2014 Traffic Technical Training
Permanent Signing

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LOTS of Updates for 2014!

- Manuals and Policies
- Standard Specifications
- Project Signing Plan Design and Construction Issues
- Information/Updates for Counties

Handout Materials

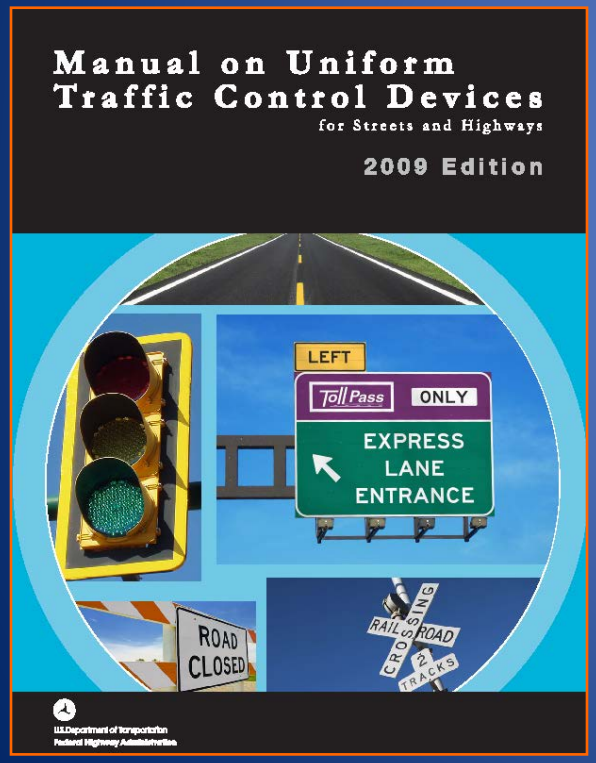
HANDOUT P 000

Reference Material Provided

- If a page in the handout is referenced in a slide, a notice marker will appear

Permanent Signing

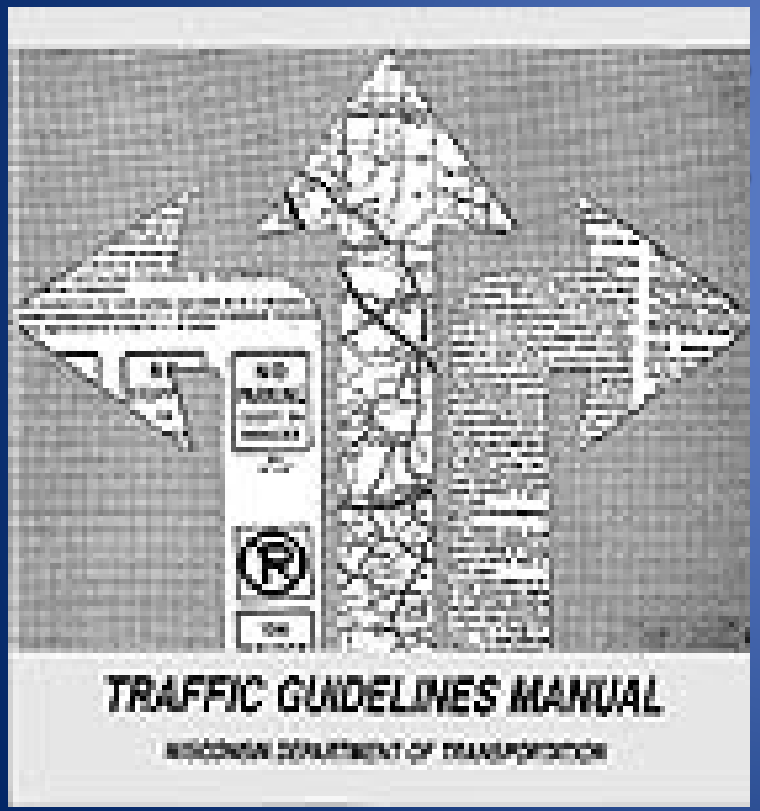
The 2009 MUTCD and Wisconsin Supplement



- Applies to all roadways open to public travel in Wisconsin

Permanent Signing

Traffic Guidelines Manual



- Chapter 2 Signing
- Applies to state maintained roadways

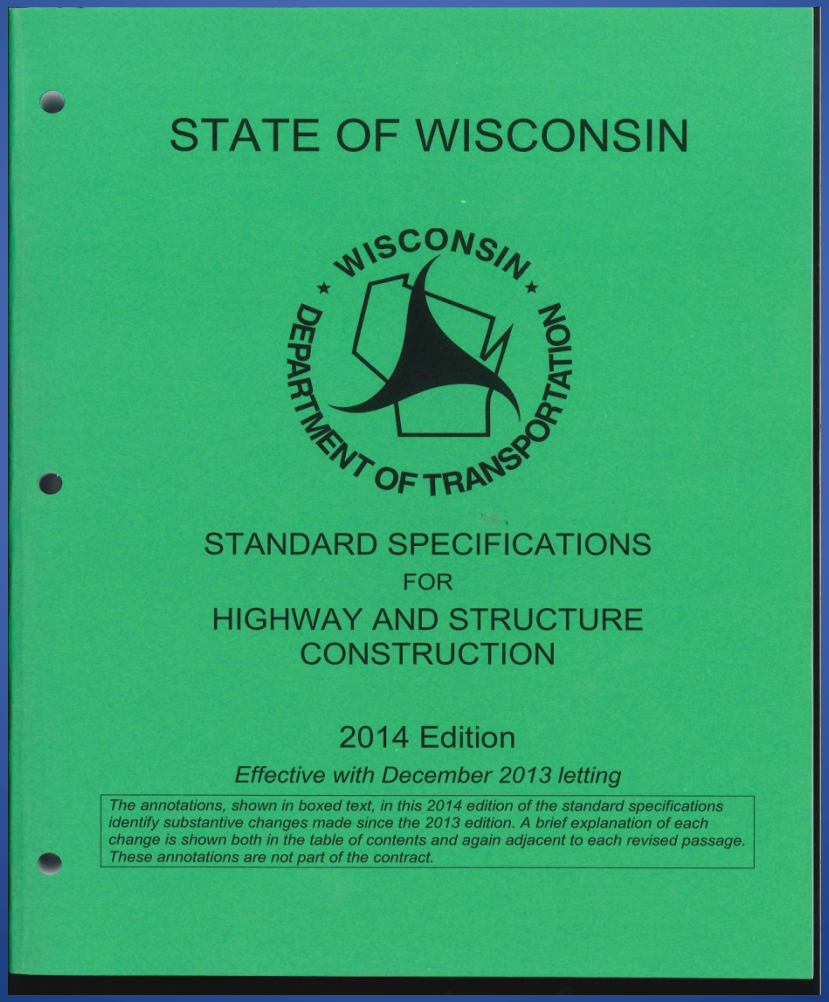
Permanent Signing

HANDOUT P 2

Other Manuals / Specifications

- Sign Plan Design Guidance in FDM
- Sign Code Book
- Standard Sign Plates
- Wisconsin DOT Standard Construction Specifications

Standard Specifications



Permanent Signing

Larger Sign Sizes for certain signs on multi-lane roads with speed limits of 40 mph or more

Permanent Signing

Sizes of Signs: TGM 2-1-35

- Size 1: Minimum Size. Used for 30 mph or less, single lane, non state trunk, non connecting highway
- Size 2S: Single Lane Conventional or Multi-Lane Conventional with posted speed of 35 mph or less
- Size 2M: Multi-Lane Conventional with posted speed of 40 mph

Permanent Signing

Sizes of Signs: TGM 2-1-35

- Size 3: Multi-lane Conventional with posted speed of 45 mph or greater.
- Size 4: Expressway Size *(except 65 mph expressways)*
- Size 5: Freeway and Interstate Highway Size *(regardless of posted speed). Expressways (65 mph posted speed)*

Permanent Signing

TGM Policy 2-2-5

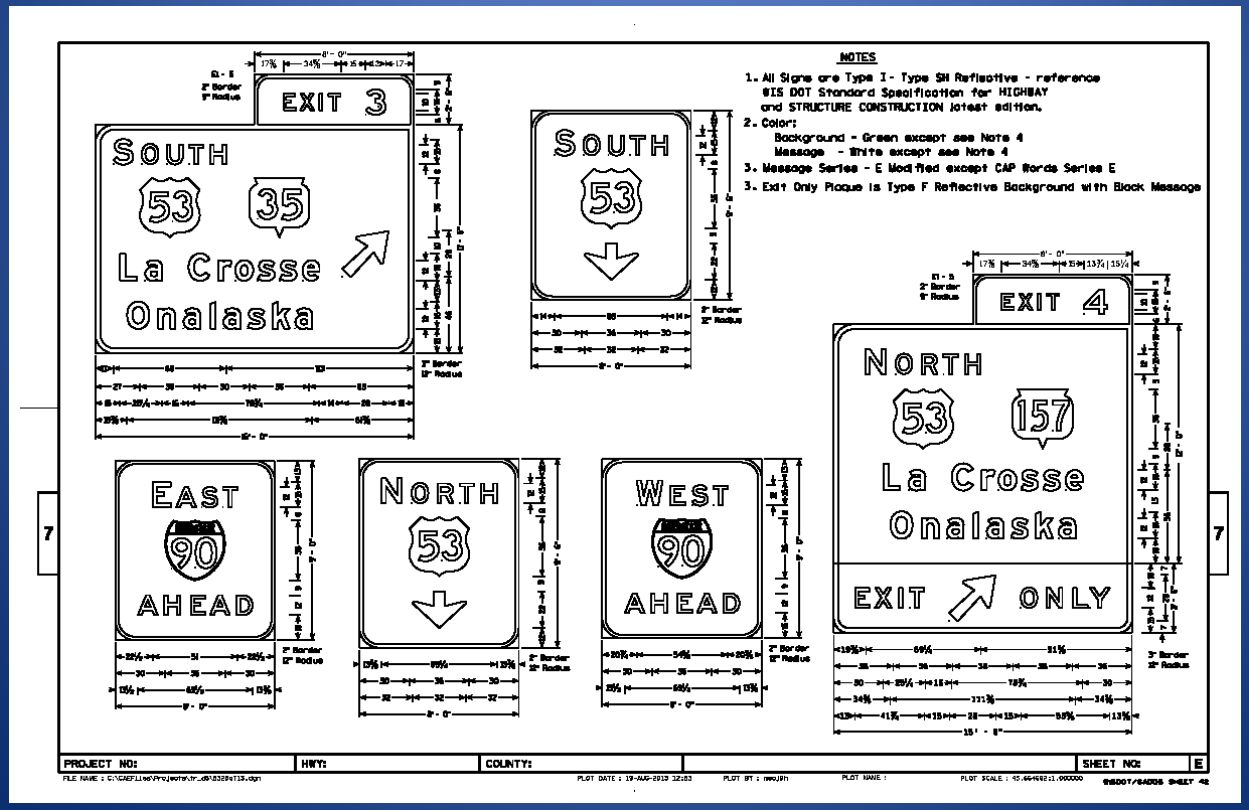
- 36 inches for any STOP sign facing a multi-lane approach
- 36 inches for any road approach to a multi-lane road

Changes to Advance Crossroad Name Signs

- Left, right or double arrows required
- Utilize D1-1, D1-2, D1-60, or D1-61 signs with arrows
- M1-94 sign code still used for freeway crossroad name signs *(with no access to mainline)*
- Revision to TGM Policy 2-4-50

Shop Drawings no longer Required

- Manufacturer shall use plan details.
- ASP 6 (Effective with Dec. 2013 Letting)



Permanent Signing

Minimum Visibility Distance For Warning Signs (WI Supplement)

- Values determine if warning sign is needed, Table 2C-4 covers sign placement criteria
- Values from 2004 AASHTO Manual – Intersection sight distance – left turn from stop

Posted or 85th Percentile Speed	Minimum Visibility Distance	
	Old Value	NEW Value
25 MPH	155 ft	280 ft
30 MPH	200 ft	335 ft
35 MPH	250 ft	390 ft
40 MPH	305 ft	445 ft
45 MPH	360 ft	500 ft
50 MPH	425 ft	555 ft
55 MPH	495 ft	610 ft
60 MPH	570 ft	665 ft
65 MPH	645 ft	720 ft

Permanent Signing

Advanced Placement of Warning Signs

- Table 2C-4 in Wisconsin Supplement *(2009 Changes)*
- Condition B values remain the same as in the 2003 Supplement

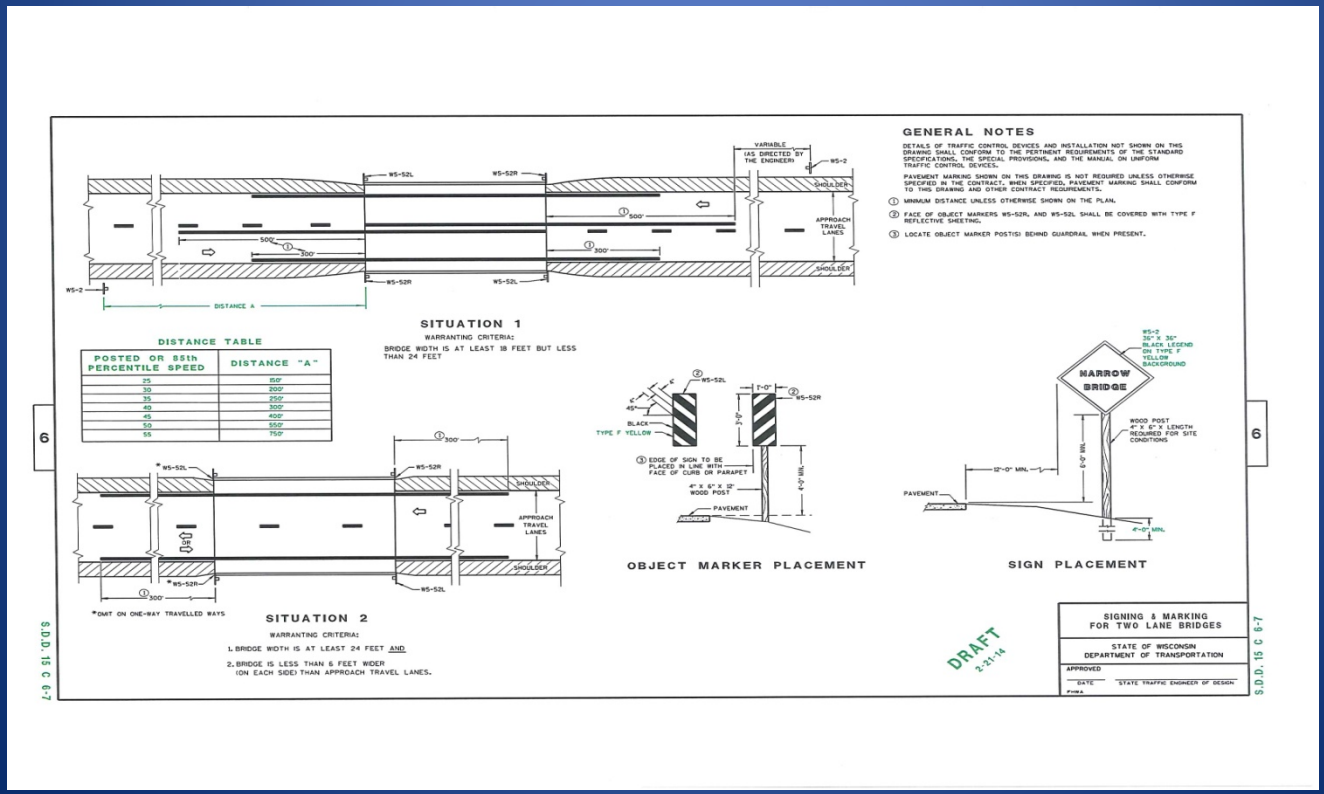
Posted or 85th Percentile Speed	Advanced Placement Distance Condition "A"	
	Old Value	NEW Value
25 MPH	325 ft	325 ft
30 MPH	450 ft	460 ft
35 MPH	550 ft	565 ft
40 MPH	650 ft	670 ft
45 MPH	750 ft	775 ft
50 MPH	850 ft	885 ft
55 MPH	950 ft	990 ft
60 MPH	1000 ft	1100 ft
65 MPH	1000 ft	1200 ft

