAFT)



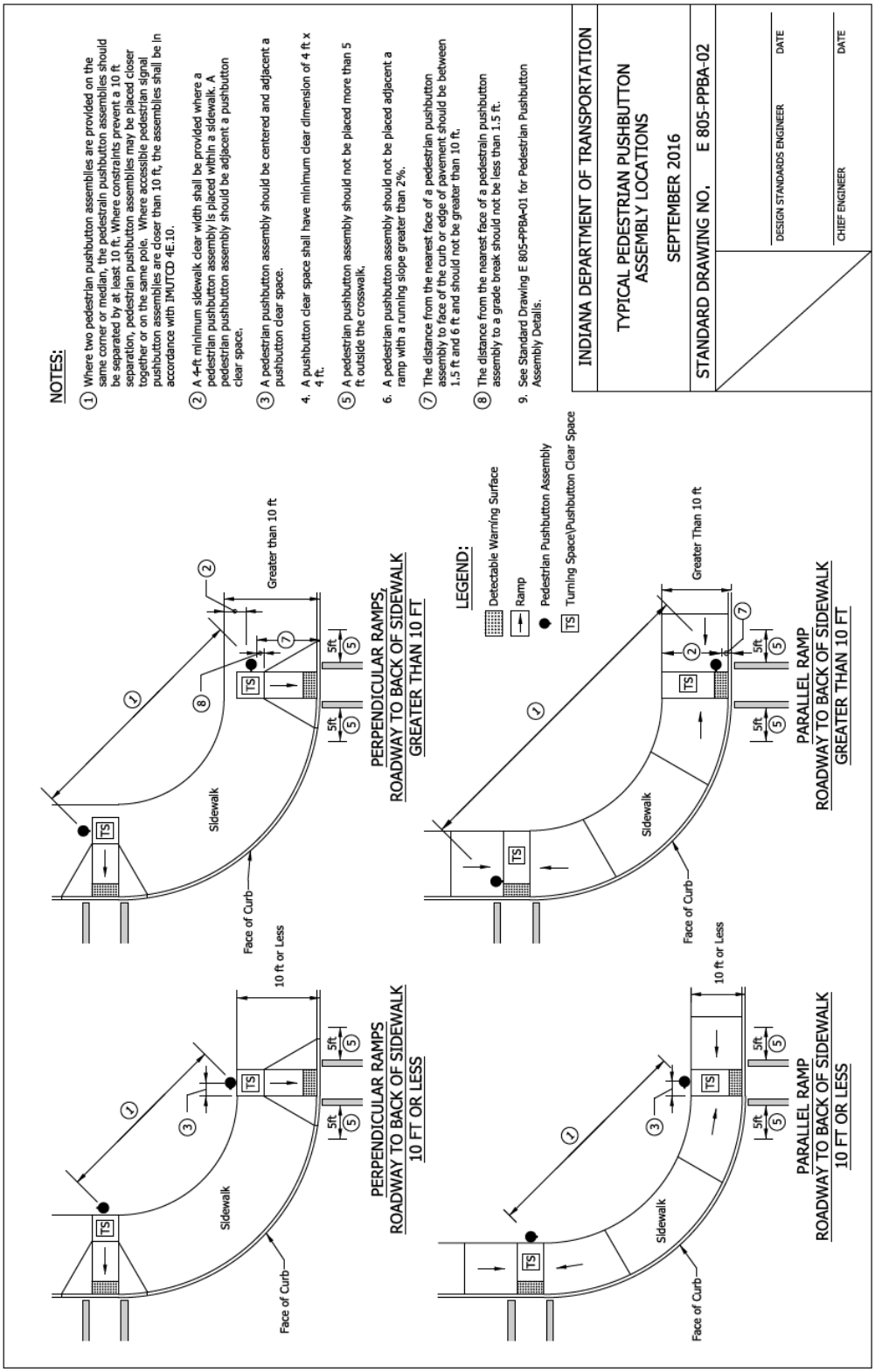
REVISION TO STANDARD DRAWINGS

805-PPBA-01 PEDESTRIAN PUSHBUTTON ASSEMBLY DETAILS (DRAFT)



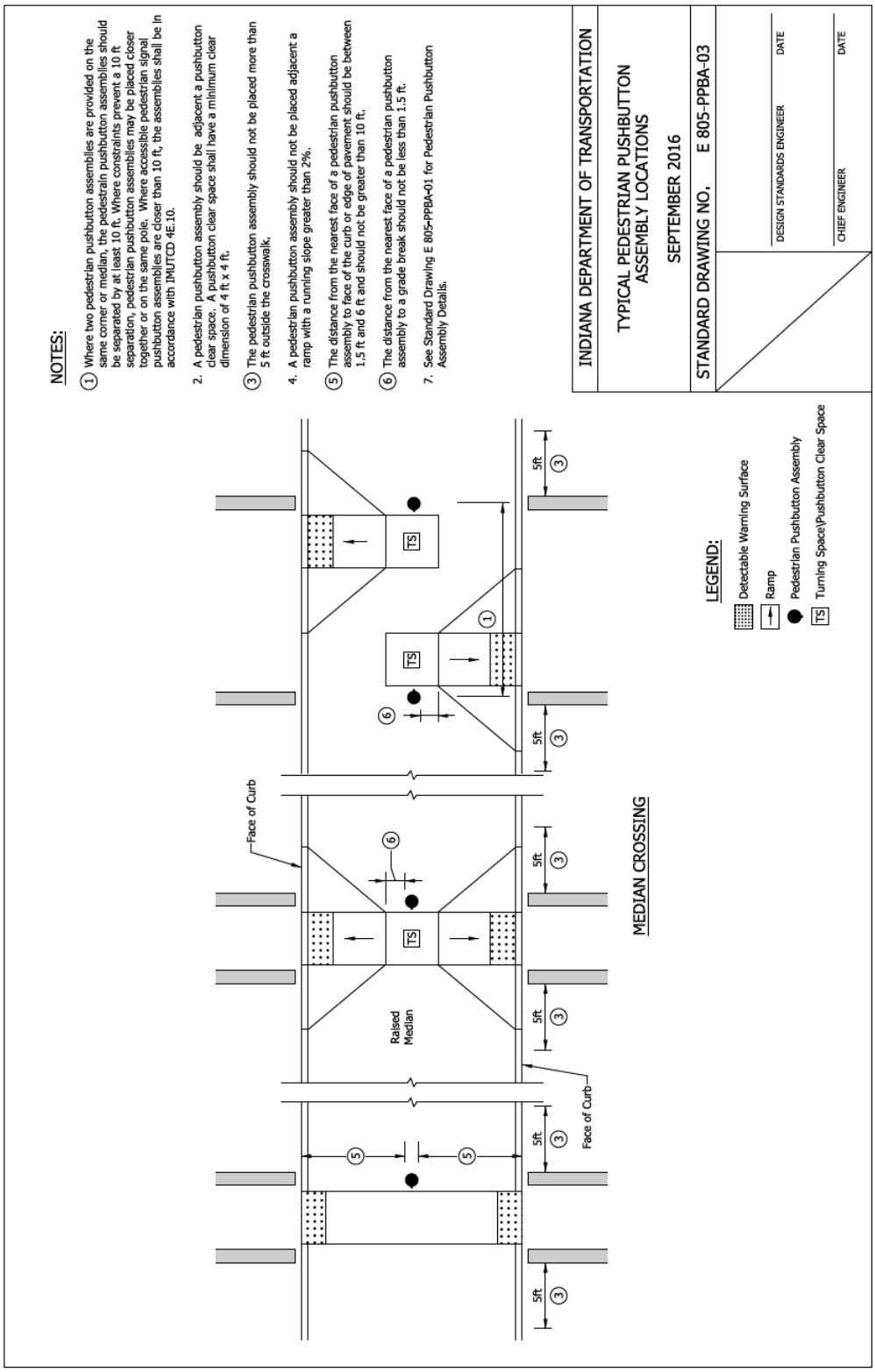
REVISION TO STANDARD DRAWINGS

805-PPBA-02 TYPICAL PEDESTRIAN PUSHBUTTON ASSEMBLY LOCATIONS (DRAFT)



REVISION TO STANDARD DRAWINGS

805-PPBA-03 TYPICAL PEDESTRIAN PUSHBUTTON ASSEMBLY LOCATIONS (DRAFT)



BACKUP 01

REVISION TO IDM 51-1.06 PEDESTRIAN PUSHBUTTON ASSEMBLY, APS AND NON-APS

51-1.06 PEDESTRIAN PUSHBUTTON ASSEMBLY, APS AND NON-APS [REV. AUG. 2016]

51-1.06 (01) Accessible Pedestrian Signal [R209 and R307] [Rev. Aug. 2016]

An accessible pedestrian signal (APS) is a device that communicates information about the WALK and DON'T WALK intervals at a signalized intersection in a visual and non-visual format. This device is essential for a pedestrian who is blind or has low vision to effectively navigate the crossing.

For a new signal installation, signal modernization, or intersection improvement project, the Department will determine whether pedestrian heads are appropriate for the location. If pedestrian heads are appropriate, an APS Study in accordance with Section 502-3.04(05) must be conducted.

51-1.06 (02) Pedestrian Pushbutton Assembly Placement and Configuration [Rev. Aug. 2016]

The placement and configuration of the pedestrian pushbutton assembly is critical to proper function. Engineering judgment is required to determine the optimal installation at each crossing. Variations in curb radius, available right of way, presence of a buffer or curb ramp, and existing infrastructure make each crossing unique.

