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DEPARTMENT OF TRANSPORTATION
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TRANSMITTAL LETTER

PUBLICATION:

Publication 108

DATE:
8/21/2018

SUBJECT:

Publication 108 – Sign Foreman's Manual

INFORMATION AND SPECIAL INSTRUCTIONS:

The attached 2018 Sign Foreman's Manual shall replace the 1996 edition of the same title. It is a complete rewrite of the 1996 edition and incorporates many changes to comply with current Department and Manual on Uniform Traffic Control Devices (MUTCD) requirements.

This publication provides information to assist Sign Foremen and others involved with the installation and maintenance of traffic signs.

CANCEL AND DESTROY THE FOLLOWING:

Publication 108 – April 1, 1996

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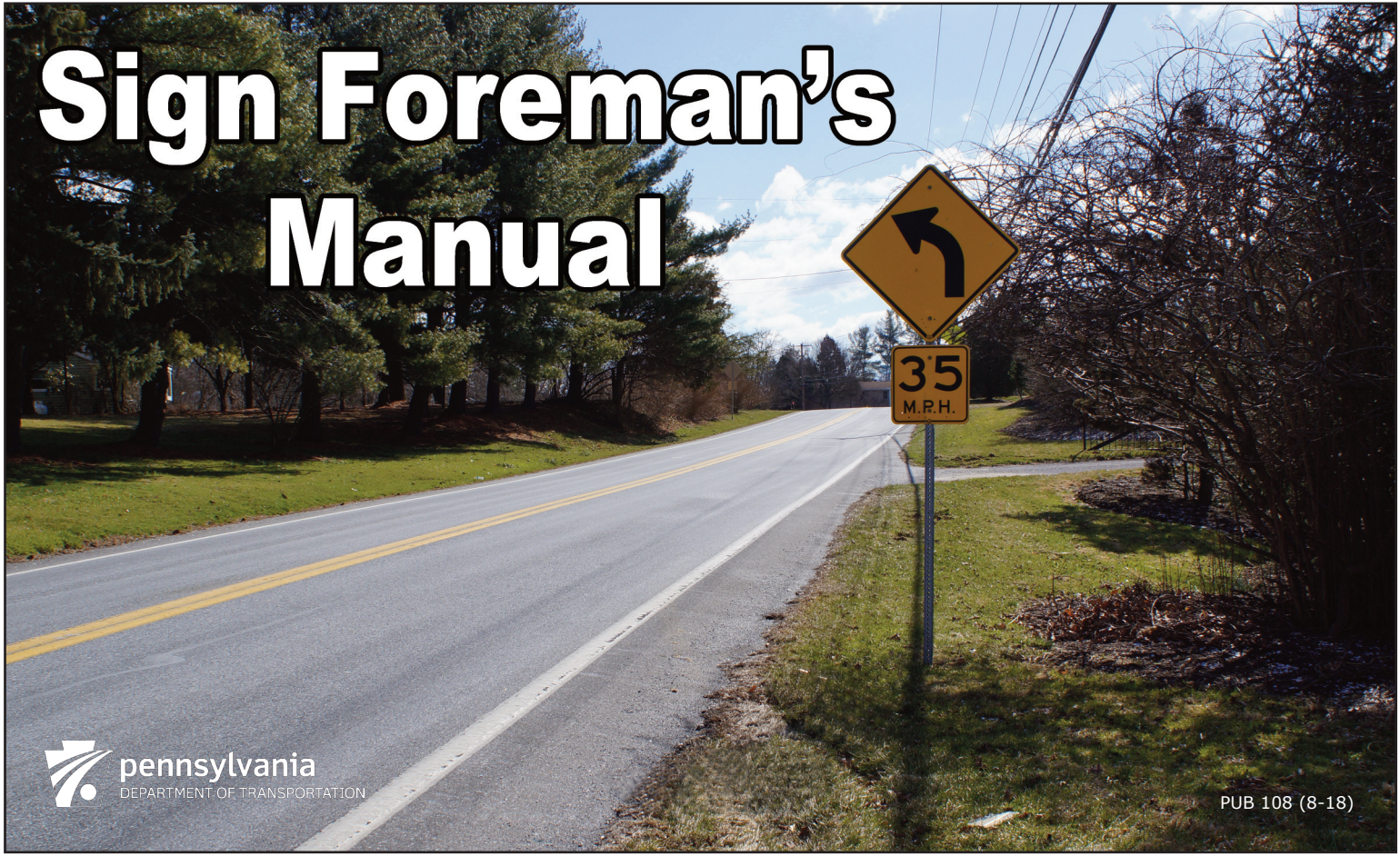
Sign Foreman's Manual



pennsylvania
DEPARTMENT OF TRANSPORTATION

PUB 108 (8-18)