Permanent Signing

HANDOUT P 63

Signing and Marking on Two-Lane Bridges

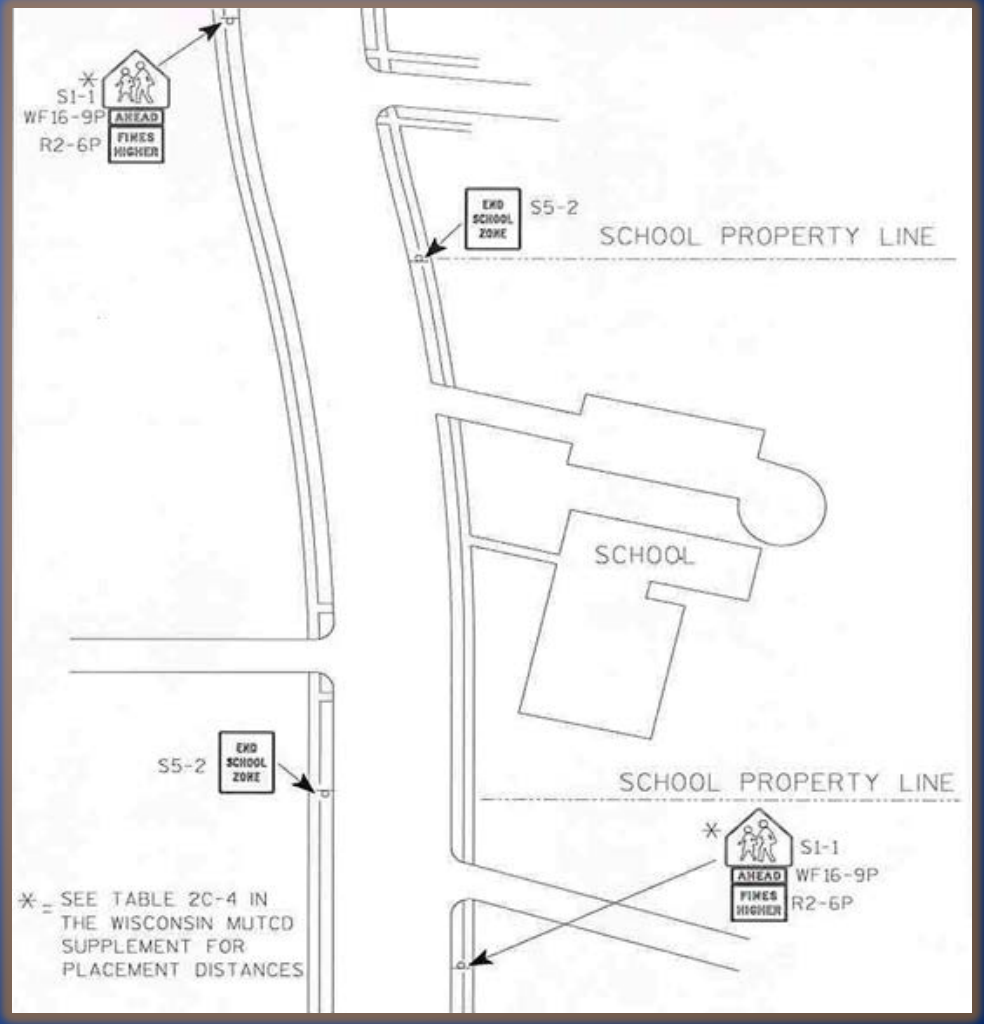
Revisions to Standard Detail Drawing



Permanent Signing

School Signing: TGM 2-3-54

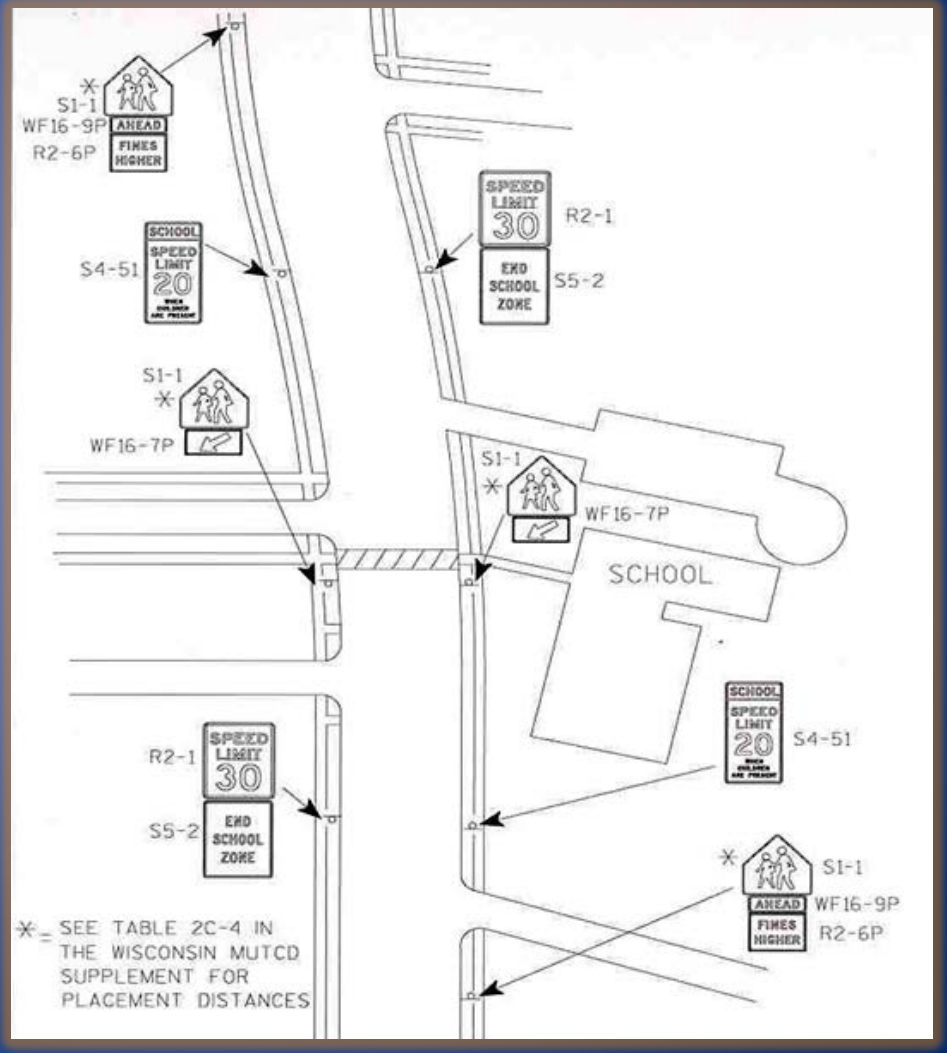
- Rural school without crossing



Permanent Signing

School Signing: TGM 2-3-54

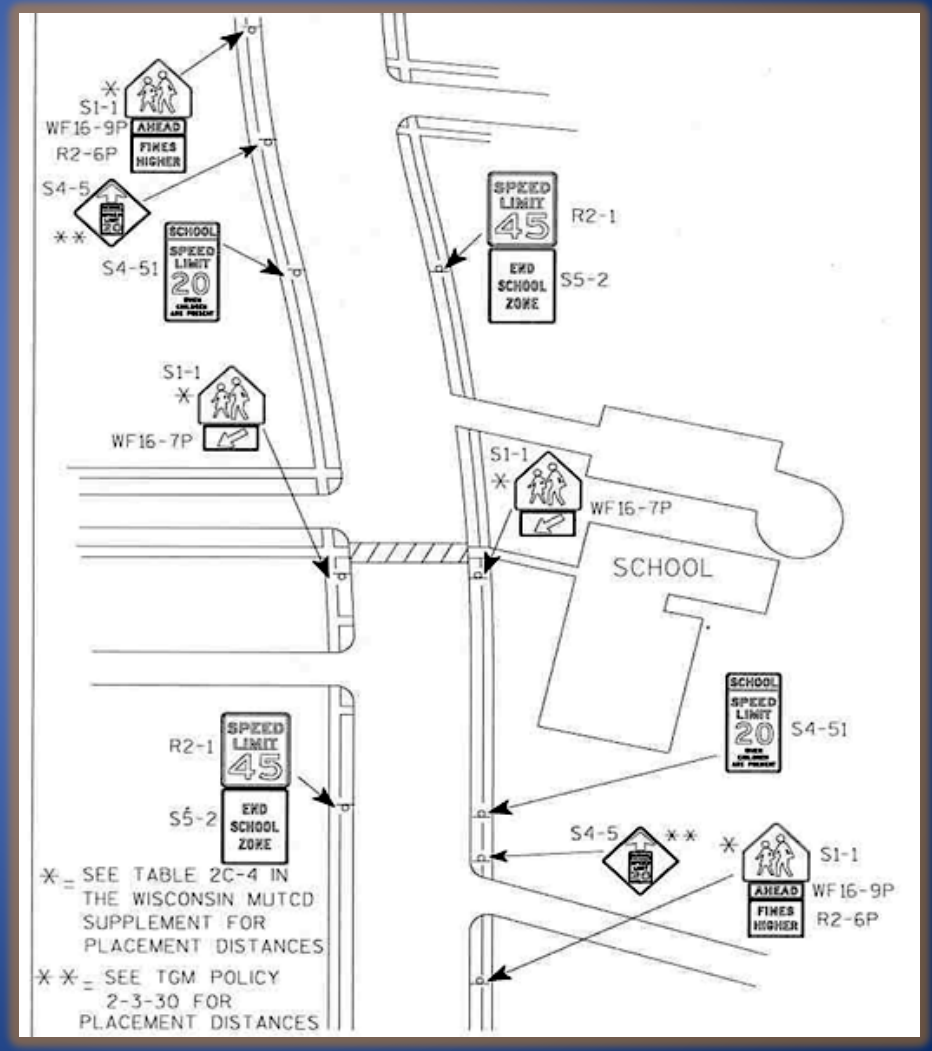
- Without Reduced School Speed Zone Signs



Permanent Signing

School Signing: TGM 2-3-54

- (With) Reduced School Speed Zone Signs

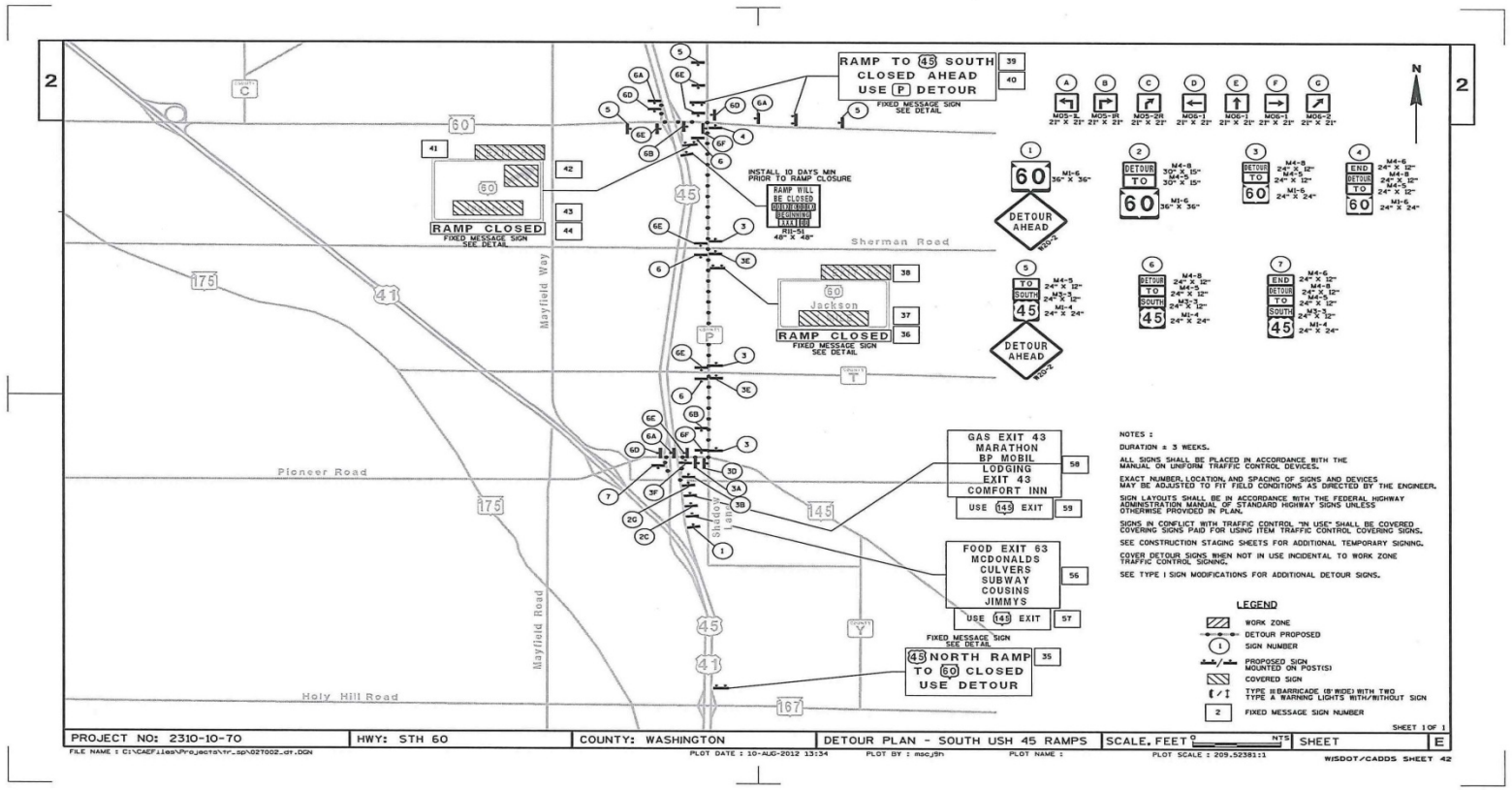


HANDOUT P 42

Temporary Traffic Generator Signing for Improvement Projects

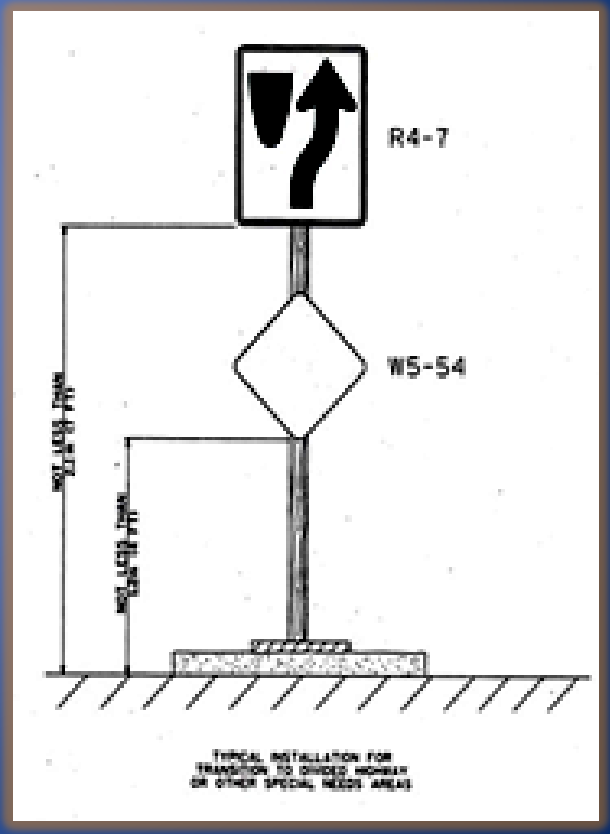
- TGM 2-15-7
- Temporary SIS signs
- Temporary Supplemental Guide Signing
- Temporary Business Signs (non freeway)

Sample of Temporary SIS Signs



Object Markers Under Keep Right Signs

- New TGM Policy 2-3-64
- 45 mph or greater undivided to divided transitions
- Used at first median in a series of medians



Permanent Signing

Deer Crossing Signs: TGM 2-3-41

- National Research has shown static signs to be ineffective
- No longer installing new signs
- Existing signs should be removed with projects

Signing For Roundabouts

HANDOUT P 50

- Revisions to FDM Policy 11-25-35
- ROUNDABOUT AHEAD word plaque removed
- Combination Ped/Bike Warning signs for trails
- Additional guidance on wrong way prevention
- Multi-lane approach guide signing for urban areas
- Type I Diagrammatic sign option
- Mounting heights for Yield Signs shall be 7’ minimum

Horizontal Alignment Signs TGM 2-3-35

- Dec. 31, 2019 Compliance date
- Review horizontal curves *(utilizing 12-degree ball bank indicator)*

Table 2C-5. Horizontal Alignment Sign Selection

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.