Details for pedestrian pushbutton assembly placement and configuration are shown on the INDOT *Standard Drawings* series 805-PPBA. The details are in accordance with the IMUTCD 4E.08 – 4E.13 and the *Public Rights-of-Way Accessibility Guidelines* (PROWAG).

The following apply to pushbutton assembly placement and configuration for both APS and Non-APS unless otherwise stated.

1. Pushbutton Clear Space. [R404] A pushbutton clear space should be adjacent a pedestrian pushbutton assembly. The minimum required clear dimensions of a pushbutton clear space are 4 ft by 4 ft. A pushbutton clear space should be free of any grade breaks, may overlap a curb ramp turning space or sidewalk, and may only overlap a ramp with a running slope of 2% or less. It is preferred to overlap a pushbutton clear space with a curb ramp turning space because the turning space provides an adequate level area and close proximity to the crosswalk.

   The running slope and cross slope of a clear space are based on the orientation of the pushbutton assembly. See Figure 51-1P, Pushbutton Clear Space. The running slope may be consistent with the grade of the sidewalk. The cross slope must be 2.00% maximum.

BACKUP 01

REVISION TO IDM 51-1.06 PEDESTRIAN PUSHBUTTON ASSEMBLY, APS AND NON-APS

2. Placement. Where the offset between the face of curb or edge of pavement and the back edge of sidewalk is 10 ft or less, a pedestrian pushbutton assembly should be placed outside the back edge of sidewalk. A pedestrian pushbutton assembly placed outside the back edge of sidewalk is preferred.

Where the offset between the face of curb or edge of pavement and the back edge of sidewalk is greater than 10 ft, or other site constraints exist, e.g. a building at the back edge of sidewalk, placement within the sidewalk or buffer may be necessary.

a. Pedestrian Pushbutton Assembly Outside the Back Edge of Sidewalk. A pedestrian pushbutton assembly should not be placed more than 5 ft outside the associate crosswalk. A pushbutton assembly should be centered adjacent a pushbutton clear space. See Figure 51-1Q, Pedestrian Pushbutton Assembly Outside the Back Edge of Sidewalk, Preferred.

A pushbutton assembly must not be blocked by obstructions, e.g. behind guardrail.

b. Pedestrian Pushbutton Assembly Within a Sidewalk or Buffer. A pedestrian pushbutton assembly should not be placed more than 5 ft outside the associate crosswalk. A pushbutton assembly should be adjacent a pushbutton clear space. Centering on the pushbutton clear space is not required, however the grade break guidance in Item 3 would apply.

The distance from the nearest face of a pushbutton assembly to face of the curb or edge of pavement should be between 1.5 ft and 6 ft and should not be greater than 10 ft. A minimum offset of 1.5 ft from the face of curb or edge of pavement will allow a wheelchair user to remain out of traffic while actuating the pushbutton assembly. A minimum offset of 1.5 ft also provides an appurtenances-free zone along the roadway. See Section 55-5.02, Item 5.

A 4-ft minimum sidewalk clear width must be provided where a pushbutton assembly is placed within a sidewalk.

See Figure 51-1R, Pedestrian Pushbutton Assembly Within a Sidewalk or Buffer.

A pushbutton assembly must not be blocked by an obstruction, e.g. behind street furniture.

3. Grade Break. Where a grade break is adjacent a pushbutton clear space it is preferred to offset the pedestrian pushbutton assembly a minimum of 1.5 ft from the grade break. A wheelchair user positioned on a grade break may become unstable while actuating the pushbutton assembly and enter into traffic prematurely. Figure 51-1R, Pedestrian Pushbutton Assembly Within a Sidewalk or Buffer.

4. Spacing. Where two pedestrian pushbutton assemblies are provided on the same corner of a signalized intersection or within a median, the pushbutton assemblies should be separated by at least 10 ft. Where constraints prevent a 10-ft separation, pushbutton assemblies may be placed closer together or on the same pole. Where APS pushbutton assemblies are closer than 10 ft, special features must be included in accordance with IMUTCD 4E.10 and RSP 805-T-201 until such time as the RSP is incorporated into the *Standard Specifications*. RSP 805-T-202 "ACCESSIBLE PEDESTRIAN SIGNALS WITH SPEECH WALK MESSAGES" should be completed by the designer and included in the contract, when an APS pushbutton assembly is required.

5. Mounting Height and Side Reach. [R406] The actuator of the pedestrian pushbutton assembly must be located between 42 in. and 48 in. above the pushbutton clear space and within a 10-in. unobstructed side reach. See Figure 51-1S, Pedestrian Pushbutton Assembly Mounting Height and Side Reach. Where pole placement is limited, a 6 in. or 12 in. pushbutton assembly extension may be used to meet the side reach criteria.

6. Orientation. The face of a pedestrian pushbutton assembly must be aligned parallel to the direction of pedestrian travel on the associated crosswalk. See Figure 51-1T, Orientation of Pedestrian Pushbutton Assembly.

7. Signage. Pedestrian signal signs must be mounted immediately above or incorporated into the pedestrian pushbutton assembly.

51-1.06(03) Curb Ramp Plan Requirements [Added Aug. 2016]

Each pedestrian pushbutton assembly should be detailed as follows:

1. Plan Views. A symbol and lines representing the pushbutton assembly and pedestrian clear space, respectfully, should be shown in plan view over existing survey or an aerial survey. Use of an aerial survey should consider the effect on file size.

2. Stations and Offsets. The station and offset for each pushbutton assembly should be tabulated or detailed. Where two pedestrian pushbutton assemblies are provided on the same corner of a signalized intersection or within a median, the distance between the two should also be tabulated or detailed.

3. Dimensions. Length and width for each pedestrian clear space should be tabulated or detailed.

4. Slopes. Slopes of the pedestrian clear space, if not detailed with the curb ramp or sidewalk, should be tabulated or detailed.

BACKUP 01

REVISION TO IDM 51-1.06 PEDESTRIAN PUSHBUTTON ASSEMBLY, APS AND NON-APS

An approved Determination of Technical Infeasibility or Technical Inquiry must accompany each pushbutton assembly or pedestrian clear space that does not meet the ADA requirements. Examples of non-compliance include a pushbutton assembly placement or pedestrian clear space slope or dimensions falling outside of the minimum or maximum criteria. See Section 40-8.04(01) Item 3 for requesting a Determination of Technical Infeasibility or Technical Inquiry.

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

502-3.03(02) Pedestrian Control [Rev. Jan. 2016]

The pedestrian feature works in conjunction with the signal controller. This feature allows for the timing of the "Walk" and "Don't Walk" cycles and can be actuated by *pedestrian pushbutton assemblies*~~pedestrian push buttons~~. *IMUTCD* Chapter 4E describes pedestrian control features. See Section 502-3.04(05) for information on the use of pedestrian signals and accessible pedestrian signals.

Advantages of the pedestrian feature include the following.

1. It provides additional time for crossing pedestrians.
2. Where there is minimal pedestrian demand, disruption to the vehicular phases can be minimized.

Disadvantages of the pedestrian feature are as follows.

1. Where *pushbutton assemblies* ~~pedestrian push buttons~~ are required, they must be located in a convenient, accessible location.
2. Pedestrian cycles concurrent with green time can delay right-turning vehicles.
3. It can increase the required minimum green time on the minor street if the major street is wider than the minor street.

502-3.03(03) Preemption

Preemption is the modification of a signal's normal operation to accommodate an occurrence such as the approach of an emergency vehicle, the passage of a train through a nearby grade crossing, priority passage of transit vehicles, or the opening of a moveable bridge. With a microprocessor-based controller, all preemption routines are performed by the controller software. The only necessary external equipment is the preemption call detection device.

Preemption sequences should be shown in the plans or in the special provisions. For information on preemption equipment, the designer should contact the manufacturer. The following describes situations where preemption is used.

1. Railroad-Crossing Preemption. The purpose of the preemption is to clear vehicles from the railroad crossing before the arrival of a train. Where a signalized intersection is within 200 ft of a railroad grade crossing with active warning devices, preemption is required. Where this distance is between 200 ft and 600 ft, a queue analysis should be performed to determine if a highway-traffic queue has the potential for extending across a nearby rail crossing. If the analysis indicates that this potential exists, the traffic signal should be

interconnected with active warning devices at the railroad crossing. The Federal *MUTCD*, the Indiana *MUTCD*, and the *FHWA Railroad-Highway Grade Crossing Handbook* describe preemption strategies and define the requirements for grade-crossing preemption.

Railroad-crossing preemption requires interconnection between the traffic-signal controller and the grade-crossing signal equipment. The preemption routine at the traffic-signal controller is initiated by the approach of a train, as detected by the railroad's controller, and starts with a transition from the current phase into the Track Clear Green interval (TCG). The TCG interval is used to clear vehicles which can be stopped between the railroad-crossing stop line and the intersection. Subsequent signal displays include only those that are not in conflict with the occupied grade crossing. Once the railroad preemption call is cleared, after the train has passed, the traffic signal is returned to normal operations. On a state route, this type of preemption requires an agreement between the State and the Railroad.