Introduction

This manual has been developed to assist Sign Foremen and others involved with the installation and maintenance of traffic signs. It is not a replacement, but rather a supplement, to the Manual on Uniform Traffic Control Devices (MUTCD), Traffic Control - Pavement Marking and Signing Standards (Publication 111), Handbook of Approved Signs (Publication 236) and the Traffic Engineering Manual (Publication 46).

It is important that signs are installed consistently and correctly; however, because no two roads are exactly alike, unusual situations are often encountered related to topography, man-made objects, intermediate intersections or other circumstances that may require some modifications to typical sign placement guidelines and standards. The most suitable placement for a sign must be determined in the field where all variables are visible. Any deviation or adjustment must be documented in the SAP Plant Maintenance sign inventory.

PREFACE

The Sign Foreman's Manual (Publication 108) was first published in 1983, with revisions in 1986 and 1996. This 2018 edition replaces the 1996 publication and incorporates many changes to keep current with both Department requirements and the requirements found in the MUTCD.

This publication is intended to assist Sign Foremen with fulfilling their job responsibilities. It includes information from many sources, but will not eliminate the need to refer to other applicable publications.

If in your use of this manual you determine that additional areas or modifications should be included in future editions, please refer your comments to:

Bureau of Maintenance & Operations
Traffic Engineering & Permits Section
6th Floor, Commonwealth Keystone Building
Harrisburg, PA 17105-2047

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CHAPTER 1
DEFINITIONS

Accessories – Posts, bolts, nuts, washers, rivets, brackets, straps, shims, stiffeners, sleeves and miscellaneous hardware used to install signs.

Bicycle Lane – A portion of a roadway designated for preferential or exclusive use by bicyclists by pavement markings and signs.

Breakaway Sign Post – A post designed to separate or break from its base when impacted in order to reduce the damage to the impacting vehicle and its occupants.

Clear Zone – The total roadside border area starting at the edge of the traveled way, available for safe use by errant vehicles. The width of the clear zone is influenced by traffic volume, the design speed and embankment slope. (See PennDOT Design Manual, Part II).

Delineators – Retroreflective devices used to indicate the alignment of the roadway, or to highlight a roadside obstacle especially at night or in adverse weather.

Foundation – A base for anchoring a sign support.

Gore – A longitudinal point where a physical barrier or the lack of a paved surface inhibits road users from crossing from a ramp or channelized turn lane or channelized entering lane to the adjacent through lane(s) or vice versa.

May – Indicates an action which is permissible but not required.

Object Marker – A device used to mark obstructions within or adjacent to the roadway.

Retroreflective Sheeting – A material applied to a sign blank or delineator that is capable of reflecting light back to a light source enhancing nighttime visibility.

Road User – A vehicle operator, bicyclist or pedestrian, including persons with disabilities, within the roadway.

Roadway – The portion of the highway designed or ordinarily used for vehicular travel. The shoulder is not considered part of the roadway.

Roundabout – A circular intersection with yield control at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around the central island.

CHAPTER 1
DEFINITIONS (continued)

Shall – Indicates an action is required or prohibited.

Should – Indicates an action is required unless engineering judgment or an engineering study indicates otherwise.

Sign – An official traffic-control device used to convey information to road users through a word, symbol or arrow legend.

Sign Assembly – A group of signs, located on the same support(s) that supplement one another in conveying information to road users.

Speed Limit – The maximum speed applicable to a section of roadway as established by law or engineering study.

Support – Any device used to support a sign, e.g. post, bridge, luminaire, span wire, or an overhead structure.

Stop Line – A solid white pavement marking line extending across the approach lanes to indicate the point at which a stop is intended or required to be made.

Traffic – Pedestrians, bicycles, ridden or herded animals, vehicles, streetcars and other conveyances, used singly or together using any highway for purposes of travel.