New For 2014

Rumble Strip Warning Signs

- REVISED TGM Policy 2-3-65
- SIGNS NO LONGER USED AFTER DEC. 2013 LETTING

Permanent Signing

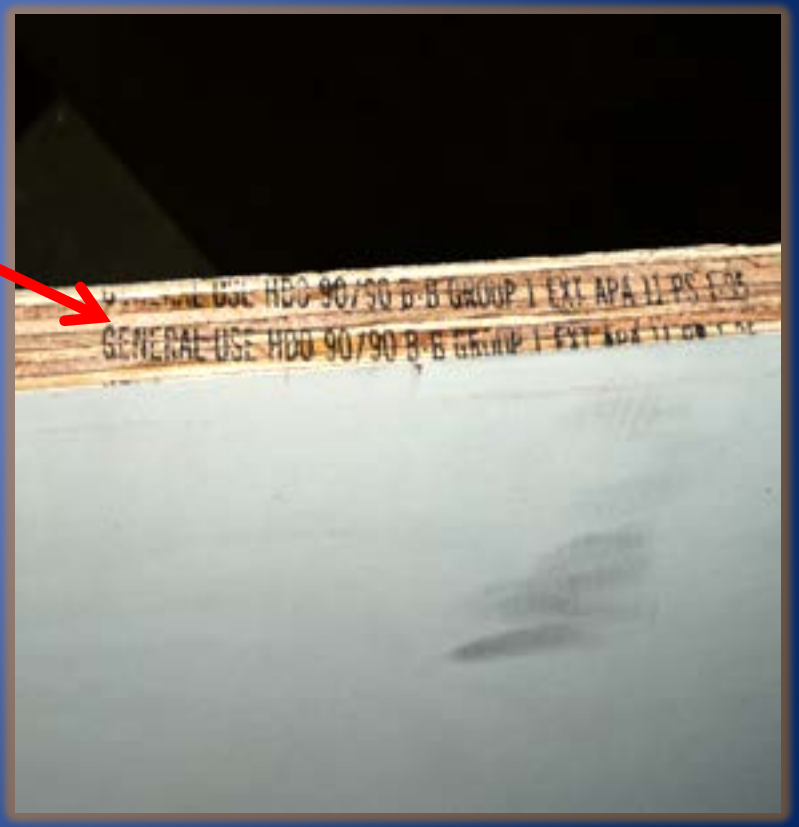
Plywood over 12’ in width

- Standard specs 637.3.2.8
- Allow one vertical joint for plywood over 12’ in width.
- Batten boards required over the joint (screwed to back side of sign).
- Battens made out of 6” HDO plywood material (same base material as sign).

Plywood Quality Control

Standard Spec. 637.2.1.2

- Plywood needs to be 7-ply HIGHWAY GRADE HDO
- Problems with substandard HDO being used on Projects!



Permanent Signing

Sheet Aluminum Sign Base Material

- Type II and Type III Signs shall use sheet aluminum base material.
- For Type II and Type III Signs with a dimension greater than 48 inches, High Density Overlay Plywood may be used.
- All Overhead Street Name Signs (M1-94H and M1-94S) shall be sheet aluminum.

Engineer Grade Sheeting

- No Longer Allowed on WisDOT projects!
- Engineer Grade Sheeting is officially removed from the 2013 Standard Specification Book

Permanent Signing

Prismatic High Intensity Sheeting

- Type H Reflective Sheeting Specification mandates Prismatic High Intensity sheeting for most Type II and Type III signs
- Applies to all temporary signs in work zones, except orange
- Prismatic High Intensity sheeting meets minimum FHWA retroreflectivity requirements
- 10-year product

Permanent Signing

"Super High" Intensity Prismatic Sheeting

- Type SH Reflective Sheeting Specification now required for all Type I signs
- Full-cubed prismatic sheeting
- Will eliminate the need for overhead sign lighting
- 12-year product

Permanent Signing

“Super High” Intensity Prismatic Sheeting

Permanent Signing

Sign Face Materials

- Fluorescent Sheetings
  - Work zone traffic control warning signs (Orange)
  - School warning sign assemblies, school bus stop ahead and school speed limit signs (Yellow-Green)
  - Work Zone Fixed message signs and Detour signs (Orange)
  - 12-year product

Permanent Signing

- Fluorescent Yellow Sheeting

  (Change fully implemented in 2013)

  - Now used on ALL Type II warning signs

APPROVED PRODUCTS LISTS FOR SIGN SHEETING

HANDOUT P 64

- Effective with the December 2013 Letting
- All Permanent and Temporary Sign sheetings and delineators.
- Standard Specification 637.2.2.2.
- Does not apply to drums, barricades or flexible tubular marker posts at this time.

SIGNING BID ITEM CHANGES

HANDOUT P 3

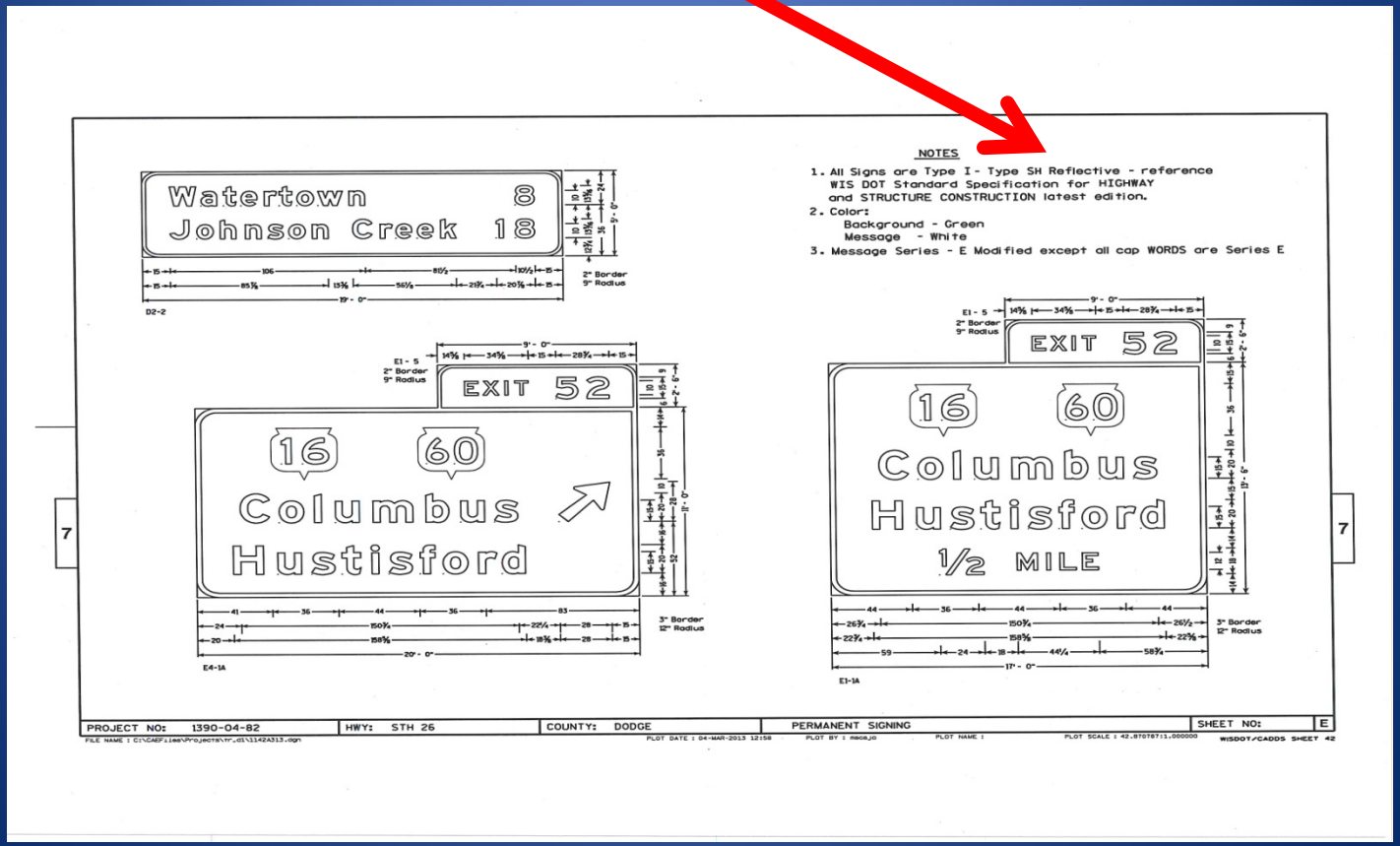
Effective with Dec. 2013 Letting

- Sign bid items must take the sheeting type into account!!
  - 637.1000 – 1999 Signs Type I (reflectivity)
  - 637.2000 – 2999 Signs Type II (reflectivity)
  - 637.3000 – 3999 Signs Type III (reflectivity)

Permanent Signing

HANDOUT P 3

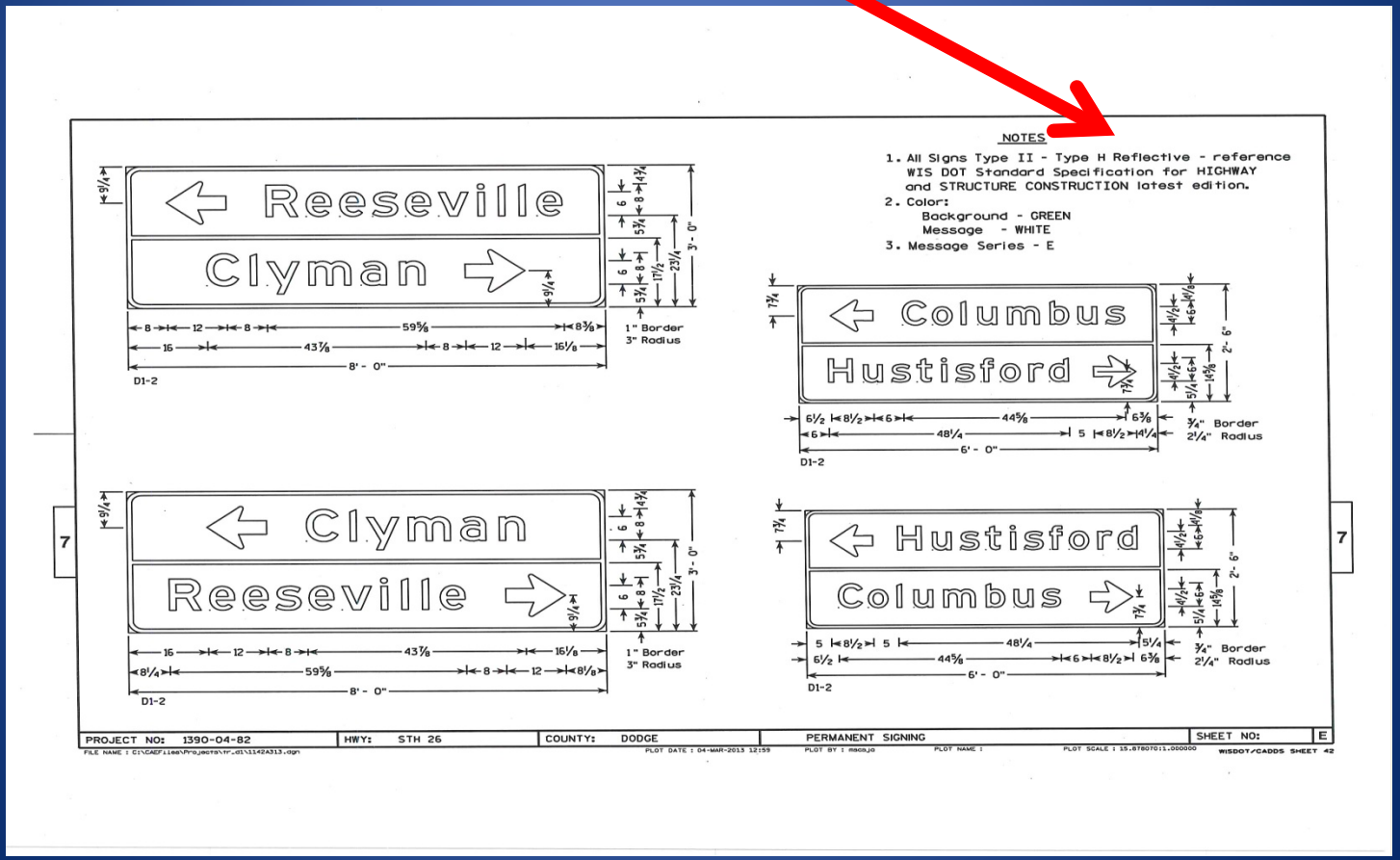
New Signing Bid Items



Permanent Signing

HANDOUT P 3

New Signing Bid Items



SIGNING BID ITEM CHANGES

HANDOUT P 3

Signs with multiple types of sheeting:

- Overhead Type I signs with E11 series plaques – Utilize 637.1220 Signs Type I Reflective SH.
- S4-5 School Reduced Speed Limit Sign – Utilize 637.2230 Signs Type II Reflective F.

SIGNING BID ITEM CHANGES

HANDOUT P 3

Signs with multiple types of sheeting:

- S4-51 School Speed Limit Sign – Utilize 637.2230 Signs Type II Reflective F.
- W3-5 Reduced Speed Limit Sign – Utilize 637.2230 Signs Type II Reflective F.

Folding Type II Signs

HANDOUT P 3

Another Important Miscellaneous Quantity Issue!

- **Signs Type II (reflectivity) Folding bid item must be used.**
- Example signs falling under this bid item would be folding STOP signs *(R1-1F)*, folding ramp gate sign *(R11-54F)* and folding route assembly signs *(JV-F)*

Removing or Moving Signs

Yet… Another Important Miscellaneous Quantity Issue!

- **Signs paid for by each individual sign location.**
- Sign Supports paid for by each individual support.
- Dec. 2014 Standard Specification Change.

Questions


CAUTION
THIS SIGN HAS
SHARP EDGES
DO NOT TOUCH THE EDGES OF THIS SIGN
ALSO, THE BRIDGE IS OUT AHEAD

QUIZ QUESTION #1

Black Vinyl Message Cutouts No Longer Allowed.