Railroad-crossing preemption shall be designed using either simultaneous or advance preemption sufficient to provide for Right-of-Way Transfer Time (RTT) to transition into the TCG interval. The TCG interval shall be sufficient to clear the last vehicle in the queue past the Minimum Track Clear Distance (MTCD), avoid vehicle-gate interaction, and provide separation time as required. Traffic-control signals with railroad preemption should be provided with a back-up power supply.

Best- and worst-case scenarios shall be considered with regard to the signal phase state and all known preemption traps, such as the advance, second train, failed circuit, and vehicular-yellow preemption traps. Pre-signals, queue-cutter signals, and not-to-exceed timers should be considered as options where an engineering study determines that the queue extends into the track area.

Other options to consider for railroad preemption are blank-out signs for protected or permitted left turns, optically programmable heads for pre-signals, and pavement markings and signage to prevent vehicles from stopping on the tracks if inadequate storage distance exists for the design vehicle.

2. Fire-Station or Fire-Route Preemption. The most common preemption method is the activation of the preemption sequence at a fixed point, e.g., a ~~push button~~*pushbutton* located within the fire station. On a state route, this type of preemption requires an agreement between the State and the appropriate local public agency.

The simplest form of fire-station preemption is the installation of a traffic signal, at the fire-station driveway intersection with a major through street. The signal remains in the through-street green display until called by an actuation in the fire station. The signal then provides a timed green indication to the driveway to allow emergency vehicles to enter the major street.

Where the fire station is near a signalized intersection, a preemption sequence can be designed to display a movement permitting the passage of emergency equipment through the intersection.

Where emergency vehicles frequently follow the same route through more than one nearby signal, a fire-route-preemption operation should be provided. Actuation of the fire-station ~~push button~~*pushbutton* will be transmitted to all of the signals along the route and, after a variable timed delay, each signal will provide a preempt movement display. This will provide a one-way green wave away from the fire station, allowing the optimal movement of emergency equipment.

3. Emergency-Vehicle Preemption. The preemption equipment causes the signals to advance to a preempt movement display. On a state route, this type of preemption requires an agreement between the State and the appropriate local governmental agency.

The system used on a state route for identifying the presence of the approaching emergency vehicle uses a light emitter on the emergency vehicle and a photocell receiver for each approach to the intersection. The emitter outputs an intense strobe light flash sequence, coded to distinguish the flash from lightning or other light sources. The electronics package in the receiver identifies the coded flash and generates an output that causes the controller unit to advance through to the desired preempt sequence.

This system requires a specialized transmitting device on each vehicle for which preemption is desired, and it requires that an emergency-vehicle driver activate the transmitters during the run and turns off the transmitter after arriving at the scene. This system also provides directionality of approach and a confirmation light at the signal that notifies the approaching emergency vehicle that the preemption call has been received by the equipment in the traffic-controller cabinet.

4. Transit-Vehicle Priority. Most transit-priority systems are designed to extend an existing green indication for an approaching bus and do not cause the immediate termination of conflicting phases, as occurs for emergency-vehicle preemption. On a state route, this type of preemption requires an agreement between the State and the appropriate local public agency.

One system is a light emitter and receiver system, using the coded, flash-strobe light emitter. An infrared filter is placed over the emitter, so that the flash is invisible to the human eye, and a flash code is used to distinguish the transit preemption call from that for an emergency vehicle. The intersection receiver can be configured to provide both emergency-vehicle preemption and transit priority with the same equipment. Another system uses the same type of radio transmitter and receiver equipment as used for emergency-vehicle preemption.

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

Two other types of transit vehicle detectors have been used and are available. One, a passive detector, can identify the electrical signature of a bus traveling over an inductive loop detector. The other, an active detector, requires a vehicle-mounted transponder that replies to a roadside polling detector.

502-3.03(05) Detector [Rev. Jan. 2016]

1. Operation. The purpose of a detector is to determine the presence or the passage of a vehicle, bicyclist, or pedestrian. This presence or passage detection is sent back to the controller which adjusts the signal accordingly. There are many types of detectors available that can detect the presence or passage of a vehicle. INDOT uses only inductive loop detectors in its signal design. The inductive loop detector is preferred because it can be used for passage or presence detection, vehicular counts, and speed determinations. It is accurate and easy to maintain. Although the inductive loop detector is the system of choice, this does not prevent recommendation of the use of new devices in the future. If, in the designer's opinion, a different detector should be considered, its use must first be coordinated with the district Traffic Engineer and the Traffic Control Systems Division to determine the acceptability of the recommended device and to determine maintenance requirements or equipment needs.

   The detection device can operate in the modes as follows.

   a. Passage, or Pulse, Detection. A passage detector detects the passage of a vehicle moving through the detection zone and ignores the presence of a vehicle stopped within the detection zone. The detector produces a short output pulse once the vehicle enters the detection zone. The loop is a single loop with a diameter of 6 ft, or a regular octagon shape with sides of 2.5-ft length at a spot location upstream of the stop line.

   b. Presence Detection. A presence detector is capable of detecting the presence of a standing or moving vehicle in the detection zone. A signal output is generated for as long as the detected vehicle is within the detection zone, subject to the eventual tuning out of the call by some types of detectors. The long loop design for a long detection area is considered to be a presence detector.

   c. Locking Mode. The controller memory holds the call once a vehicle arrives during the red or yellow display after the vehicle leaves the detection zone, until the call has been satisfied by a green display.

d. Non-Locking Mode. For a non-locking operation, the call is held only while the detector is occupied. The call is voided once the vehicle leaves the detection area. The non-locking mode is used with a presence detector.

e. Delayed Detection. Delayed detection requires a vehicle to be located in the detection area for a certain set time before detection is recorded. If a vehicle leaves the area before the time limit is reached, no detection is registered. This application is appropriate where a right-turn-on-red is allowed.

f. Extended-Call or Stretch Detection. With extended-call detection, the detection is held by the detector after a vehicle has left the detection area. This operation is performed to hold the call until the passing vehicle has had time to reach a predetermined point beyond the detection zone. With a solid-state controller, the extended-call detection is handled by the controller software.

Where the controller is part of a coordinated signal system design, extended or delayed detection should be used to ensure that the local controller will not adversely affect the timing of the system.

2. Inductive Loop Detector. An inductive loop detector consists of four or more turns of wire embedded in the pavement surface. As a vehicle passes over the loop, it changes the inductance of the wire. This change is recorded by an amplifier and is transmitted to the controller as a vehicular detection. NEMA criteria define the requirements for detector units and the *Approved Products List of Traffic Signal and ITS Control Equipment* identifies the detector units approved for use.

The advantages of a loop detector are as follows:

a. it can detect vehicles in both presence and passage modes;
b. it can be used for vehicular counts and speed determination; and
c. it can be designed to satisfy the various site conditions.

A disadvantage of the loop detector is that it is vulnerable to pavement surface problems, e.g., potholes, which can cause breaks in the loops. To alleviate this problem, a sequence of loops should be used.

The types of loop detectors are the long loop, which is rectangular at 6 ft x 20 ft to 65 ft and the short loop, that can be of regular octagon or circular shape. INDOT uses the short loop. The long loop, as a single entity, is being supplanted by a sequence of short loops which emulate the long loop. The INDOT *Standard Drawings* illustrate typical loop layout and installation details. The layout shown in the INDOT *Standard*

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

Drawings is for illustrative purposes only. Each intersection should be designed individually to satisfy local site conditions.

A sequence of loops is used at an intersection for presence detection of vehicles stopped at the traffic signal. A set of loops before the intersection is used to determine the passage of vehicles. The distance from the stop line to these loops is based on the posted speed limit. Section 502-3.04(10) provides additional information on detector locations. Section 502-3.04(11) provides information on loops set up to count traffic.

A preformed loop is a detector loop constructed of the designated number of turns of wire contained inside a protective jacket. It is paved over with concrete or asphalt pavement. A preformed loop may be installed in a 1-, 2-, 3-, or 4-loop configuration. Wires from preformed loops are spliced to the 2-conductor lead-in cable in a handhole or detector housing. The *Approved Products List of Traffic Signal and ITS Control Equipment* identifies the preformed loops approved for use.

3. Other Detector Types. INDOT uses the inductive-loop detector. However, the following other detector types are also available.

   a. Magnetic Detector. A magnetic detector consists of a small coil of wires located inside a protective housing embedded into the roadway surface. As vehicles pass over the device, the detector registers the change in the magnetic field surrounding the device. This signal is recorded by an amplifier and relayed back to the controller as a vehicular detection. A problem with this detector is that it can detect only the passage of a vehicle traveling at a speed of 3 mph or higher. It cannot be used to determine a stopped vehicle's presence. The advantages are ease of installation and resistance to pavement-surfacing problems.

   b. Magnetometer Detector. A magnetometer detector consists of a magnetic metal core with wrapped windings, similar to a transformer. This core is sealed in a cylinder with a diameter of 1 in. and length of 4 in. The detector is placed in a drilled vertical hole about 1 ft into the pavement. A magnetometer detector senses the variation between the magnetic fields caused by the passage or presence of a vehicle. The signal is recorded by an amplifier and is relayed to the controller as a passage or presence vehicle. A magnetometer detector is sufficiently sensitive to detect a bicyclist or to be used as a counting device. A problem with the magnetometer detector is that it does not provide a sharp cutoff at the perimeter of the detection vehicle, i.e., it can detect vehicles in adjacent lanes.