Traffic Control Devices – All signs, signals, pavement markings, delineators and other devices used to regulate, warn, or guide traffic, placed on, over or adjacent to a street, highway, pedestrian facility, bikeway or private road open to public travel.

Urban District – The territory adjacent to and including the street which is built up with structures devoted to business, industry or dwelling houses situated at intervals of less than 100 feet for a distance of one-quarter mile or more.

Vehicle – Any device in, upon or by which any person or property is or may be transported or drawn upon a highway, except devices used exclusively upon rails or tracks.

Work Zone – The area of a highway where construction, maintenance or utility work activities are being conducted and in which traffic control devices are required in accordance with Title 67, Chapter 212.

CHAPTER 1
ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AHMM	Assistant Highway Maintenance Manager
BOMO	Bureau of Maintenance and Operations
BW	Business Warehouse
CSR	Custom Sourcing Routine
DMI	Distance Measuring Instrument
EUP	End User Procedures
FHWA	Federal Highway Administration
DGS	Department of General Services
GMS	General Motorist Services
GR	Goods Receipt
IES	Integrated Enterprise System
MRP	Material Requirements Planning
MUTCD	Manual on Uniform Traffic Control Devices
OM	Object Marker
PHMC	Pennsylvania Historical and Museum Commission
PM	Plant Maintenance
PO	Purchase Order
PREQ	Purchase Requisition
PTST	Pennsylvania Tourism Signing Trust
PRT	Perception-Response Time
RAR	Reimbursable Activities Report
RPC	Roadway Program Coordinator
RPM	Raised Pavement Marker
RPT	Roadway Program Technician
SAP	Systems, Applications & Products
SI	Sign Notification
STO	Stock Transport Order
TECO	Technically Completed
TODS	Tourist Oriented Directional Signs

CHAPTER 2
DEPARTMENT ORGANIZATIONS AND THEIR RESPONSIBILITIES

2.1 GENERAL

Various organizations within the Department are involved in signing and each has their necessary function and area of responsibility. The flow of information starts with Department regulations and policies and ends with the installation and maintenance of signs.

The various organizations and their relationships are identified in Sections 2.2 through 2.4. Please note that the duties and responsibilities of the Engineering District and Maintenance District personnel are general guidelines that vary from district to district and county to county.

2.2 BOMO – TRAFFIC ENGINEERING AND PERMITS SECTION

2.2.1 CENTRAL OFFICE

The Pavement Markings, Sign Standards and Specifications Unit is responsible for establishing signing policies and guidelines, developing standards, specifications and regulations related to signing, developing annual contracts for the purchase of miscellaneous signs, sign accessories and work zone traffic control devices for use by county maintenance districts and raw materials for use by the Sign Shop Distribution Center; developing safety programs, monitoring the statewide use and inventory of signs and sign accessories, performing quality assurance reviews of sign installations and managing the Plant Maintenance (PM) – Signs Program. Central Office is also responsible for rendering technical assistance to the districts and counties for the program areas identified above.

CHAPTER 2
DEPARTMENT ORGANIZATIONS AND THEIR RESPONSIBILITIES

2.2.2 SIGN SHOP DISTRIBUTION CENTER

The Sign Shop Distribution Center (Sign Shop) manufactures signs and stocks select sign accessories for distribution to county maintenance units. The Sign Shop's general goal is to have all signs and sign accessories available for pickup by Pony Drivers within two (2) weeks after receipt of an order.

2.3 ENGINEERING DISTRICT

2.3.1 DISTRICT TRAFFIC UNIT

The District Traffic Unit determines what signs and delineation devices should be in place along all State Highways within the Engineering District. They also use PM to edit the sign database, create sign notifications (SI) for the installation, relocation and removal of existing signs. The Traffic Unit prepares any SignCAD drawings required for these SI notifications and may create PMS1 (Sign) work orders for the counties.

The District Traffic Unit will refer concerns from the public to the District Customer Care Center Administrator related to signing or enter them directly when required. They also provide technical assistance and guidance to county maintenance units for all matters related to signing and offer assistance and training in the use of PM.