Standard Specification 637.3.2.4.1

- Allowable black messages:
  - Silk screen process
  - Black Electronic Cuttable Overlay Film

Digital Printing of Sign Messages

Digital Printing currently not allowed per Standard Specifications

- Allowable messages:
  - Silk screen process
  - Electronic Cuttable Overlay Film
  - Cut-out letters (die-cut)
  - Demountable Copy (Type I signs only)

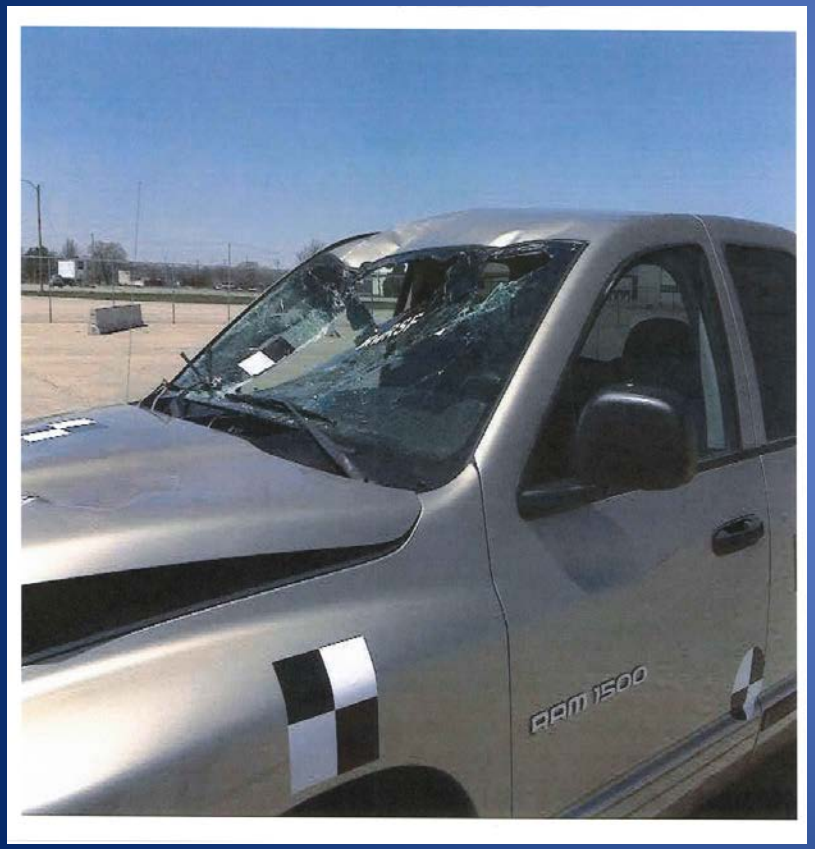
Covering of Type I and Type II Signs

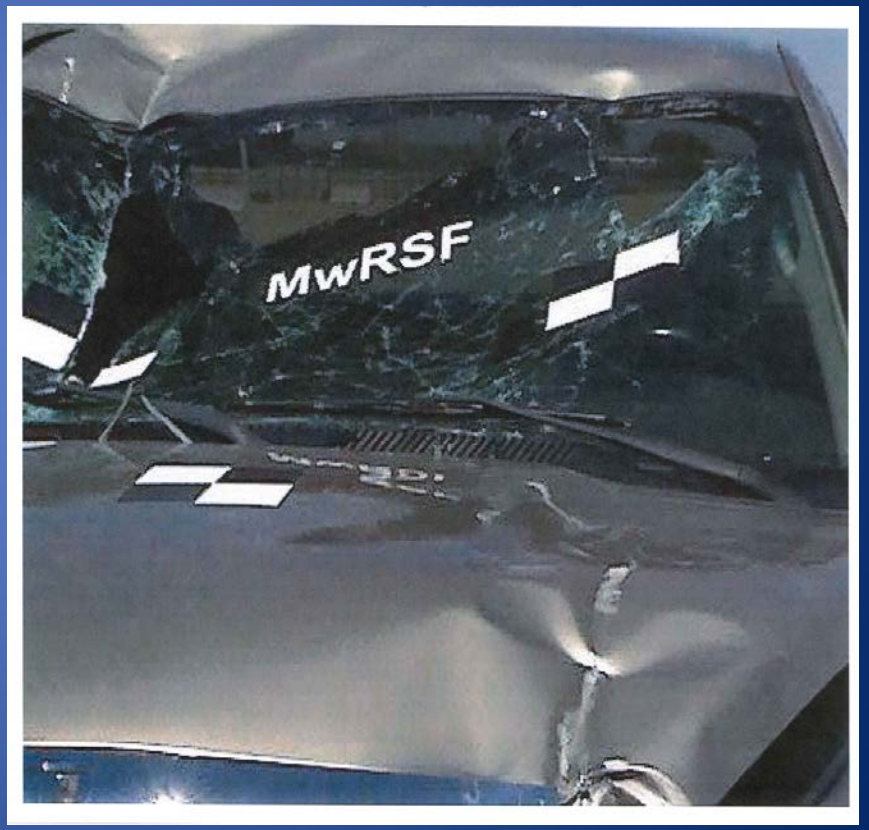
HANDOUT P 40

- Bid Items Available
- Intended to be used for the full or partial covering of existing signs and for permanent signs under the contract

Turning of signs parallel to roadway no longer allowed, per NCHRP 350 Crash Testing.

Here's what happens…





Permanent Signing

HANDOUT P 2

Signing Plan Development Guidance

- FDM Procedure 15-1-20
- Proper layout of Signing Plan Sheets
- Miscellaneous Quantity Sheet layouts
- Overhead Sign Support Layouts in Plan
- Maintenance of Roundabout Signing
- CADDS Cells available for signs

Permanent Signing

HANDOUT P 2

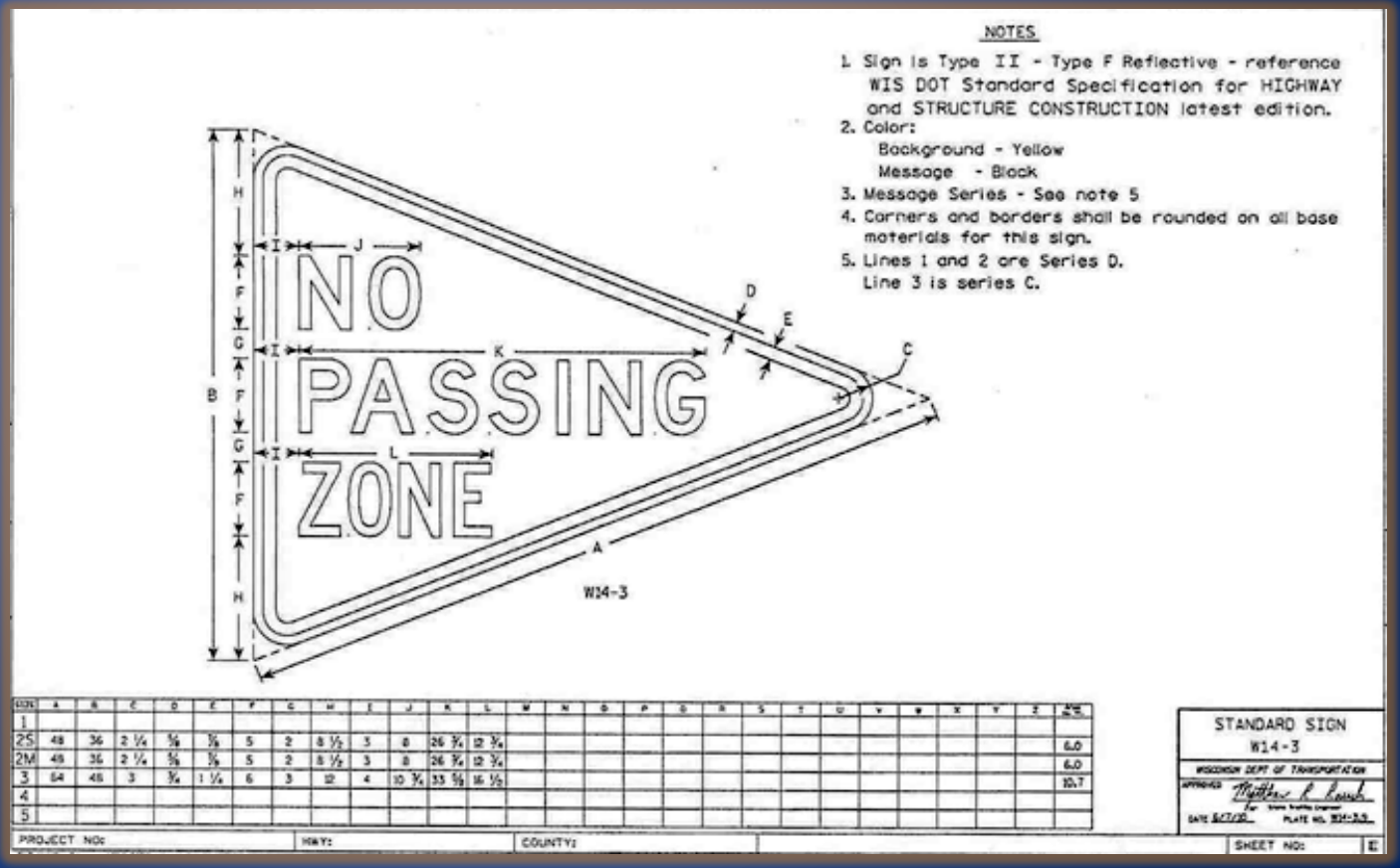
Replacing Signs in Projects

- FDM Procedure 15-1-20 and TGM Policy 2-15-51.
  - If signing work will exceed 10% of the project cost *(milling, rut filling, seal coating and crack filling projects)*, then it may not be able to be included with the project
- Any exceptions to not replace signs in a project shall be coordinated with the Region Traffic Engineer Supervisor

Permanent Signing

Miscellaneous Quantity Issues

- Use square footage off of sign plate!



Permanent Signing

Miscellaneous Quantity Issues: No more WF Series

- S1-1 signs: S16-7 L/R and S16-9P plaques are used
- W11-2 signs: W16-7 L/R and W16-9P plaques are used

Permanent Signing

HANDOUT P 4

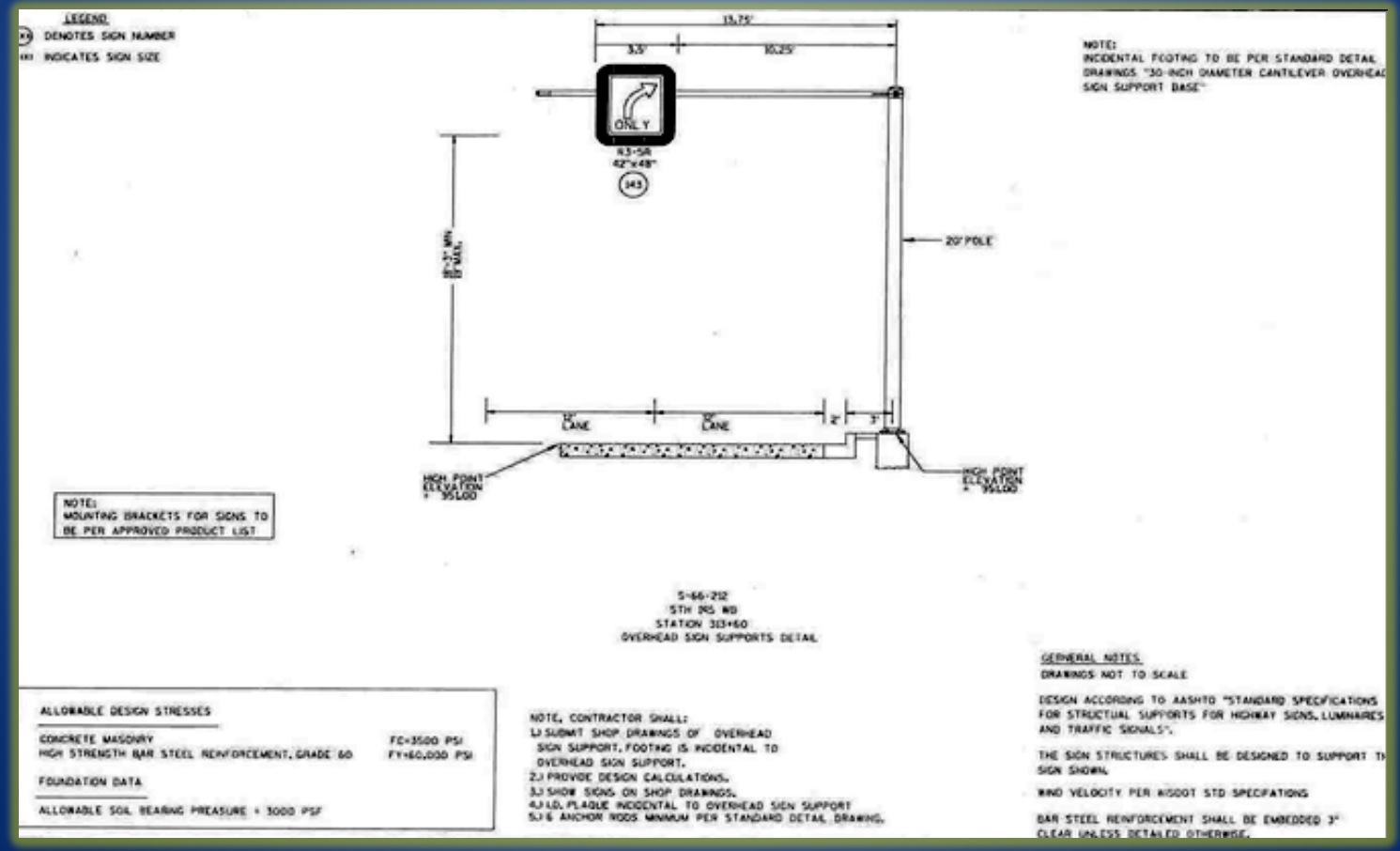
Determination of Type I Sign Quantities

- Length and Type of I-beams
  - length shall be field verified by the contractor
- Weight of High Strength Structural Steel Sign Supports
  - Bid item 635.0200
- Concrete Masonry quantities
  - Bid item 636.0100
- Reinforcing steel for bases
  - Bid Item 636.0500

Permanent Signing

HANDOUT P 13

Sample Overhead Sign Support Layout



Permanent Signing

HANDOUT P 67

Sign Fabrication Detail Requests

- Details prepared by Central Office. Three (3) week lead time needed for requests
- In-house SE Region signing plans will have fabrication details prepared by SE Region Traffic Operations unit
- NEW Revised on-line request form now available!!!
- Questions on usage should be directed to Jason Henning at Central Office (608) 245-5345.

Performance Specification

Standard Specification 637.3.3.4

- Sign posts more than 5 degrees out of plumb.
- Signs twisted more than 5 degrees from plan orientation.
- Signs with delaminated plywood.
- Bubbling, fading, delaminating or buckling sheeting.