   c. Wireless Vehicle Detector. A wireless vehicle detector is similar to a magnetometer detector except that it uses a low-power radio to transmit the signal to a wireless repeater or receiver processor. The

signal is recorded by an amplifier and is relayed to the controller as a passage or presence vehicle. The detector is placed in a drilled vertical hole of 0.2 ft depth into the pavement. The wireless repeater and receiver processor should be mounted to the signal structures. The ethernet cable for the receiver processor may be placed across the span wire on a span and strain pole installation. A wireless vehicle detector is sufficiently sensitive to detect a bicyclist or to be used as a counting device. A disadvantage is that it must be replaced at least every 10 years and the wireless repeater's batteries must be replaced every 2 years. See Figures 502-3A and 502-3B for installation details.

d. Microloop Detector. A microloop detector is similar to a magnetometer detector. The microloop is installed by drilling a hole of 3 in. diameter to a depth of 1'-6" into the pavement structure, by securing it to the underside of a bridge deck, or inserting a conduit of 3 in. diameter under the pavement to accommodate a non-invasive microloop system. A disadvantage is that it requires motion to activate the triggering circuitry of the detector and it does not detect a stopped vehicle. This type of detector requires two detectors placed side-by-side per lane due to its limited field of detection.

e. Video-Image Detector. The video-image detector consists of one to six video cameras, an automatic control unit, and a supervisor computer. The computer detects a vehicle by comparing the images from the cameras to those stored in memory. The detector can work in both the presence and passage modes. This detector also allows the images to be used for counting and vehicular classification. A housing is required to protect the camera from environmental elements. Problems have been experienced with video detection during adverse weather conditions, e.g., fog, rain, or snow. INDOT allows video detection only for a temporary signal.

4. Pedestrian Detector. The most common pedestrian detector is the *pedestrian pushbutton assembly*~~pushbutton~~. Where pedestrian signals are provided at pedestrian street crossings, they shall include *pedestrian pushbutton assemblies* ~~pedestrian pushbuttons~~ complying with section 4E.08 of the *MUTCD*.

For an accessible pedestrian signal (APS), the pedestrian pushbutton assembly is an integrated device that communicates information about the "Walk" and "Don't Walk" intervals at signalized intersections in *visual and* non-visual formats, i.e., audible tones and vibrotactile surfaces, to pedestrians who are blind or have low vision *in addition to traditional pedestrian signal heads.*

Pedestrian pushbutton assembly ~~Pedestrian pushbutton detectors~~ must ~~be a minimum of 2 in. across in one dimension and contrast visually with their housing or mounting to~~ meet the requirements of the *Americans with Disabilities Act* (ADA). *The actuator must have a 2-in. minimum diameter and contrast visually with the housing or mounting. The actuator for an APS pushbutton assembly, must vibrate during the walk*

interval and a tactile arrow should be mounted on the actuator or the housing directly above or below the actuator. The tactile arrow must contrast with the background. The actuator must be operable with one hand without grasping, pinching or twisting of the wrist and require no more than 5 pounds of force to actuate.

See Section 502-3.04(05) for information on the use of a pedestrian signals *and accessible pedestrian signals.*

5. Bicycle Detector. The following methods are used for bicycle detection.

   a. Pushbutton Detector. With the pushbutton detector, the bicyclist must stop and push the detector button for the controller to record the detection. This can require the bicyclist to leave the roadway and proceed on the sidewalk to reach the detector.

   b. Inductive-Loop Detector. The inductive-loop detector can detect the bicycle without the bicyclist's interaction. For the detector to be most sensitive, the bicycle should be ridden directly over the wire. A problem with a bicycle inductive-loop detector is that it requires metal to be activated. A bicycle tends to include more non-magnetic, man-made materials to increase its strength and reduce its weight. This has reduced the metal content that can be detected.

6. Decision-Making Criteria for Consideration of Another Type of Detection. A detection system other than inductive loops requires plans details. See Figures 502-3A and 502-3B for typical plans details. To use a type of detection other than inductive loops, the designer must provide and submit documentation that one or more of the following conditions have been satisfied.

   a. An inductive loop design will not function because of a physical limitation, e.g., right of way, geometrics, pavement conditions, or obstructed conduit paths.
   b. A full inductive loop design has been considered and there is a post-design lifecycle cost advantage to using a detection system other than loops. No design time cost or labor savings will be considered in lifecycle cost calculations.
   c. A hybrid design using loops at the stop line and wireless magnetometers for advance vehicle detection has been considered and evaluated where a wireless magnetometer has been evaluated for advance vehicle detection only, and the hybrid design is the most cost effective for post-design lifecycle cost.

Written concurrence is required from the Office of Traffic Control Systems or the district Traffic Engineer, or the local agency for a local project, before another type of detection may be used at a specific location.

502-3.03(07) Signal-Support Structure

Traffic-signal heads are installed using span, catenary, and tether cables on four steel strain poles, or with cantilever structures on all four corners. Pedestal or pole-mounted supplemental signals may be used if necessary. Pedestrian-signal heads are mounted on pedestals or poles.

IMUTCD Section 4E.08 provides guidance on the location of *pedestrian pushbutton assemblies*~~pedestrian pushbuttons~~.

A post-mounted signal has the following advantages:

1. low installation costs;
2. ease of maintenance, with no roadway interference;
3. considered most aesthetically acceptable;
4. acceptable locations for pedestrian signals and *pushbutton assemblies*~~pushbuttons~~; and
5. provides visibility where a wide median with left-turn lanes and phasing exist.

A post-mounted signal has the following disadvantages:

1. requires underground wiring which can offset low installation costs;
2. does not provide visibility of signal indications for a motorist due to lateral placement of signal heads;
3. signal indications can be blocked by signs or trees;
4. may not provide a mounting location such that a display with understandable meaning is provided;
5. height limitations can be a problem where the approach is on a vertical curve; and
6. is subject to vehicular impact if installed close to the roadway, particularly in a median.

A cable-span-mounted signal has the following advantages:

1. ease of installation, with less underground work required;
2. allows lateral placement of signal heads for maximum visibility;
3. allows for future adjustments to signal heads;
4. allows signal placement with respect to the stop line;
5. can provide convenient post locations for supplemental signal heads and pedestrian signals and *pedestrian pushbutton assemblies*~~pushbuttons~~;
6. permits bridles to reduce distance from the stop line at a wide intersection as shown on Figure 502-3C; and

7. allows for proper placement of signs.

A cable-span mounted signal has the following disadvantages:

1. seen by some users as aesthetically unpleasing;
2. requires periodic maintenance for span tightening; and
3. prevents passage of over-height vehicles.

A cantilever-mounted signal has the following advantages:

1. allows lateral placement of signal heads and placement relative to the stop line for maximum visibility of signal indications;
2. may provide post locations for supplementary signals or pedestrian signals and *pedestrian pushbutton assemblies*~~pushbuttons~~;
3. accepted as an aesthetically pleasing method for installing overhead signals in a developed area;
4. rigid mountings provide the most positive control of signal movement in wind; and
5. allows better clearance to an overhead obstruction.

A cantilever-mounted signal has the following disadvantages:

1. costs are the highest;
2. on a wide approach, it can be difficult to properly place signal heads; and
3. limited flexibility for addition of new signal heads or signs on an existing cantilever.

For the span, steel strain poles provide greater strength, are easier to maintain, and require less space. Wood poles are limited to temporary installations and require the use of down-guy cables.

Each traffic signal cantilever structure shall be designed to satisfy the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.* Signal cantilever structures and foundations should be as shown on the INDOT *Standard Drawings.* See Section 502-3.03(08) for design criteria for a non-standard structure.

At a rural signalized intersection, overhead highway lighting may be provided where warranted; see Section 502-4.02(03). A traffic signal cantilever structure may be used for the overhead highway lighting. Figure 502-3D provides an illustration of a combination signal-luminaire cantilever structure.

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

502-3.04(04) Placement of Signal Equipment

Available options are limited in determining acceptable locations for the placement of signal pedestals, signal poles, pedestrian detectors, and controller cabinets. Considering roadside safety, these elements should be placed as far back from the roadway as practical. However, due to visibility requirements, limited signal cantilever structure arm lengths, limited right of way, restrictive geometrics, pedestrian requirements, or overhead or underground utility conflicts, traffic signal equipment must be placed relatively close to the travelway. The following should be considered in determining the placement of traffic signal equipment.

1. Traffic Signal Support. A traffic signal support should be placed to provide the lateral clearance as specified in Chapter 49.

2. Controller Cabinet. In determining the location of the controller cabinet, the following should be considered.

   *a. T*he controller cabinet should be placed in a position so that it is unlikely to be struck by an errant vehicle. It should be outside the obstruction-free zone.

   b. T*he controller cabinet should ~~not~~ be placed ~~within~~*outside *a sidewalk. Where placement within a sidewalk is unavoidable the cabinet must not reduce the sidewalk clear width to less than 4 ft*~~sidewalk clear width of 4 ft minimum should be provided~~.

   c. The controller cabinet should be located where it can be accessed by maintenance personnel.

   d. The controller cabinet should be located so that a technician working in the cabinet can see the signal indications in at least one direction.

   e. The controller cabinet should be located where the potential for water damage is minimized.

   f. The controller cabinet should not obstruct intersection visibility *for pedestrian or the motoring public. A controller cabinet should be located away from curb ramps to insure the visibility of pedestrians.*

   g. The power service connect should be close to the controller cabinet.

   h. Where a utility must perform additional work to provide power to the service point, such information should be included in the contract special provisions.