2.3.2 DISTRICT PM COORDINATOR

The District PM Coordinator responsibilities include:

- Assist power users in resolution of PM issues for highway, signs and equipment
- Participate in training county personnel in PM
- Use business warehouse reports to monitor county production
- Liaison between Central Office and counties on PM issues

2.3.3 DISTRICT PM MATERIALS COORDINATOR

The District PM Materials Coordinator responsibilities include:

- Extend materials to counties as required
- Assist in material procurement
- Monitor material usage and recommend changes
- Provide procurement and/or inventory management training to counties
- Liaison between Central Office and counties on PM material issues
- Remove deletion status from materials

2.4 COUNTY MAINTENANCE UNIT

2.4.1 ADMINISTRATIVE STAFF ASSISTANT HIGHWAY MAINTENANCE MANAGER & ROADWAY PROGRAM COORDINATOR

The Assistant Highway Maintenance Manager (AHMM) responsibilities include:

- Creation of PMS1 work orders
- Planning Sign Foreman's work (Dispatch and weekly plan)
- Printing of work orders for use by Sign Foreman
- Timely completion of work orders (Technically Completed (TECO))
- Liaison between Central Office, district and county for PM
- Review and approve sign crew payroll

The Roadway Program Coordinator (RPC) responsibilities include:

- Back-up for AHMM
- Runs Custom Sourcing Routine (CSR) for approval of Purchase Requisitions (PREQs)
- Oversees all activities associated with purchasing
- Develops and manages the county's budget
- Manages the Agility Program

2.4.2 STOREKEEPER /ROADWAY PROGRAM TECHNICIAN (RPT)

The Storekeeper/RPT responsibilities include:

- Create Manual Orders when circumstances dictate the need
- Perform Goods Receipt (GR) within 48 hours of materials being received
- Maintain stocked sign inventory and review Planned Orders generated through Material Requirements Planning (MRP)
- Assist in Physical Inventories
- Recommend inventory adjustments

2.4.3 SIGN FOREMAN

The Sign Foreman's responsibilities include:

- Complete PMS1 Work Orders including removing, relocation, installing and repairing traffic control devices
- Supervises sign crew members
- Complete Daily Payroll to include Stocked Materials
- Work with Storekeeper/RPT in maintaining signs, delineation devices, post and hardware inventories
- Keep Storekeeper/RPT apprised of existing and anticipated material needs
- Insure SI notifications are created to capture spot field work performed
- Conduct field views and communicate sign repair/replacement needs

CHAPTER 3
TYPES AND PRIORITIZATION OF SIGNS

3.1 TYPES OF SIGNS

3.1.1 REGULATORY SIGNS

Regulatory signs inform the driver of traffic laws or regulations and are normally placed where the regulation applies.

3.1.2 WARNING SIGNS

Warning signs direct the driver's attention to potentially hazardous conditions on or adjacent to the roadway that otherwise would not be readily apparent. Warning signs are normally placed an adequate distance in advance of the condition. The actual advance warning distance should be determined by the normal approach speed and other roadway conditions as well as the availability of space for the sign (see Section 5.2). These factors must be considered so the normal driver has time to read, comprehend, evaluate and react to the sign.

3.1.3 GUIDE SIGNS

Guide signs provide direction to the driver, including traffic routes, destinations, available services, points of interest and other geographic, recreational or cultural sites. Guide signs are strictly for the purpose of traffic control and are not to be used as a means of advertising. Guide signs are placed in advance of or at the point where a decision must be made regarding a change in direction of travel.

3.2 PRIORITIZATION

The prioritization (highest to lowest) by sign type is as follows:

- Stop, Yield, Do Not Enter and One-Way Signs
- Regulatory Signs which protect the integrity of the system, (Weight Limit, Road Closed, Bridge Out, No Trucks, etc.)
- Warning Signs
- Remaining Regulatory Signs
- Guide Signs
- Motorist Service Signs (GMS, Logo signs, TODS, Hospital signs, State Police signs, Driver's License Centers, etc.)

CHAPTER 4
SIGN MATERIALS

4.1 TYPES OF SIGN BLANKS

4.1.1 FLAT SHEET ALUMINUM SIGNS

Flat sheet aluminum is the most common type sign blank material. Signs larger than 60” x 60” are typically made with stiffeners in accordance with Section 4.1.2.