Permanent Signing

Overhead Type II Sign Support Brackets

- Involves sign mounting bracket systems on monotube overhead sign supports
- WisDOT has experienced cases of cracked cast aluminum components

Permanent Signing

Overhead Type II Sign Support Brackets

- Main Problems Found
  - Usage of brittle cast aluminum alloys with low elongation strength.
  - Improper torque applied on connection bolts during installation

Permanent Signing

Overhead Type II Sign Support Brackets

- Standard Specification 637.2.4.2.2
  - Utilize Approved Products List for all overhead Type II and Type III signs
  - Manufacturer needs to provide torque and other installation instructions with the brackets
  - Contractor needs to provide a copy of the torque and installation instructions to the engineer

Incorrect Overhead Type II Sign Installation

Correct Overhead Type II Sign Installation

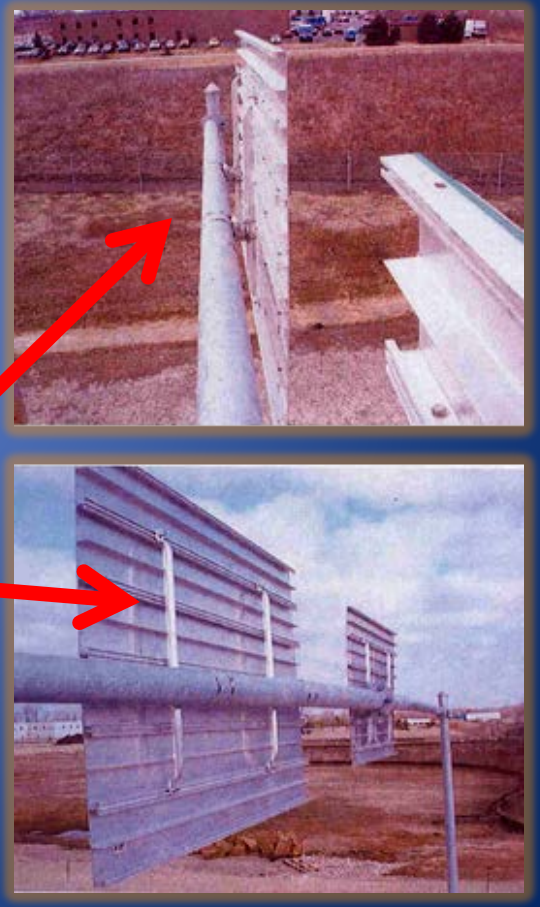
Correct Overhead Type II Sign Installation

Correct Overhead Type II Sign Installation

Permanent Signing

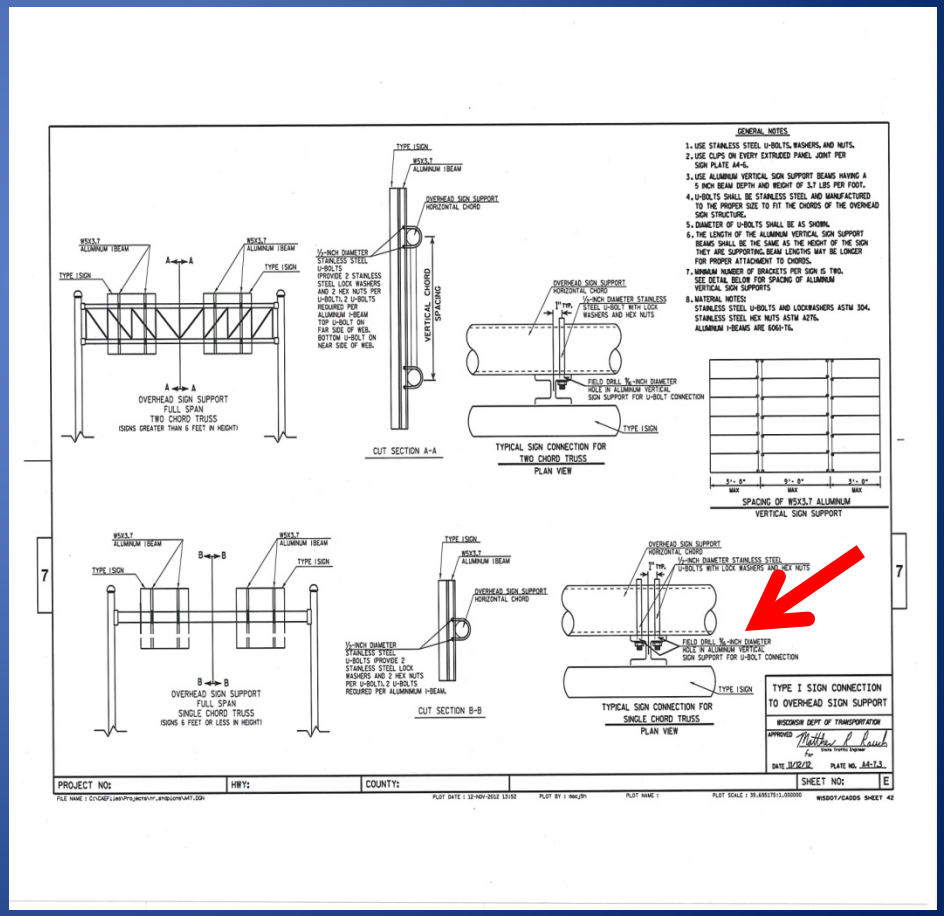
Type I Signs Mounted on Overhead Sign Supports

- Main problems found:
  - Improper bracket systems used, especially for monotube overhead sign supports
  - Lack of extruded panel supports

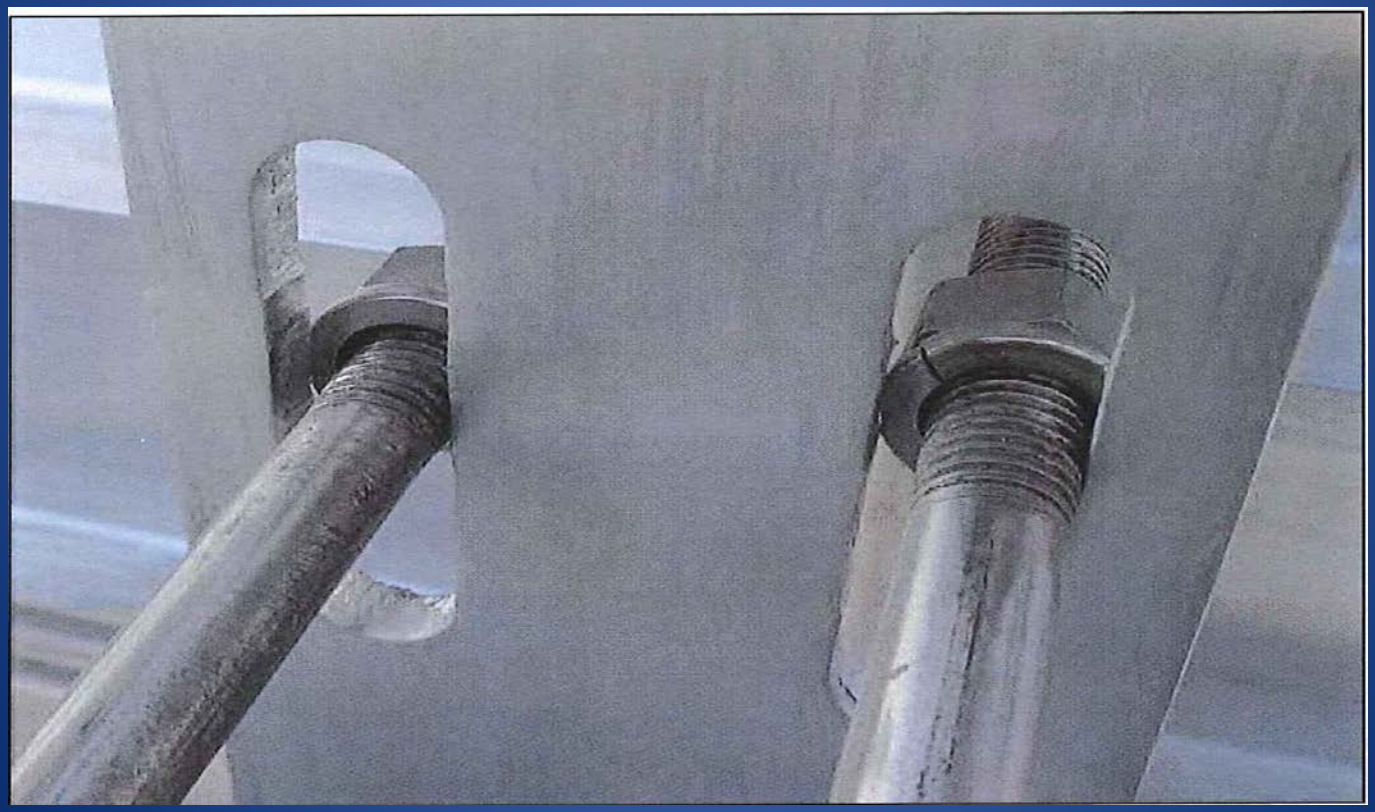


HANDOUT P 30

Slotted Aluminum Vertical Sign Supports Not Allowed



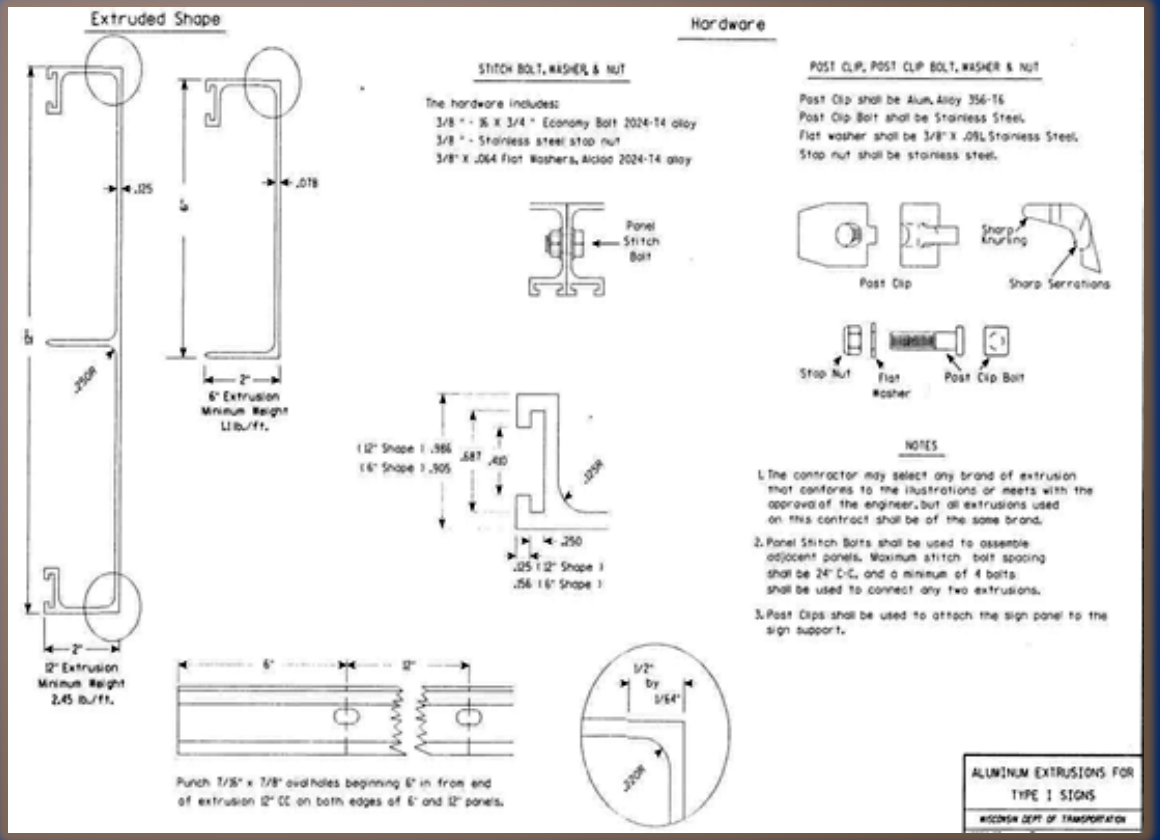
Slotted Aluminum I-beams (Overhead Type I Signs)



Permanent Signing

Attachment of Type I Signs to Posts

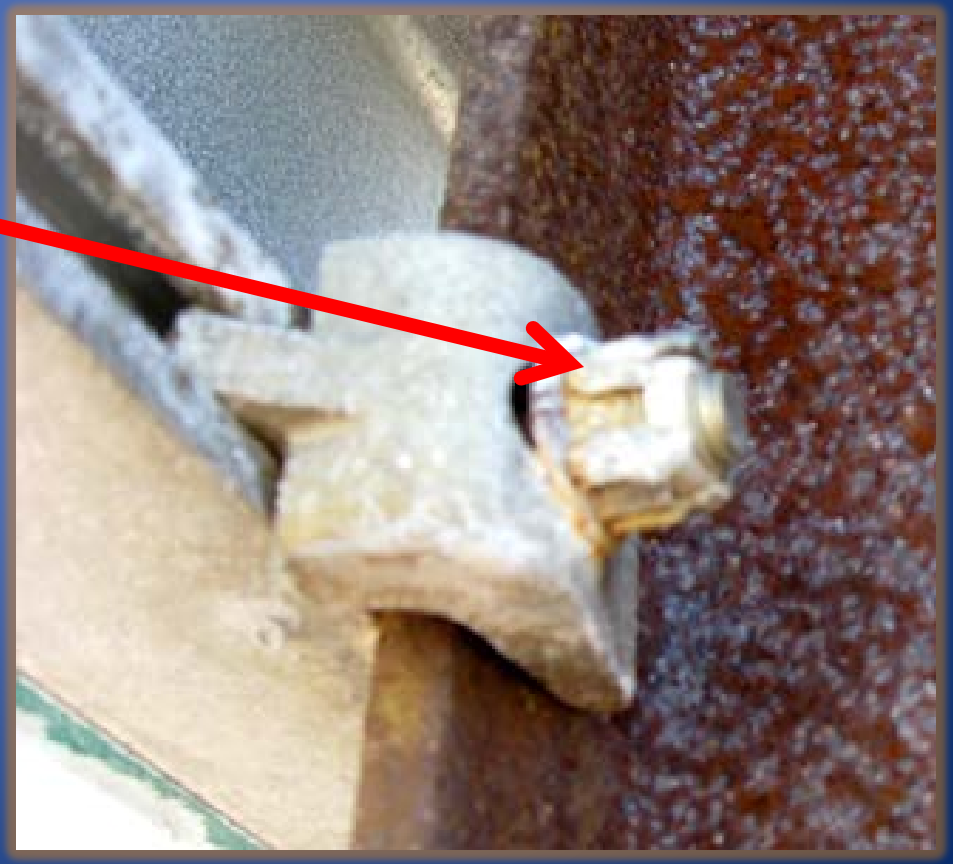
- Ensure proper mounting clips are used
- A5-2 Sign Plate
- Post clips are aluminum alloy 356-T6
- Post clip bolts, nuts and washers are stainless steel



Permanent Signing

When Aluminum Bolts and Nuts are Used!