   Pedestrians. If the signal pole must be located in the sidewalk, *the pole must not reduce the sidewalk clear width to less than 4 ft* ~~it should be placed to minimize pedestrian conflicts~~. The signal pole shall not be placed so as to restrict wheelchair access to curb ramps.

   See Section 502-3.04(05) for information on the use of a pedestrian signals and accessible pedestrian signals.

~~**1.** Pedestrian pushbuttons must be conveniently located. *IMUTCD* Sections 4E.08 through 4E.13 provide criteria for ADA accessibility.~~

502-3.04(05) Pedestrian Signal [Rev. Jan. 2016]

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

Pedestrian signal indications should be provided on a new or modernized traffic-signal installation in accordance with *IMUTCD* Section 4E.03.

An INDOT pedestrian signal installation should satisfy the INDOT *Standard Specifications*. For a local-agency facility, a pedestrian signal installation should satisfy ITE criteria and local practice. *IMUTCD* Section 4E.04 provides additional information regarding the location of pedestrian-signal indications.

Where a median cut through is less than 6 ft in the direction of pedestrian travel and the pedestrian street crossing is signalized, the signal should be timed for a complete crossing of the street, Public Rights-of-Way Accessibility Guidelines (PROWAG) R208.2.

The use of an accessible pedestrian signal (APS) at a location will be based on an APS study conducted by the designer or the district Traffic Engineer. *The procedure for completing the study is described in Operations Memo 14-01. This procedure and a* ~~A~~n editable version of the APS Study Report Form ~~is~~ *are* available from the Department's Editable Documents webpage at http://www.in.gov/dot/div/contracts/design/dmforms/ , under Traffic. When an APS is used, the percussive tone should be specified for APS when the *pushbutton assemblies*~~pushbuttons~~ at a curb ramp are separated by 10 ft or more. The speech walk message should be specified for APS when the *pushbutton assemblies*~~pushbuttons~~ at a curb ramp are separated by less than 10 ft. The speech walk message should normally be patterned after the model, "Broadway. Walk sign is on to cross Broadway." The speech walk message must not include commands or tell pedestrians that it is safe to cross. The speech walk message should also avoid superfluous street name terms such as "street" or "avenue" unless necessary to avoid confusion. When a speech walk message is required the Accessible Pedestrian Signals with Speech Walk Messages recurring special provision should be completed and inserted into the contract.

*W*here crosswalks are longer or the ambient noise level is greater, it may be necessary to specify speakers or baffling for the APS. A 7C/14 signal cable should be specified from the controller to each corner with APS.

An APS Guide to Best Practice is available from the National Cooperative Highway Research Program, Project 3-62 at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w117a.pdf.

See Section 51-1.06 for additional information on the placement and configuration of a pedestrian pushbutton assembly.

502-3.04(07) Electrical System

BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

The electrical system consists of electrical cables or wires, connectors, conduit, handholes, etc. Electrical connections between the power supply, controller cabinet, detectors, and signal poles are carried in conduit. The following should be considered in developing the traffic signal wiring plan.

1. Service Connections. Service connections from the local utility lines should go directly to the signal service and then to the controller cabinet. The lines should be as short as practical. The signal service should be located as close to the controller cabinet as practical to minimize the power loss due to the length of cable. The connection between the signal service and the controller cabinet will be placed underground in separate conduits from other signal wires.

   The designer should contact the local utility company and obtain a written estimate of the service connection cost which should be placed in the project file. The District Utility Engineer can provide contact information and assistance.

   A unique special provision should be created for the service connection cost if this cost is greater than the amount that is recoverable through the first two and a half years of energy billing and, if applicable, the cost of the REMC membership fee. Currently this recoverable amount is about $750. The special provision should indicate the additional non-recoverable part of the estimated costs of the service connection and that the additional non-recoverable costs are included in the cost of Signal Service.

2. Electrical Cables. The number of conductor cables should be kept to only 3 or 4 types of cables, to reduce inventory requirements. A 7-or-greater conductor cable is used between the controller cabinet and the disconnect hangers or cantilever base. A 5-conductor cable is used between the disconnect hanger or cantilever base and 3-section signal indications. A 7-conductor cable is used between the disconnect hanger or cantilever base and 5-section signal indications. A 5-conductor cable is used between the controller cabinet and each pair of pedestrian signal indications located in the same corner of the intersection. A 5-conductor cable is used between the controller cabinet and each pair of *pedestrian pushbutton assemblies* ~~pedestrian push buttons~~ located in the same corner of the intersection. Where only one *pedestrian pushbutton assembly* ~~push button~~ is used, a 3-conductor cable should be used. Connections to flashers use only a 3-conductor cable.

3. Cable Runs. All electrical cable runs should be continuous between the following:

   a. controller cabinet to base of cantilever structure or pedestal;
   b. controller cabinet to disconnect hangers;
   c. controller cabinet to signal service;
   d. disconnect hanger to signal indications;
   e. base of cantilever structure to signal indications; and

f. controller cabinet to detector housing.

4. Handholes. Handholes should be located outside the travel lane and shoulder pavement adjacent to the controller cabinet, each signal structure, and each detector location.

Type I handholes are made of reinforced concrete pipe; Type II handholes are made of polymer concrete; and Type III handholes are a special design requiring the cover and ring to be secured to the handhole. The material type that should be used will depend on the location as follows.

a. A Type I (concrete) handhole should be used for a location that will be closer to motor vehicles, such as in the shoulder or immediately adjacent to the unprotected edge of pavement.

b. *A* Type II (polymer concrete) handhole should be used for a location that will not be exposed to motor vehicles, such as on a *buffer*, sidewalk, behind guardrail or non-mountable curb, or as directed by the District Traffic or District Maintenance Office. *A handhole located within a sidewalk should ~~provide a 4 ft minimum sidewalk clear width.~~*be installed such that the top of the handhole cover is flush with the sidewalk. *A handhole should ~~not~~ be located ~~within~~*outside *a curb ramp*., *~~where avoidable.~~*

c. A handhole that will be placed directly in a travel lane should be designated as a Type III and will require a special design and plan detail that includes a means by which the cover and ring are secured to the handhole.

The INDOT *Standard Drawings* provide details of handholes and wiring. The maximum spacing between handholes in the same conduit run is 250 ft.

5. Underground Conduit. Underground conduit is used to connect the controller cabinet, traffic signal structures, and loop detectors. A conduit of 2 in. diameter should be used. The *National Electrical Code* should be checked to determine the appropriate number of electrical cables that can be contained within the conduit. For a run with additional cables, the conduit size may need to be increased. The INDOT *Standard Drawings* provide details on the placement of underground conduit.

The designer should indicate which material type should be used. The conduit type should be determined based on the following guidelines.

a. PVC Schedule 40, HDPE Schedule 40, or rigid fiberglass should be used for conduit placed in a trench.

b. HDPE Schedule 80 should be used for conduit to be jacked or bored, e.g., underneath pavement.

c. Galvanized Steel should be used if requested or confirmed by the District Traffic Office.

d. PVC Schedule 80 or rigid fiberglass should be used for conduit on bridges or other structures.

6. Grounding. Each overhead signal structure, controller cabinet, signal pedestal, warning flashing beacon, etc., must be grounded. The INDOT *Standard Drawings* illustrate the correct procedures for grounding these devices.

7. Detector Housing. A detector housing should be a cast-aluminum box encased in concrete. A detector housing is used to splice the wires from the loops to the lead-in cable to the detector amplifier. The INDOT *Standard Drawings* provide additional information on detector housings, including wiring details.

8. Disconnect Hanger. A disconnect hanger is used for cable-span-mounted signals to provide a junction box between the signal heads and the controller.

9. Interconnect Cable. For a closed loop system using an interconnect cable, fiber optic cable should be used. Other types of interconnect cable are 7C/14 signal wire and 6-pair twisted cable.

502-3.04(10) Traffic-Actuated Signal Timing

For an actuated controller, the district and the Traffic Control Systems Division will be responsible for timing on a state highway after the controller is installed. However, the designer must understand how the signal timing will affect the efficiency of the actuated signalized intersection. With an actuated controller, the designer must understand how the signal timing will affect the placement of the traffic detectors.

The design of actuated control is a trade-off process where optimization of the location of vehicular detection provides safe operation while providing controller settings that will minimize the intersection delay. The compromises that must be made among these conflicting criteria become difficult to resolve as approach speed increases. For example, on an approach with speed of higher than 35 mph, the detector should be located in advance of the indecision zone. The indecision zone is the decision area, on such an approach, where the motorist needs to decide whether to go through the intersection or to stop once the yellow interval begins. Depending on the distance from the intersection and vehicular speed, the motorist may be uncertain whether to stop or continue through the intersection, thus,

creating the indecision problem. Figure 502-3AA further defines the indecision zone. The design considerations for an actuated controller are as follows.

1. Advanced-Design Actuated Controller. An advanced-design actuated controller is used at an isolated intersection with fluctuating or unpredictable traffic demands, and approach speed higher than 35 mph. INDOT uses this type of controller, irrespective of the approach speed. An advanced-design actuated controller is one that has a variable initial interval. It can count waiting vehicles beyond the first one, and can extend the initial interval to satisfy the needs of the number of vehicles actually stored between the stop line and the detector. As with basic-actuated control, the small-area detection requires that the controller have a locking memory.