4.1.2 FLAT SHEET ALUMINUM SIGNS WITH STIFFENERS

Flat sheet aluminum signs with stiffeners are covered with reflective sheeting on the front and have extruded aluminum stiffeners riveted on the back side.

This type of sign is typically used for large guide signs on expressways and freeways. These sign panels should be attached to W-beam steel posts by post clips or attached to wood posts by stainless steel buckle straps or mounting brackets in accordance with Traffic Control Signing Standards TC-8701S, TC-8702A and TC-8702E.

4.1.3 EXTRUDED ALUMINUM CHANNEL SIGNS

Extruded aluminum channel signs are made from either 6 or 12-inch wide channels placed one on top of another with stitch bolts to form a single sign of the desired height. This type of sign is not manufactured by the Sign Shop and is not typically installed by Department sign crews. These signs may, however, require routine maintenance. (See Traffic Control Signing Standards TC-8702A, TC-8701E and TC-8702E for guidance on this type of sign).

CHAPTER 4
SIGN MATERIALS

4.1.4 ROLL UP SIGNS

Another suitable material in addition to aluminum signs for Work Zone Traffic Control is roll-up retroreflective sheeting material. This is classified as Type VI material. Roll-up signs are available on contract through UniqueSource.

4.2 IDENTIFICATION OF SHEETING MATERIALS AND TIME OF MANUFACTURE

Each sign manufactured at the Sign Shop has coding to identify the manufacturer of the retroreflective sheeting, sheeting type and the year and quarter in which the sign was made. For silk-screened signs, this information takes the form of small symbols screened on the lower front face of the sign.

The code for the year is the last two digits of the year, e.g., 12,13,14, etc. The letter A, B, C or D represents the 1st, 2nd, 3rd and 4th quarters of the calendar year, respectively. The manufacturer of the retro-reflective sheeting is identified by the symbols shown in Table 4-1.

Manufacturer	Symbol
3M	II
Avery Dennison	+
Nippon Carbide	*

TABLE 4-1
Silk-Screened Manufacturer Symbols

On signs made with cut-out legend, two pressure sensitive stickers are applied; one in the lower left corner for the background material and one in the lower right corner for the legend material. Unlike silk screened signs, the symbols that are missing or punched out identify the material and time of manufacture. Figure 4-1 illustrates an unpunched identification sticker.

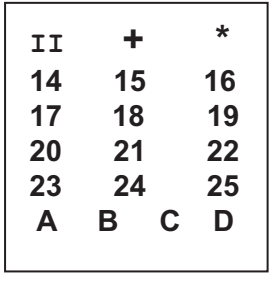


FIGURE 4-1
Identification Sticker

4.3 PARTIALLY FINISHED SIGNS

Each maintenance district should maintain an inventory of the commonly used R12-1 (Weight Limit), R12-1-2 (Bridge), R12-5A (Except Combinations – Tons) and W16-103P (Distance Ahead Plaque) to insure a ready supply. In lieu of stocking completely finished signs, the maintenance district may elect to stock some signs without numerals (Legacy Commodity Group 15) and also stock cut-out pressure sensitive numerals. The numerals should consist of 5” E-Series digits for the standard size R12-1 Signs. Ensure that the proper size legend is used on the applicable signs. Five numerals of the same type will be supplied as a unit from the Sign Shop. Cut-out pressure sensitive numerals have a tendency to dry out; therefore, no more than a normal 12 month supply should be stocked. Legend should be stored upside down to help prevent curling, and the oldest numerals should be used first.

CHAPTER 4
SIGN MATERIALS

4.3.1 FIELD APPLICATION OF PRESSURE SENSITIVE LEGEND

Pressure sensitive legend shall be applied as illustrated in the official sign standard (found in Publication 236) and according to the procedure outlined below.