- Damage to nuts
  - Rounding
  - Cracking
- Damage to bolts
  - Stripping
  - Cross-threading

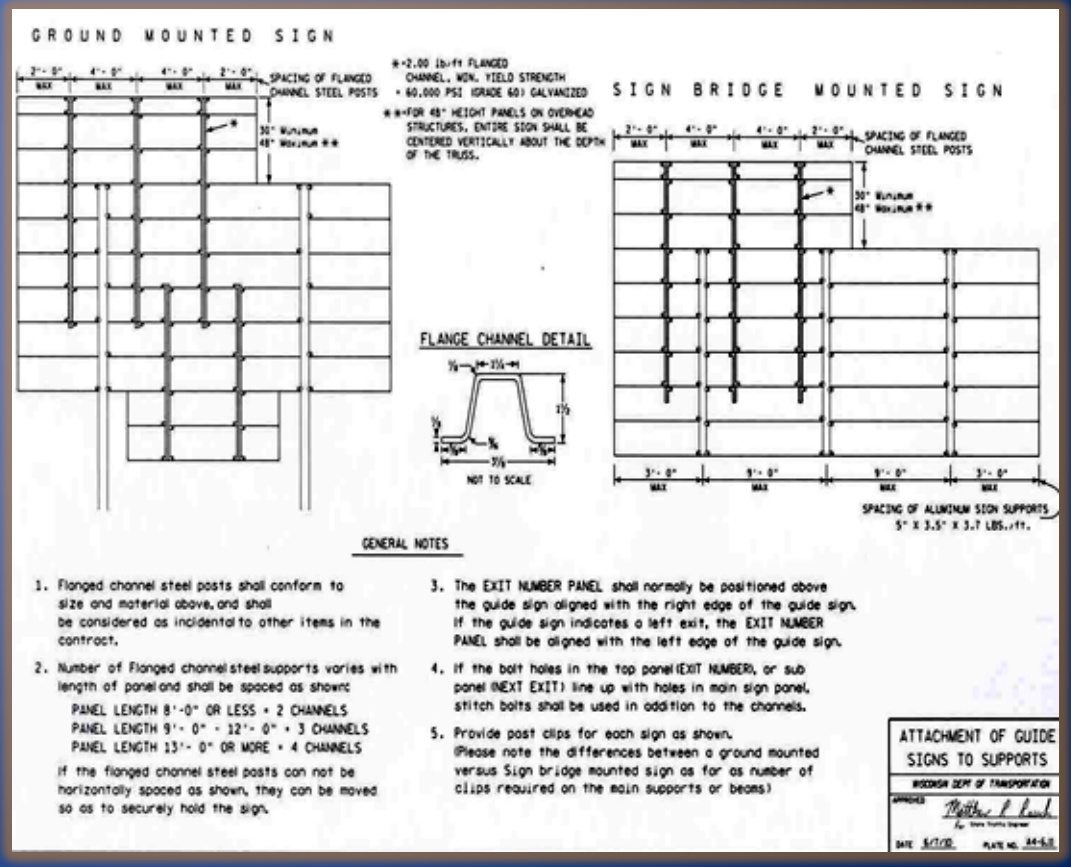


Permanent Signing

HANDOUT P 28

Attachment of Type I Signs to Posts

- Every other panel clipped for ground mounted signs
- Every panel clipped for overhead signs

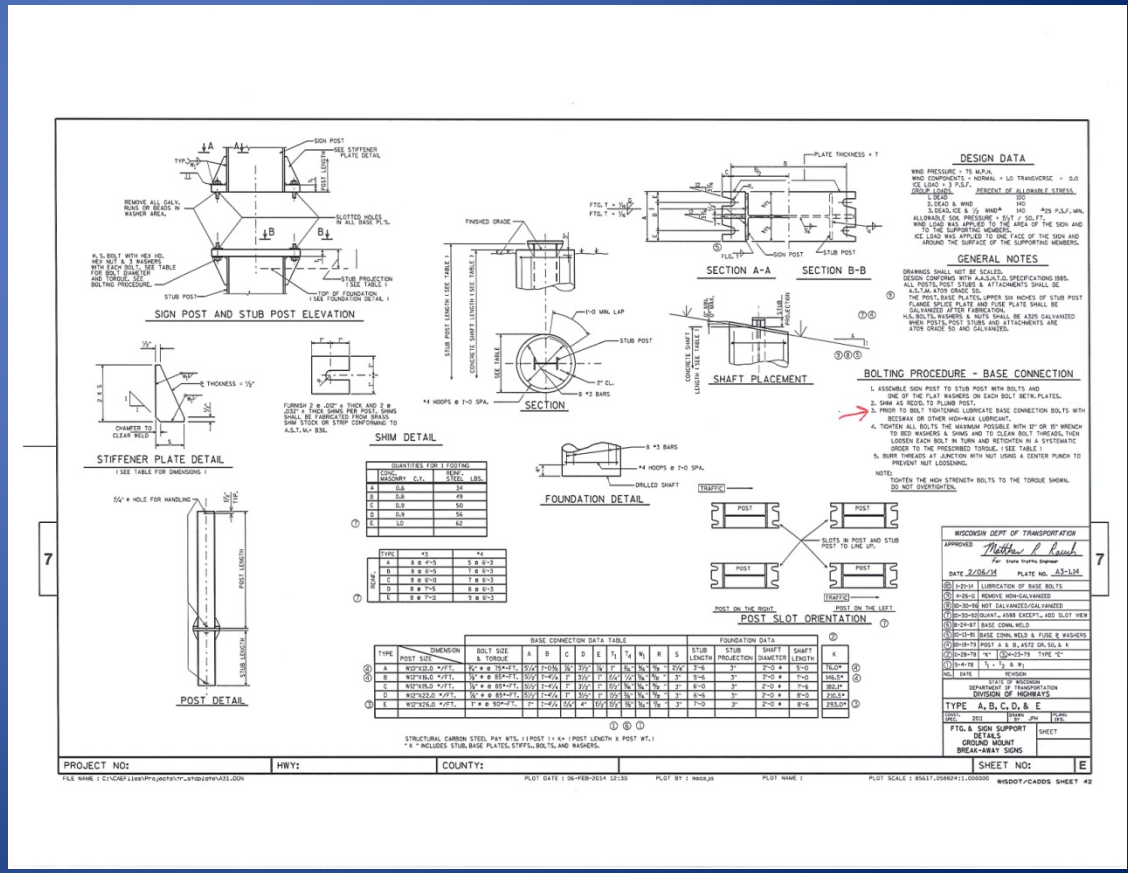


Permanent Signing

HANDOUT P 15

Attachment of Type I Signs to Posts

- Ensure correct torque values are followed
- Lubrication of Base Bolts
- Insure that slots in post and stub post are angled toward traffic



Permanent Signing

Structural Steel Sign Supports

- Bases are not to be buried!
- Concrete bases should be flush with the ground

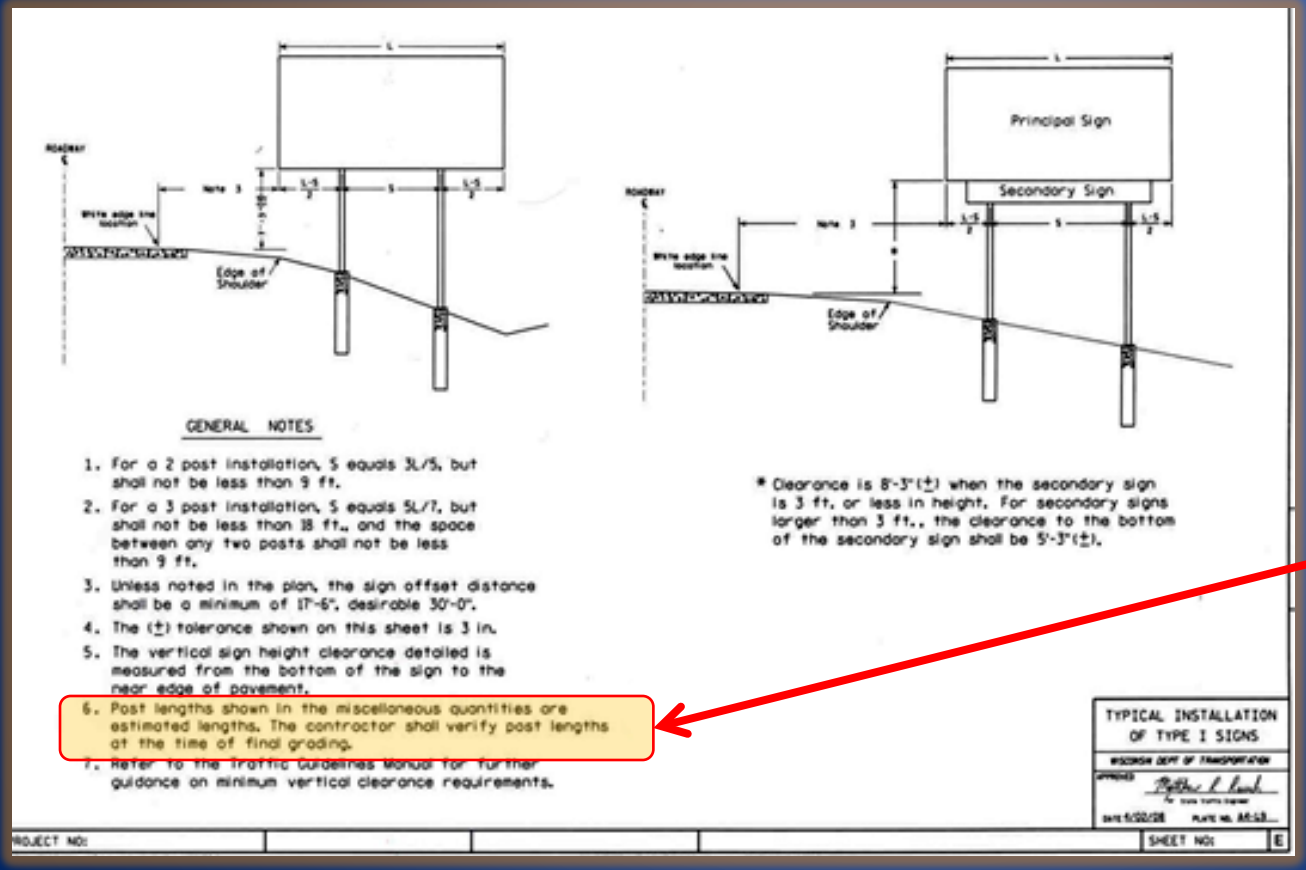
Permanent Signing

Proper Installation of Type I Sign Support Base

Permanent Signing

HANDOUT P 20

New Type I Signs – Installation Details

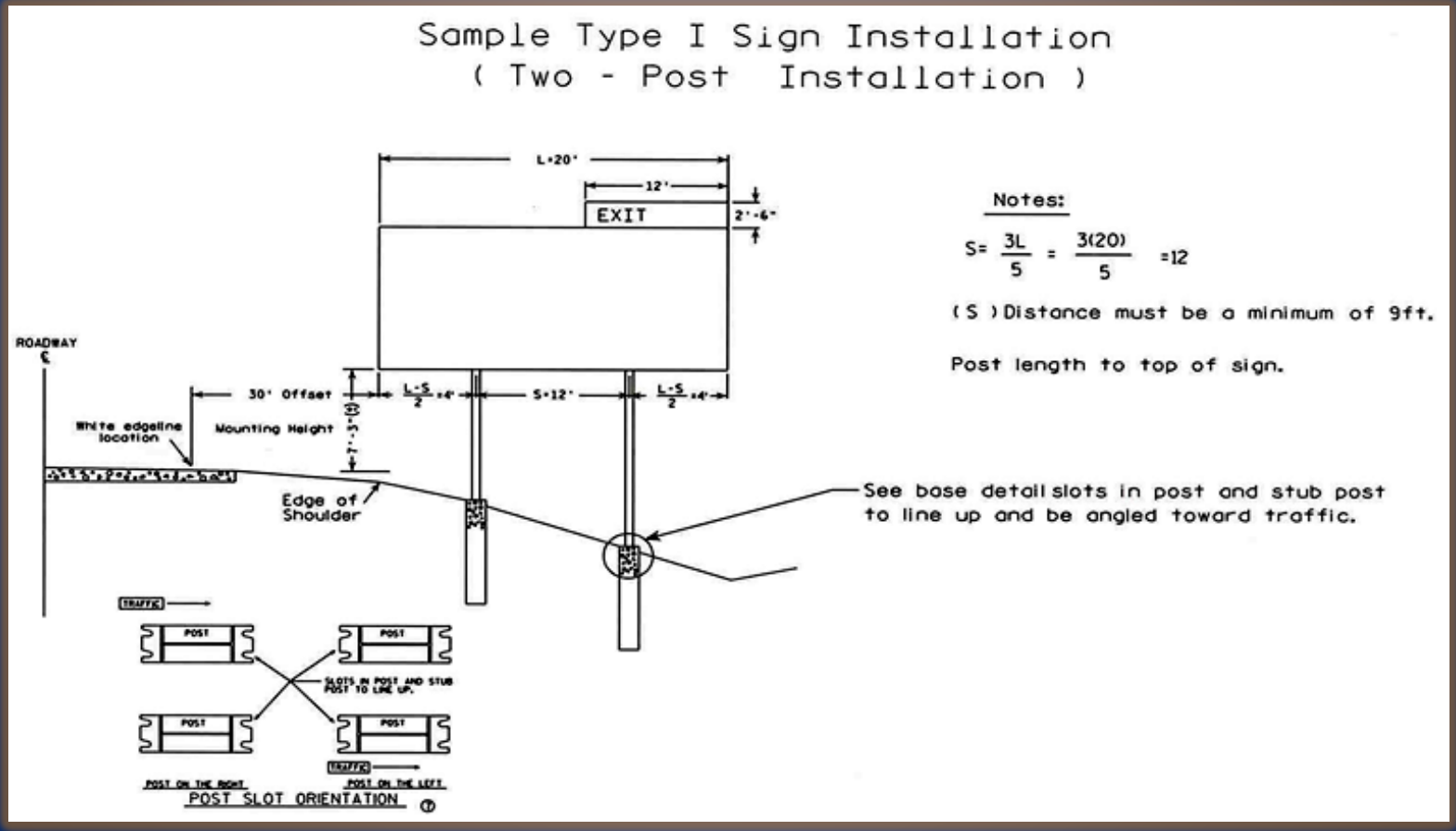


- Sign height, offset, post spacing and correct
- Contractor to verify I-beam lengths

Permanent Signing

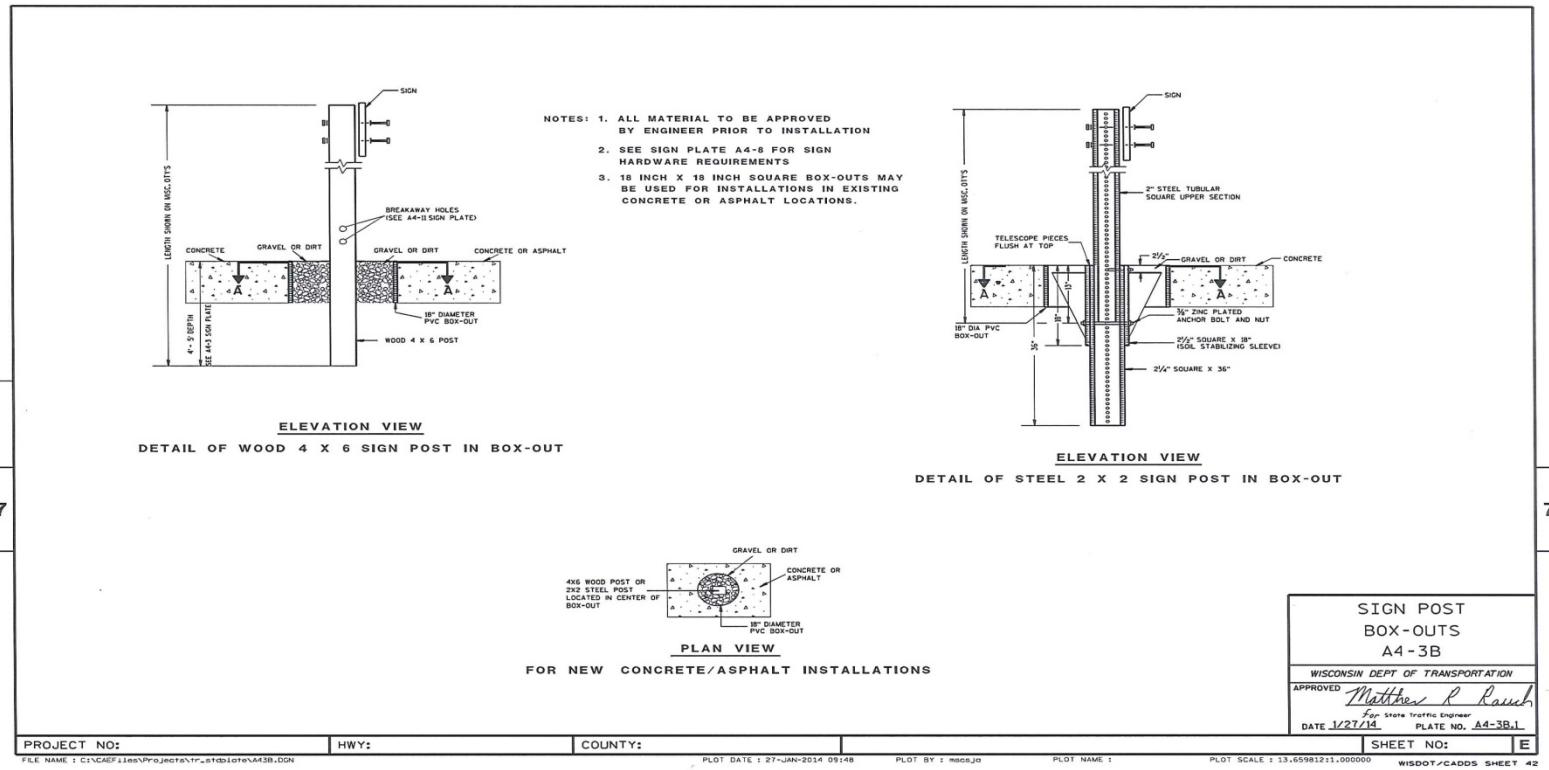
HANDOUT P 21

Type I Sign Installations



New Box-Out Detail (A4-3B Sign Plate)