   The timing requires judgment. Therefore, field adjustments are often required after the initial setup. The considerations in signal timing and detector placement are as follows.

   a. Detector Placement. For an approach with speed of higher than 35 mph, the detector should be located in advance of the indecision zone (see Figure 502-3AA). This will place the detector at about 5 s of passage time from the intersection. The speed selected should be the posted speed of the approach roadway. Figure 502-3BB provides the appropriate detector set-back distance for each combination of passage time and approach speed. Figure 502-3BB also provides the passage time that is appropriate for other types of detection.

   b. Vehicular Extension. The vehicular extension setting fixes both the allowable gap and the passage of time at one value. The extension should be long enough so that a vehicle can travel from the detector to the intersection while the signal is held in the green phase. However, the allowable gap should be kept short to ensure transfer of the green phase to the side street. Headway between vehicles in a platoon averages between 2 and 3 s. Therefore, the minimum vehicular extension time should be at least 3 s. For the maximum gap, a motorist waiting during the red phase finds that a gap of 5 s or longer is too long and inefficient. Therefore, the vehicular extension should be set between 3 and 5 s. For faster phase changes, a shorter gap should be used.

   c. Minimum Initial. Because the advanced-design actuated controller can count the number of vehicular arrivals, the minimum initial time should be long enough only to satisfy motorist expectancy. The minimum initial interval is set at 8 to 15 s for a through movement, and 5 to 7 s for a left turn.

   d. Variable Initial. The variable initial is the upper limit to which the minimum initial can be extended. It must be long enough to clear all vehicles that have accumulated between the detector

and the stop line during the red phase. The minimum assured green phase (MAG) should be between 10 and 20 s for each major movement. The actual value selected should be based on the time it takes to clear all possible stored vehicles between the stop line and the detector. If the MAG is too short, the stored vehicles may be unable to reach the stop line before the signal changes. This time can be calculated using Equation 502-3.6.

$$MAG = 3.7 + 2.1\ n \qquad \text{[Equation 502-3.6]}$$

Where:

MAG = minimum assured green, s
n = number of vehicles per lane which can be stored between the stop line and the detector

The minimum green time selected should be able to service at least two vehicles per lane. Using Equation 502-3.6, this translates into approximately 8 s. Assuming that two vehicles occupy approximately 45 ft, the detector should not be placed closer than 45 ft from the stop line. Closer placement will not reduce the MAG.

Where pedestrians must be accommodated, a pedestrian detector, e.g., *pedestrian pushbutton assembly*~~pushbutton~~, should be provided. Where a pedestrian call has been detected, the MAG must be sufficient enough for the pedestrian to cross the intersection. The minimum time for a pedestrian, as discussed in Section 502-3.04(09) for a pretimed signal, is also applicable to an actuated system.

e. Number of Actuations. The number of actuations is the number of vehicles that can be accommodated during the red phase that will extend the initial green phase to the variable initial limit. This is a function of the number of approach lanes, average vehicle length, and lane distribution. It should be set based on vehicles being stored back to the detector.

f. Passage Time. The passage time is the time required for a vehicle to pass from the detector to the stop line. This is based on the posted speed limit of the approach roadway.

g. Maximum Green Interval. This is the maximum time that the green interval should be held for the green phase, given a detection from the side street. For a low to moderate traffic volume, the signal should gap out before reaching the maximum green time. However, for a period with high traffic volume, the signal will rarely gap out. Therefore, a maximum green interval is set to accommodate

the waiting vehicles. The maximum green interval can be determined assuming a pretimed intersection; see Section 502-3.04(09). It may be made longer to allow for peaking.

h. Allowable Gap. A density-type controller permits a gradual reduction of the allowable gap to a preset minimum gap based on one or more cross-street traffic parameters of time waiting, vehicles waiting, or density. Time waiting has been determined to be the most reliable and usable. As time passes after a conflicting call, the allowable gap time is gradually reduced. The appropriate minimum gap setting will depend on the number of approach lanes, the volume of traffic and the various times of day. Adjustments will need to be made in the field.

i. Clearance Interval. The clearance interval should be determined as for a pretimed signal. See Section 502-3.04(09).

j. Semi-Actuated Controller. For a minor street with semi-actuated control, the signal is held on green for the major street. To ensure that the major street is not interrupted too frequently, a long minimum green period should be used on the major street. The low-volume minor street is expected to experience delay.

k. Intermediate Traffic. Where vehicles can enter the roadway between the detector and intersection, e.g., driveway, side parking, or where a vehicle may be traveling so slow that it does not clear the intersection in the calculated clearance time, the signal controller will not register its presence. A presence detector at the stop line may be required to address this.

2. Actuated Controller with Large Detection Area. A large-area detector is used with an actuated controller in the non-locking memory mode, and with the initial interval and vehicular extension set at or near zero. This is loop occupancy control (LOC). A large-area detector is used in the presence mode, which holds the vehicle call for as long as the vehicle remains over the loop. An advantage of a large-area detector is that it reduces the number of false calls due to right-turn-on-red vehicles. A large-area detector consists of four octagonal 6 ft x 6 ft or circular 6-ft diameter small loops, 9 ft apart connected in series; see the INDOT *Standard Drawings*. With a large area detector, the length of the green time is determined based on the time the area is occupied. However, a minimum initial time should be provided for motorist expectancy. Applications for LOC are as follows.

a. Left-Turn Lane. An LOC arrangement is appropriate for a left-turn lane where left turns can be serviced on a permissive green or yellow clearance or where vehicles can enter the left-turn lane beyond the initial detector. The following should be considered in using the LOC for left turns.

1) To ensure that the motorist is committed to making the left turn, the initial loop detector may need to be installed beyond the stop line to hold the call.

2) Where motorcycles are part of the vehicular volume, the vehicular extension may need to be set to 1 s so that a motorcycle will be able to hold the call as it passes from loop to loop. An alternative is to use the extended-call detector.

b. Through Lanes for a Low-Speed Approach. For a low-speed approach of 35 mph or lower, the indecision zone protection is not considered a problem. The detection area length and controller settings are determined based on the desired allowable gap. For example, assuming an approach speed of 30 mph and desired allowable gap of 3 s, the LOC area length is calculated to be as follows:

$$\frac{30\ mi}{h}\ x\ 3\ s\ x\ \frac{5280\ ft}{mi}\quad x\quad \frac{h}{3600\ s}\quad =\ 132\ ft$$

The vehicular length of 20 ft should be subtracted from the LOC, so that the required detector area length is 112 ft. The loop layout length is only 45 ft, therefore, for a 30-mph approach speed, the vehicular extension setting should be set at 1.5 s to provide the 3 s gap.

If the initial interval is set at zero and the vehicular extension is between zero and 1 s, under light traffic conditions, a green interval as short as 2 or 4 s may occur. The presence of pedestrian or bicyclists should be determined. If so, the minimum green time for their crossing should be provided. Motorist expectancy should also be considered. A motorist for a major-road through movement expects a minimum green interval of 8 to 15 s.

c. Through Lanes for a High-Speed Approach. For a high-speed approach of speed higher than 35 mph, it is not practical to extend the LOC beyond the indecision zone, or 5 s of passage time back from the stop line. To solve the indecision-zone problem, an extended-call detector is placed beyond the indecision zone. This detector is used in a non-locking mode. The time extension is based on the time for the vehicle to reach the LOC area. Intermediate detectors may be used to discriminate the gaps.

Concerns with using the LOC concept for a high-speed approach include the following.

1) The allowable gap is higher than the desired 1.5 to 3 s. The controller's ability to detect gaps in traffic is impaired. As a result, moderate traffic will extend the green interval to the maximum setting, which is undesirable.