1) Store signs and legend at room temperature
2) Apply legend at the storeroom since it is difficult to apply during hot, cold or humid weather conditions.
3) Wash hands and the sign face with clean soapy water and thoroughly dry to ensure proper adhesion of the legend.
4) Using a china pencil or soft lead pencil, draw horizontal lines on the sign face to delineate the top and bottom of the legend in accordance with the dimensions shown on the approved sign standard (Publication 236). These lines will also be valuable to help align the legend. Vertical lines may also be valuable in orienting some legend.
5) Without removing the backing paper, position the characters at their relative locations. The space between characters should generally be about 125% of the stroke width (the width of the lines in the legend) – a slightly smaller space should be used before and after “4” or a “7”. Characters which have a curve at the bottom should extend slightly below the lower transverse line.
6) Pull the backing paper off the character and align that part before removing the balance of the paper. It is normally best to start with the bottom of the characters with straight bottoms (e.g. 2’s, A’s, L’s, etc.) and the top of characters with straight tops (e.g. 5’s, 7’s, F’s, etc.). After the first part of the character is in place, remove the balance of the backing paper and allow the character to flow into place without being stretched.
7) Finger nails or a special plastic blade should be used as a squeegee to apply pressure to the characters to permanently affix them to the sign. The legend will normally be removable for a period of time by using a blade or knife to lift a corner, but if removed, new legend should be applied instead of trying to reapply the same legend.
8) Use a damp cloth to remove felt-tip or china pencil markings. Do not erase lead pencil markings.
9) Take pride in your work – the Department’s image is judged by it!

CHAPTER 5
GENERAL SIGN INSTALLATION REQUIREMENTS

5.1 SIGN GROUPINGS

Signs are normally erected individually on separate supports. However, when one sign supplements another and where the installation of two or more signs on the same post or structure will not confuse the driver, signs should be grouped. Some examples of sign groupings include (this list is not intended to be all inclusive):

STOP SIGN WITH:

- Except Right Turn
- All-Way
- One-Way (typically above Stop Sign)
- Turn Restrictions (R3-1, R3-2 & R3-3)
- Divided Highway Crossing
- SR or Segment Marker (but not on same side as Stop)
- Street Name Signs (by local authorities, no required vertical separation)
- Do Not Enter (on the backside – cannot extend beyond the edges of the Stop Sign)
- Opposing Traffic Does Not Stop
- Stop Sign Removed from Side Street

STOP SIGN WITH (continued):

- Cross Traffic Does Not Stop
- Traffic From Right (or Left) Does Not Stop

YIELD SIGNS WITH:

- One-Way (typically above the Yield Sign)
- Turn Restrictions
- Divided Highway Crossing
- Divided Highway Side Road Crossing
- SR or Segment Marker (but not on same side as Yield)
- To Oncoming Traffic

CHAPTER 5

GENERAL SIGN INSTALLATION REQUIREMENTS

INTERSECTION WARNING SIGNS WITH:

- Advance Street Name (black on yellow)
- Advisory Speed

ROUTE MARKER ASSEMBLIES WITH:

- Directional Signs (D-Boards)
  - ✧ Route Marker assemblies shall be installed below D-Boards
  - ✧ Where two or more routes follow the same section of highway, the route signs for Interstate, US, State and County routes shall be mounted in that order from left to right in the horizontal arrangements and from top and bottom in the vertical arrangements.
  - ✧ Subject to this order of precedence, route signs for lower numbered routes shall be placed at the left or top.
  - ✧ Within groups of assemblies, information for routes intersecting from left shall be mounted at the left in horizontal arrangements and at the top or center of veritcal arrangements.
  - ✧ Information for routes intersecting from the right shall be at the right or bottom; for straight-thru routes at the center in horizontal arrangements or top in vertical arrangements.

SR AND SEGMENT MARKERS WITH:

- Warning and Guide Signs
  - ✧ Markers placed on the same side of post should be at least 12 inches below the other sign.
- Regulatory Signs
  - ✧ Stop and Yield Signs as noted on page 13.
  - ✧ For all other regulatory signs, markers cannot be mounted facing the same direction as the regulatory sign.

SPEED LIMIT WITH:

- No Passing Zone Pennants (on back)
- Municipal Name Sign

5.2 LONGITUDINAL PLACEMENT

The longitudinal location of signs depends on the type of sign, the nature of the message and the desired motorist response. Therefore, the placement should be such that the sign is at the proper location which is within the cone of vision of the driver and does not block the motorist's vision of the road or other signs. Generally on facilities with operating speeds less than 35 miles per hour, a minimum of 200 feet should be maintained between all signs. However, on facilities where operating speeds are 35 miles per hour or greater, this minimum spacing value should be increased to 500 feet. However situations exist, especially at intersections of numbered routes, where many signs are required in a short distance. In these situations, the minimum spacing values may not be practical, and every effort should be made to maintain the maximum spacing possible.