HANDOUT P 29

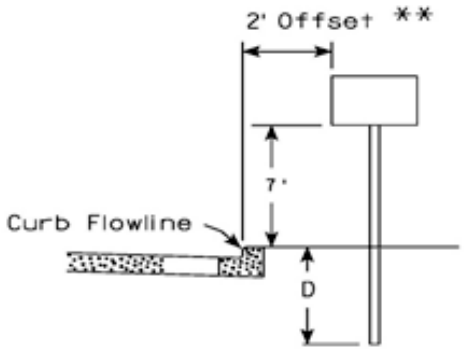


Permanent Signing

HANDOUT P 24

Urban Type II Sign Installations

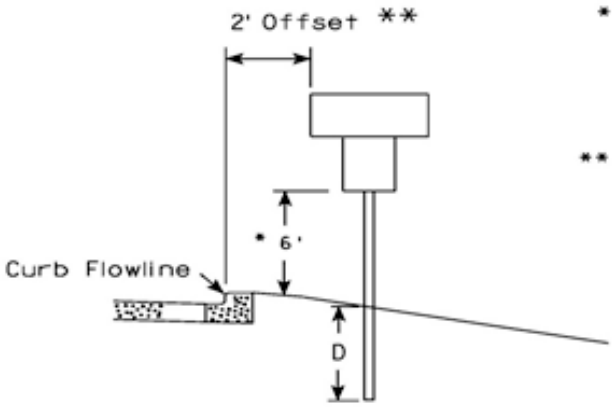
URBAN AREA Sample Type II Sign Installation



Recommended Post Depth

D= 4' (If signs are 20 S.F. or less)
D= 5' (If signs are greater than 20 S.F.)

Mounting height measured from top of sidewalk or parking lane.



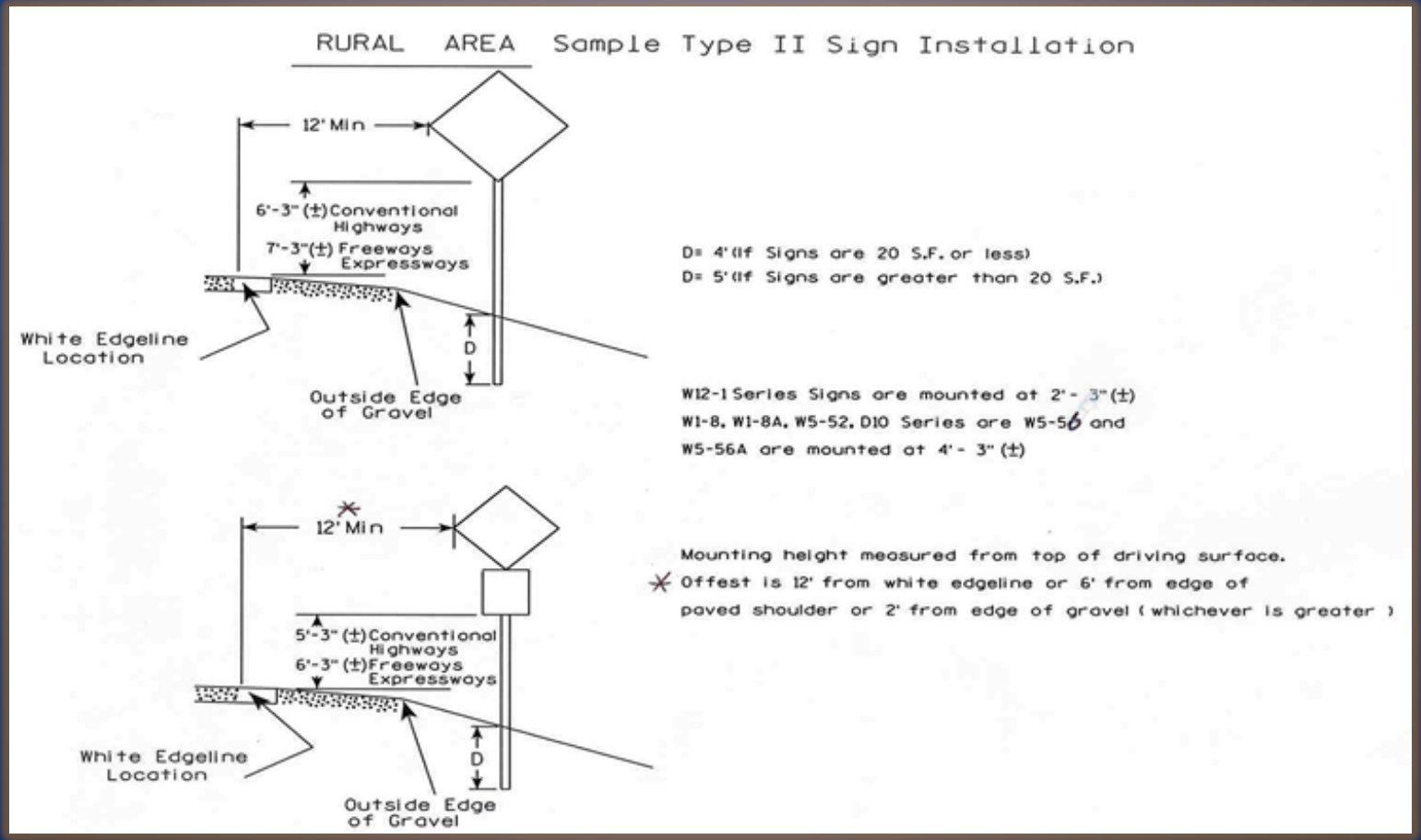
* It is recommended a 7" Mounting height be used for secondary signs where pedestrian parking movements occur.

** A 1' minimum offset may be used in urban areas. The desirable offset is 2'.

Permanent Signing

HANDOUT P 26

New Type II Signs: Rural Type II Sign Installations



Permanent Signing

HANDOUT P 25

Multiple Post Type II Sign Installations *(Wood Posts)*

- Two posts are required:
  - If sign area is greater than 20 S.F. or greater than 4 ft. in width
  - Signs 60” or less – 12” from edge of sign
  - Signs over 60” – 1/5 of distance from edge of sign
- Three posts are required if sign is greater than 12 ft. in width

Permanent Signing

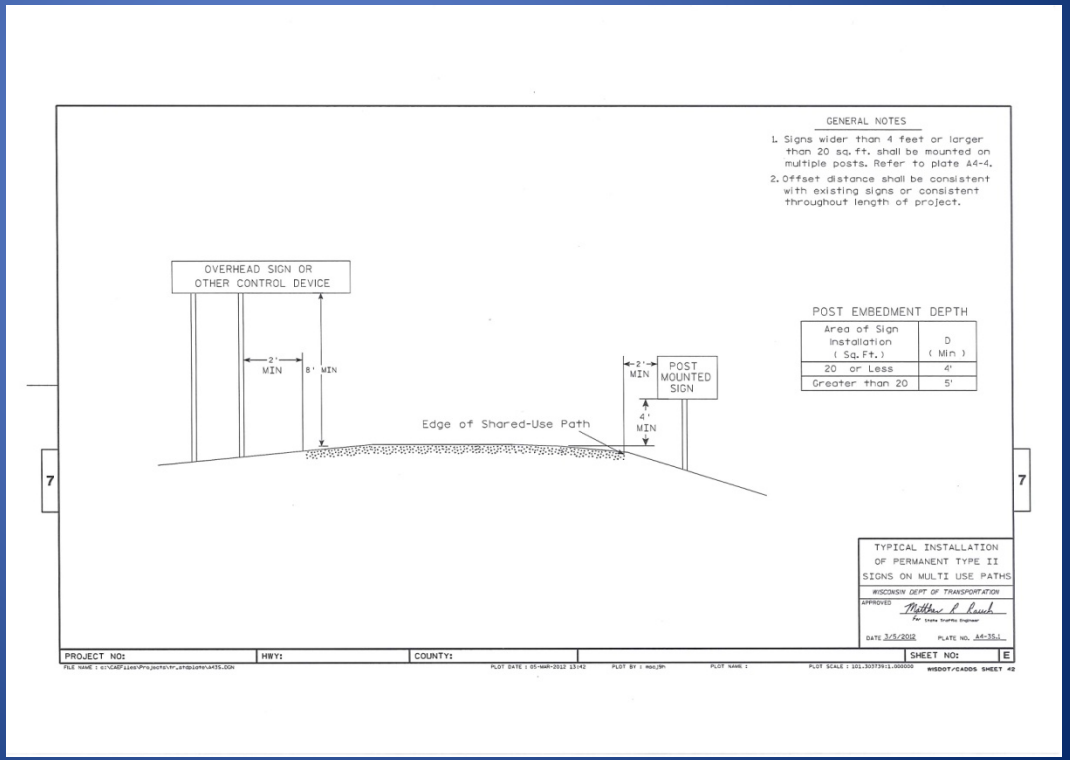
New Signs:

- Improper Type II Sign/Post Installation

HANDOUT P 27

Installation of Signs on Multi-Use Paths

- A4-3S sign plate
- Overhead and ground mounted signs

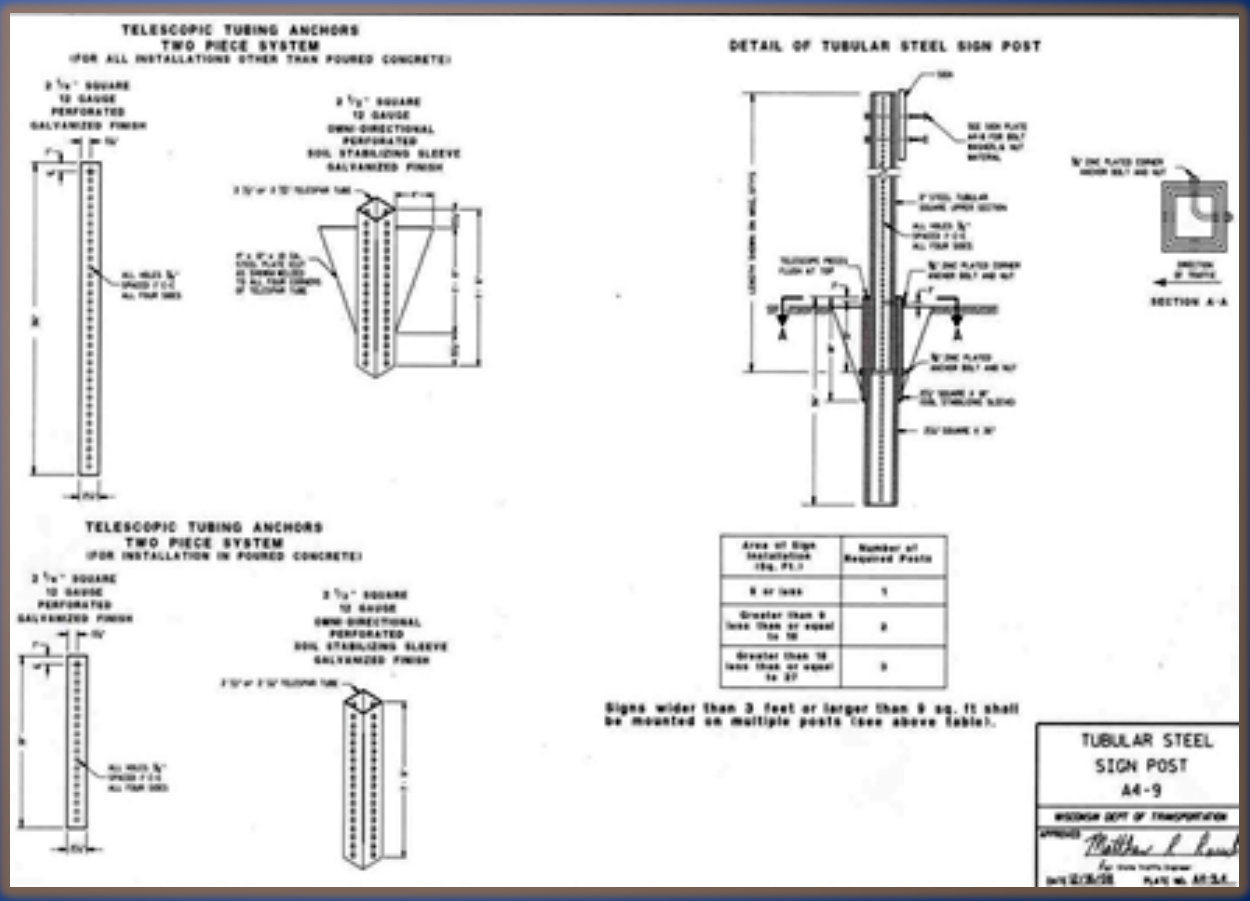


Permanent Signing

HANDOUT P 29

New Signs: Soil Stabilizers on Square Steel Posts

- Standard Specification 634.2.5.3
- Required for all installations that are not in poured concrete