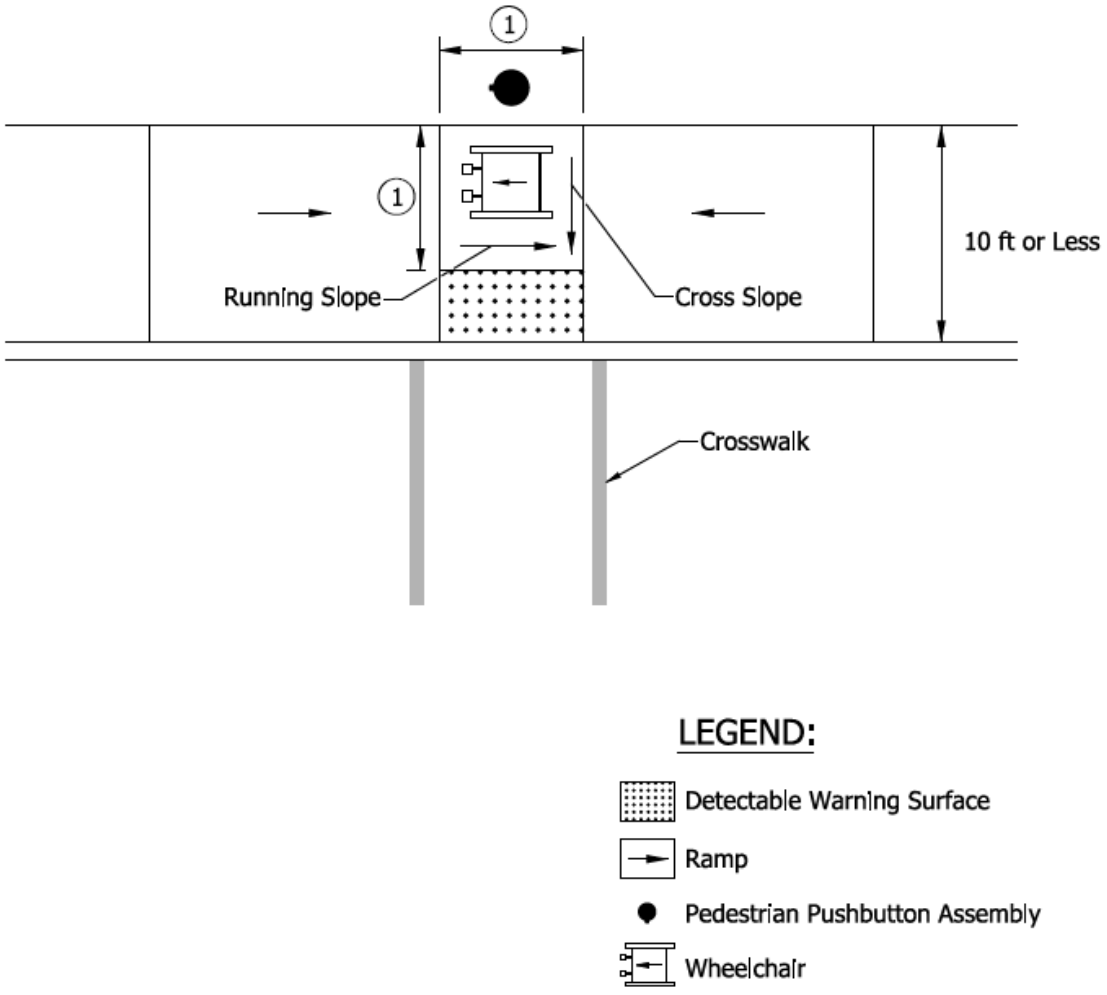
BACKUP 02

REVISION TO IDM 502-3.0 TRAFFIC SIGNAL

2) An LOC should be used only if the route's ADT is 8,000 to 10,000. A high-speed approach with a higher volume is more efficiently served with a density controller. The intersection of a high-speed artery with a low-speed crossroad is more efficiently served with a density controller on the artery and an LOC for the crossroad.

BACKUP 03

REVISION TO IDM FIGURE 51-1P PUSHBUTTON CLEAR SPACE



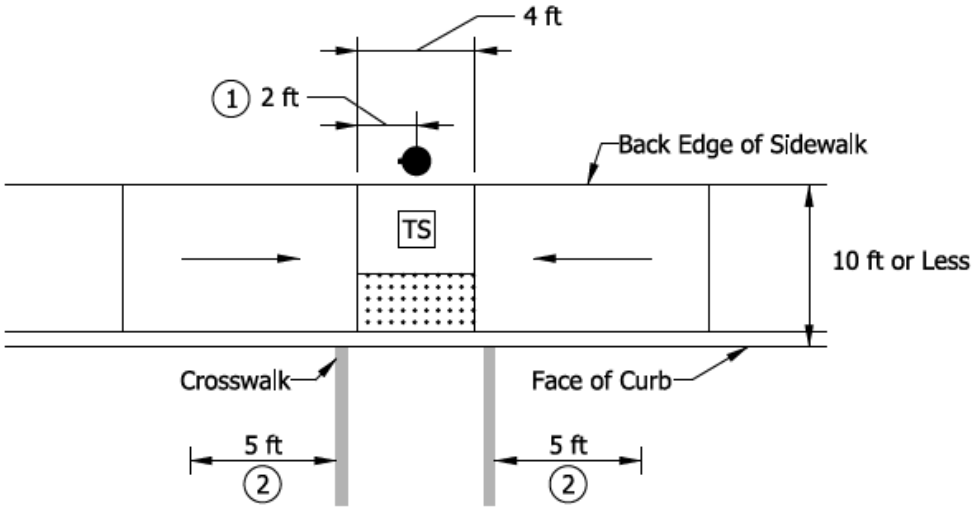
(1) The minimum required clear dimensions of a pushbutton clear space are 4 ft by 4 ft.

PUSHBUTTON CLEAR SPACE

Figure 51-1P

BACKUP 04

REVISION TO IDM FIGURE 51-1Q PEDESTRIAN PUSHBUTTON ASSEMBLY OUTSIDE THE BACK EDGE OF SIDEWALK, PREFERRED



1 A pushbutton assembly should be centered adjacent a pedestrian clear space. Overlapping a pushbutton clear space with a curb ramp turning space is preferred.

2 A pushbutton assembly should not be placed more than 5 ft outside the crosswalk. A pushbutton assembly may only be placed adjacent a ramp with a running slope of 2% or less.

LEGEND:

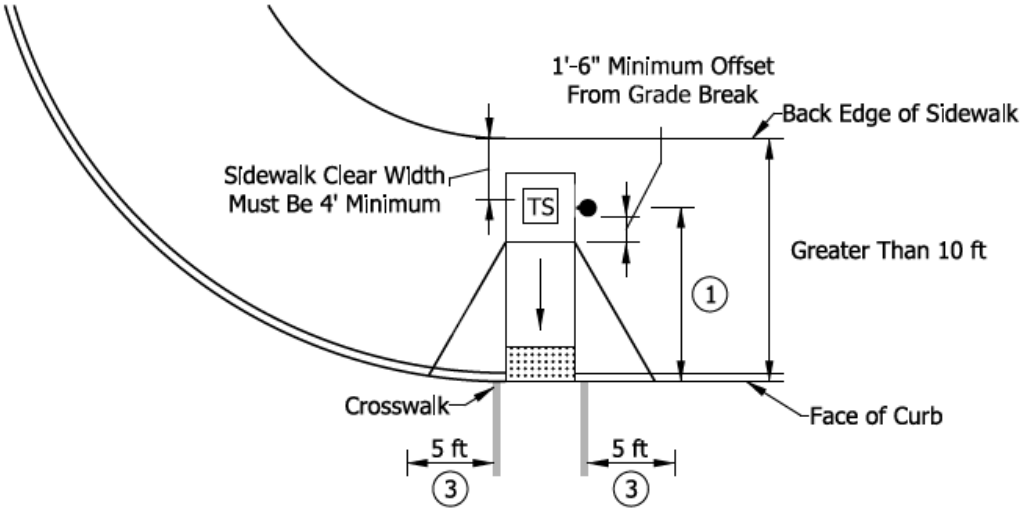
- Detectable Warning Surface
- Ramp
- Pedestrian Pushbutton Assembly
- TS Turning Space\Pushbutton Clear Space

PEDESTRIAN PUSHBUTTON ASSEMBLY OUTSIDE THE BACK EDGE OF SIDEWALK, PREFERRED

Figure 51-1Q

BACKUP 05

REVISION TO IDM FIGURE 51-1R PEDESTRIAN PUSHBUTTON ASSEMBLY WITH A SIDEWALK OR BUFFER



1. The distance from a pushbutton assembly to face of the curb or edge of pavement should be between 1.5 ft and 6 ft and should not be greater than 10 ft. A minimum offset of 1.5 ft from the face of curb or edge of pavement will allow a wheelchair user to remain out of traffic while actuating the pushbutton assembly. A minimum offset of 1.5 ft also provides an appurtenances-free zone along the roadway.

2. A pedestrian pushbutton assembly should be adjacent a pedestrian clear space. Overlapping the pushbutton clear space with a curb ramp turning space is preferred.

3. A pushbutton assembly should not be placed more than 5 ft outside the crosswalk. A pushbutton assembly may only be placed adjacent a ramp with a running slope of 2% or less.

LEGEND:

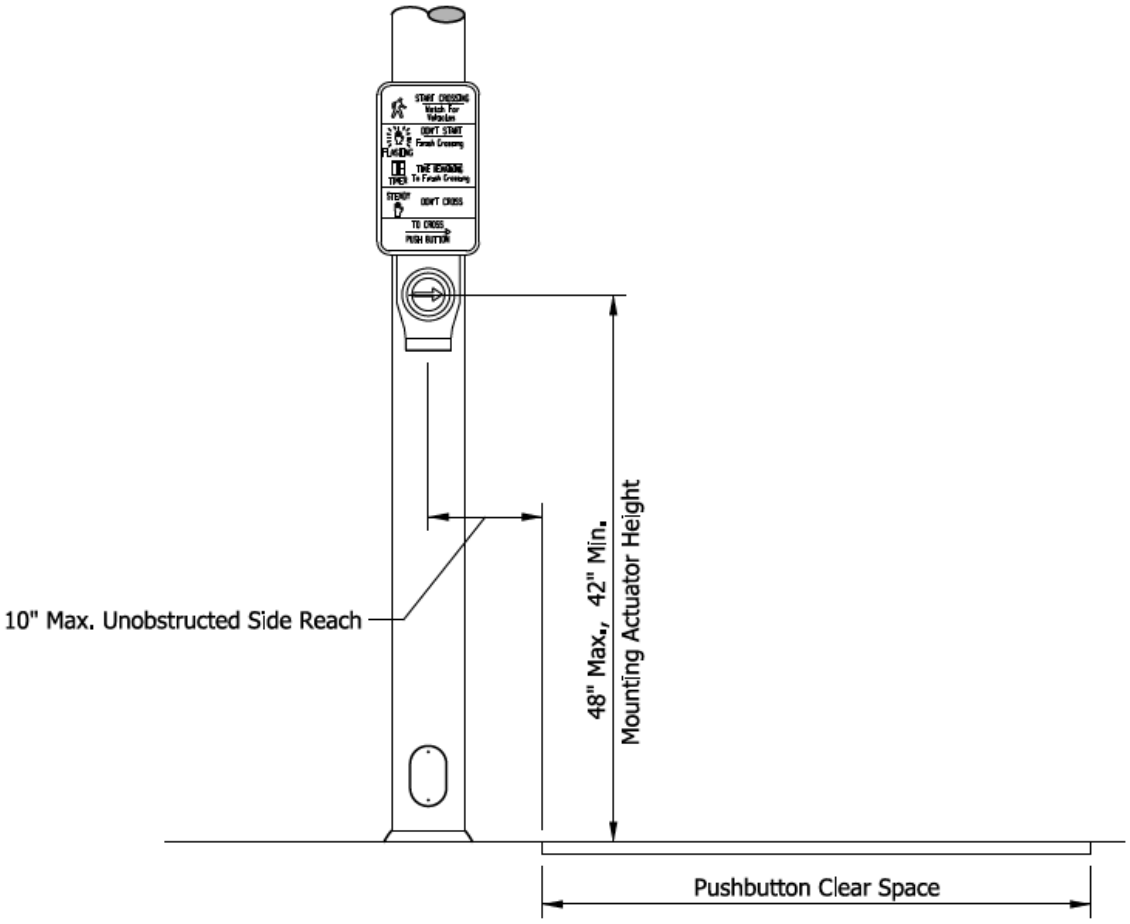
- Detectable Warning Surface
- Ramp
- Pedestrian Pushbutton Assembly
- TS Turning Space\Pushbutton Clear Space

PEDESTRIAN PUSHBUTTON ASSEMBLY
WITHIN A SIDEWALK OR BUFFER

Figure 51-1R

BACKUP 06

REVISION TO IDM FIGURE 51-1S PEDESTRIAN PUSHBUTTON MOUNTING HEIGHT AND SIDE REACH

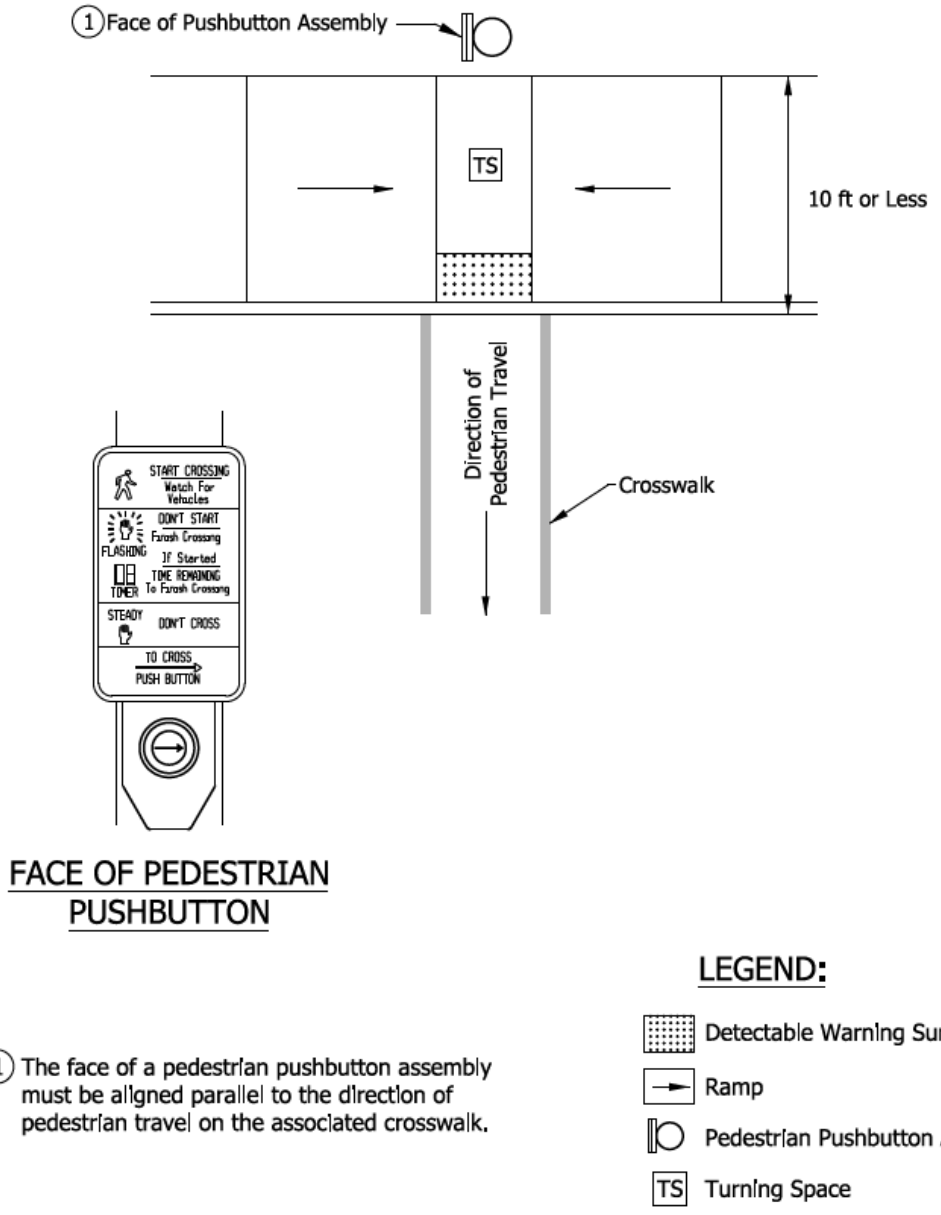


PEDESTRIAN PUSHBUTTON ASSEMBLY MOUNTING HEIGHT AND SIDE REACH

Figure 51-1S

BACKUP 07

REVISION TO IDM FIGURE 51-1T ORIENTATION OF PEDESTRIAN PUSHBUTTON ASSEMBLY



1 The face of a pedestrian pushbutton assembly must be aligned parallel to the direction of pedestrian travel on the associated crosswalk.

LEGEND:

- Detectable Warning Surface
- Ramp
- Pedestrian Pushbutton Assembly
- TS Turning Space

ORIENTATION OF PEDESTRIAN PUSHBUTTON ASSEMBLY

Figure 51-1T

COMMENTS AND ACTION

805-SGCO-01 THRU 06 SIGNAL SERVICE & CONTROLLER
805-PPBA-01 THRU 03 PEDESTRIAN PUSHBUTTON ASSEMBLY

DISCUSSION:
Ms. Phillips introduced and presented this item stating the need to update existing standard drawings, the E 805-SGCO Series, add new standard drawings, the E 805-PPBA Series, and revise the Indiana Design Manual to comply with the PROWAG, IMUTCD, and RSP 805-T-201.

Ms. Phillips also stated that creating a clear understanding of the APS and Non-APS pushbutton assembly placement will help enforce the PROWAG, IMUTCD, and RSP 805-T-201 and eliminate confusion between the plans, PROWAG, IMUTCD and RSP 805-T-201. Ms. Phillips also explained some the details shown on some of the new drawings.

Mr. Pankow inquired about the median crossings and if those are flat or elevated and Mr. Boruff recommended that the notes on the drawings state that the surface be “walkable”. Ms. Phillips agreed that those notes should be included and that she will implement them.

Mr. Bruno asked if the drawings could reflect the correct configuration for the pedestrian signals, since what is currently shown is the old configuration. Ms. Phillips agreed and said that it will be addressed and updated.

Much discussion ensued concerning making sure the ped heads (pedestrian push button assemblies with arrows) are pointed in the correct directions and that they are located properly no matter what the site conditions make dictate. Ms. Phillips expressed that the intention is to bring forward the desired intentions of the MUTCD. Mr. Pankow expressed concern about the language used for the designers to make sure the MUTCD is followed, and Mr. Cales expressed that there should be a detail shown on the plans for special circumstances due to possible retrofit of existing conditions. Ms. Phillips also expressed the desire to maintain accessibility of the devices. Ms. Phillips agreed that some editorial revisions are necessary for clarification. (Surface requirements, illustration of ped heads, language clarification, order of min. max., arrow direction requirements.)

COMMENTS AND ACTION

805-SGCO-01 THRU 06 SIGNAL SERVICE & CONTROLLER
805-PPBA-01 THRU 03 PEDESTRIAN PUSHBUTTON ASSEMBLY

(CONTINUED)

Motion: Ms. Phillips Second: Mr. Cales Ayes: 8 Nays: 0 FHWA Approval: YES	Action: _____ Passed as Submitted __X__ Passed as Revised __ __ Withdrawn
Standard Specifications Sections referenced and/or affected: SEE PROPOSAL Recurring Special Provision affected: SEE PROPOSAL Standard Drawing affected: SEE PROPOSAL Design Manual Sections affected: SEE PROPOSAL GIFE Sections cross-references: NONE	_____ 2018 Standard Specifications _____ Revise Pay Items List _____ Create RSP (No._____) Effective _____ Letting RSP Sunset Date: _____ Revise RSP (No._____) Effective _____ Letting RSP Sunset Date: __X__ Standard Drawings Effective Sept.01, 2017 __X__ Create RPD (No. 805-T-201d and 805-T-215d) Effective Jan.01, 2017 Letting __X__ GIFE Update _____ SiteManager Update