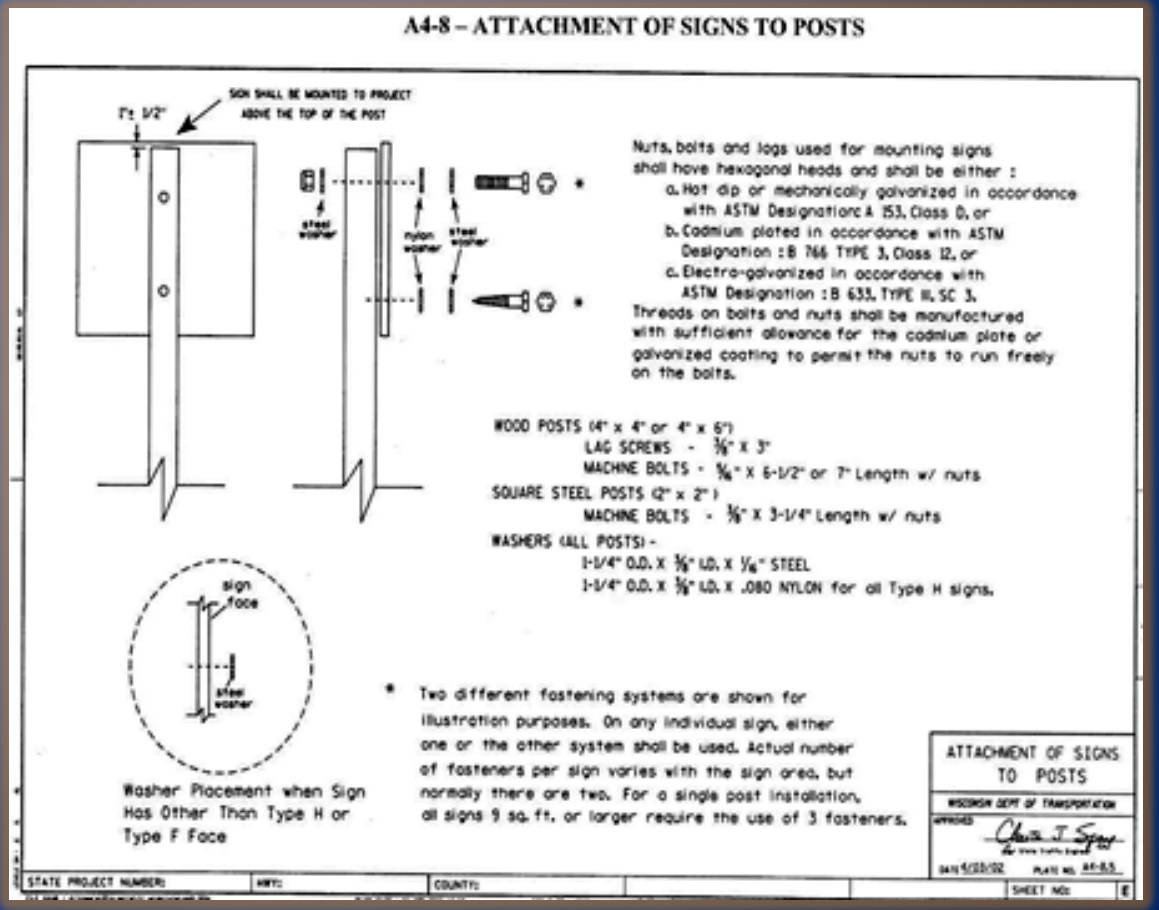


Permanent Signing

HANDOUT P 31

New Signs: Proper Installation

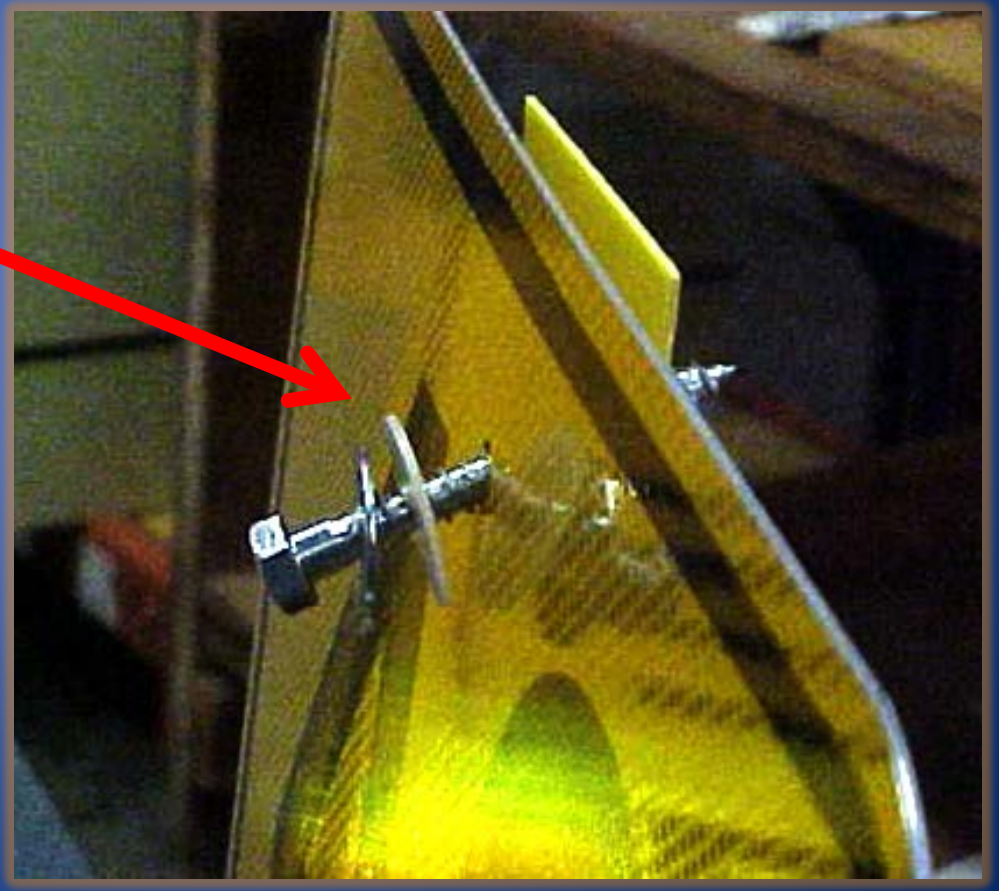
- Proper sign attachment hardware for Type II signs on wood or steel Posts



Permanent Signing

New Signs: Proper Installation

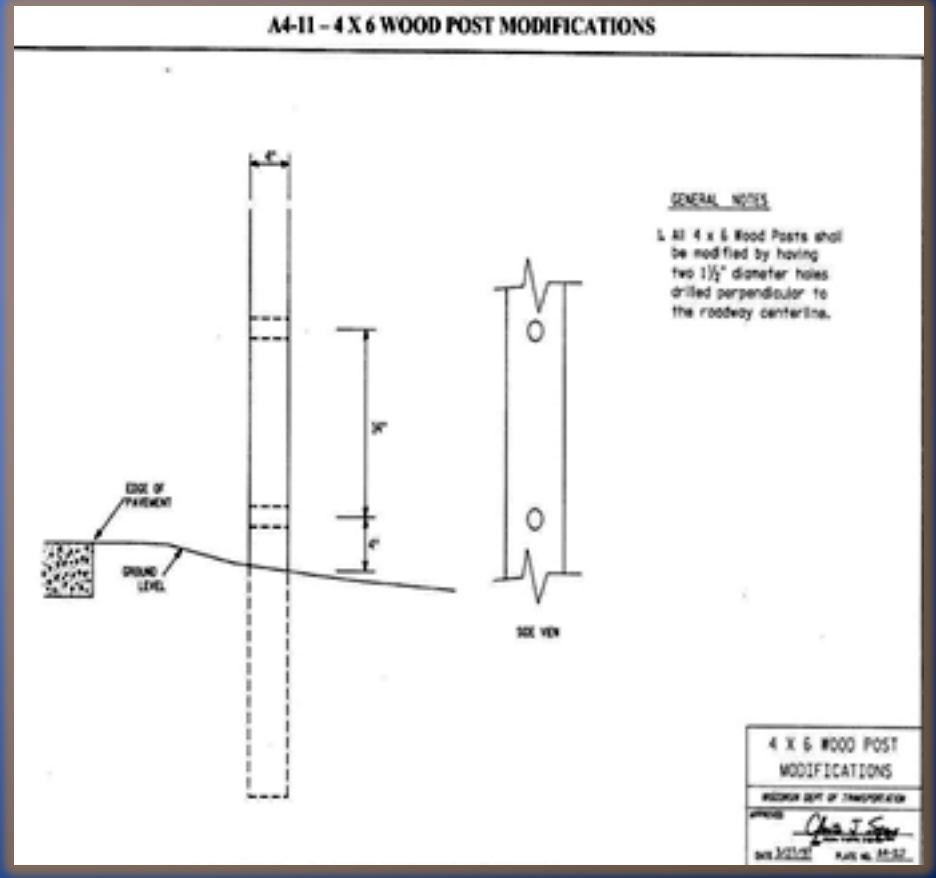
- Proper sign attachment hardware for Type II signs on wood or steel Posts



Permanent Signing

HANDOUT P 34

Breakaway Holes for 4 x 6 wood posts:



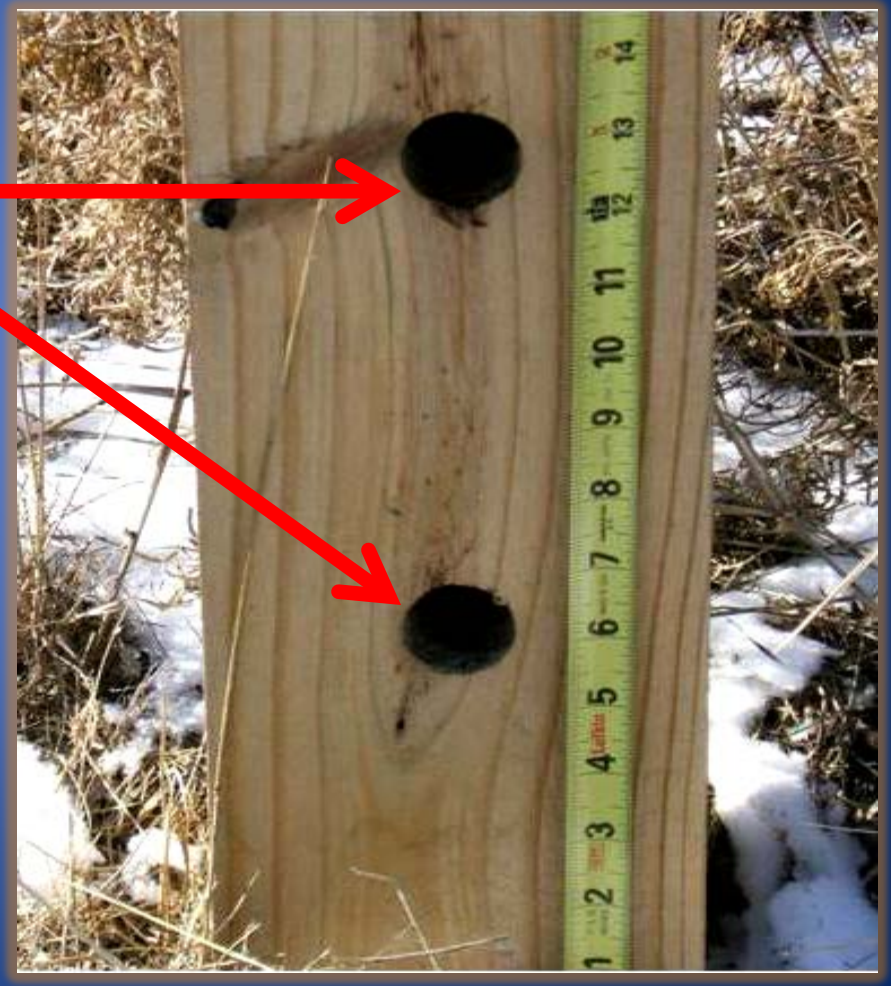
New Signs

- Proper Installation

Permanent Signing

New Signs:

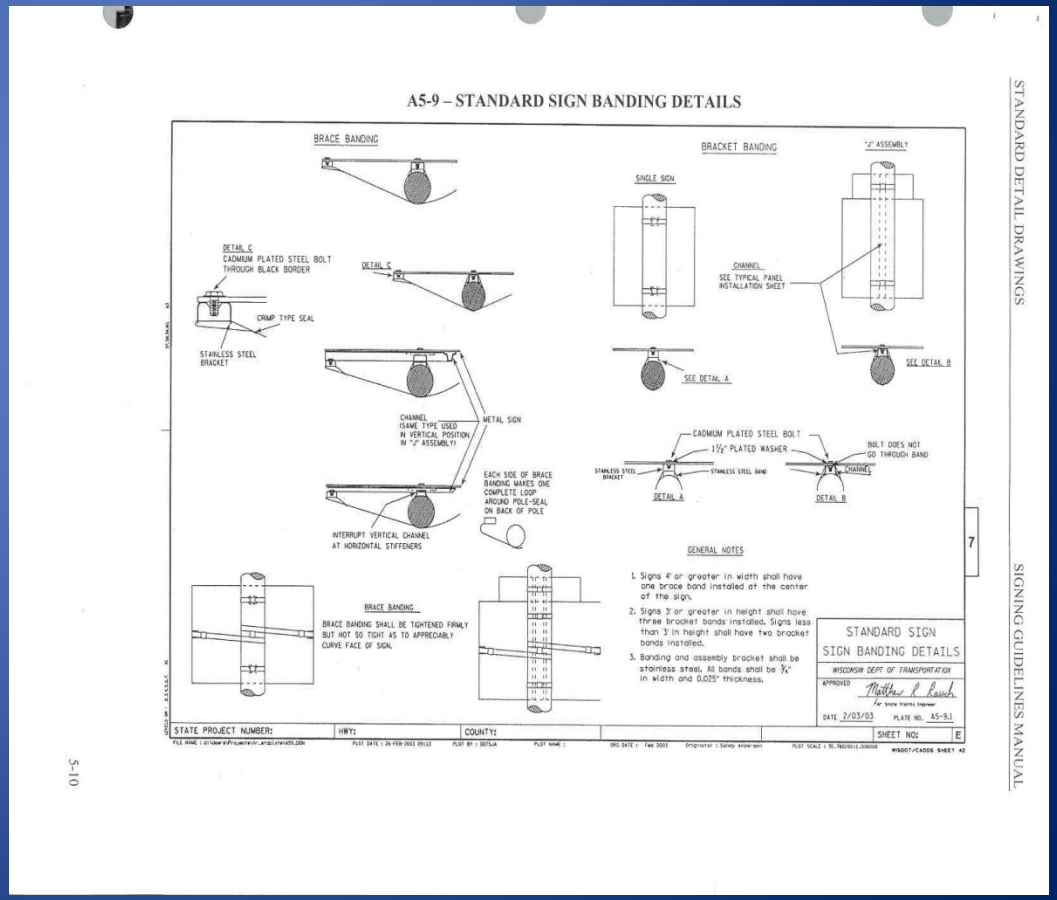
- Improper Installation



Banding Installation Details

HANDOUT P 36

- Proper sign banding hardware for Type II signs
- A5-9 Sign Plate



Overhead Sign Structures

HANDOUT P 69

Initial Inspections are critical and required

- Inspections to be performed at time of installation
- Project Engineers should work with Region Structures Maintenance (see contact List)
- Repairs completed by contractor

Sample structural deficiencies

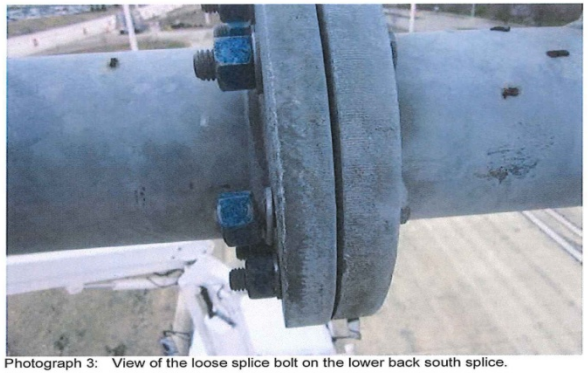
Missing truss connection bolts!

Photograph 3: View of missing truss connection bolts at LB6.

Photograph 4: View of missing truss connection bolts at LF6.

Sample structural deficiencies

Loose splice bolts!



Photograph 3: View of the loose splice bolt on the lower back south splice.

Photograph 4: View of the four loose splice bolts on the upper front south splice.

Routine Sign Installation Activities

- Only old Type II aluminum signs need to be returned to the WisDOT Region Sign Shop
- Type I signs, plywood Type II signs and Type III signs still remain property of the Contractor
- Aluminum and plywood signs need to be separated *(this includes disassembly of old route panels)*

Permanent Signing

STSP 638-010 for Specific Information Signs

- Contractor shall not remove, move or re-install SIS signs on projects
- Contractor shall contact the SIS Sign Contractor a minimum of 14 calendar days in advance

Questions??

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matt.rauch@dot.wi.gov