Whenever possible, adequate spacing should be provided between sign installations to allow the driver time to comprehend the message on one sign before being confronted with another sign. This spacing requirement is subject to the limitations prescribed for the location of the specific sign and should normally be taken care of by the District Traffic Unit in the development of the sign plan or sign work order. Slight adjustments in the longitudinal placement (up to approximately 50 feet in either direction) may provide the driver with an unobstructed view without sacrificing the intent of the sign. The sign crew should discuss with District Traffic Unit the relocation of signs if moving a sign is questionable. The sign equipment record in PM should also be updated with the new location.

Regulatory signs should be located where the regulation applies, thus limiting adjustment of their location, (see Publication 236 and Department Regulations). Stop signs shall be located as close as practical to the intersections they regulate, while optimizing their visibility to the road user they are intended to regulate, and they should not be placed farther than 50 feet from the edge of pavement of the intersected roadway. See section 2B.10 in the MUTCD for additional details on Stop sign placement. For speed limits of 50 miles per hour or less, signs shall be placed at the beginning, end and at intervals not exceeding 1/2 mile throughout the area with the speed limit. For 65 or 70 miles per hour speed limits on freeways, signs shall be installed after each interchange where the speed limit is in effect.

Since warning signs are primarily for the protection of the driver who is unfamiliar with the road, it is very important that care be given to their placement. Warning signs should provide adequate detection, recognition, decision and reaction time. This total time is referred to as Perception-Response Time (PRT).

CHAPTER 5
GENERAL SIGN INSTALLATION REQUIREMENTS

Table 5-1 lists minimum recommended warning sign placement distances for various conditions:

- **CONDITION A:**

  Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 seconds for vehicle maneuvers.

- **CONDITION B:**

  The distance required to slow from posted speed limit to the condition's advisory speed.

Table 5-1

Posted or 85th Percentile Speed	Advance Placement Distance (1)								
	Condition A: Speed Reduction and lane changing in heavy traffic(2)	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0(3)	10(4)	20(4)	30(4)	40(4)	50(4)	60(4)	70(4)
20 mph	225 ft	100 ft(6)	N/A(5)	-	-	-	-	-	-
25 mph	325 ft	100 ft(6)	N/A(5)	N/A(5)	-	-	-	-	-
30 mph	460 ft	100 ft(6)	N/A(5)	N/A(5)	-	-	-	-	-
35 mph	565 ft	100 ft(6)	N/A(5)	N/A(5)	N/A(5)	-	-	-	-
40 mph	670 ft	125 ft	100 ft(6)	100 ft(6)	N/A(5)	-	-	-	-
45 mph	775 ft	175 ft	125 ft	100 ft(6)	100 ft(6)	N/A(5)	-	-	-
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft(6)	-	-	-
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A(5)	-	-
60 mph	1100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft(6)	-	-
65 mph	1200 ft	475 ft	450 ft	400 ft	350 ft	270 ft	200 ft	100 ft(6)	-
70 mph	1250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	-
75 mph	1350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft(6)

Table 5-1 (continued)

(1) The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

(2) Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lanes Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

(3) Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sign Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second^2, minus the sign legibility distance of 180 feet.

(4) Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second^2, minus the sign legibility distance of 250 feet.

(5) No suggested Distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be places anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

(6) The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

Other miscellaneous warning signs that advise of potential hazards but are not related to a specific location (e.g., Deer Crossing and Soft Shoulder signs) may be installed in the most appropriate locations.

The effectiveness of the placement of any sign should be evaluated under both day and night conditions whenever possible.

The longitudinal placement of guide signs is similar to the placement of warning signs. Necessary adjustments should be made to provide an unobstructed view of the sign.

5.3 LATERAL CLEARANCE

Signs should be placed as far as practical from the edge of the roadway to reduce the possibility of vehicles hitting them.

When guide rail is present, signs should be placed behind the guide rail if possible. Signs should not be mounted or attached directly to guide rail. The sign crew should discuss sign relocations with the District Traffic Unit if moving a sign is necessary.

Although field conditions may restrict installation location, an effort should be made to place signs with the following lateral clearances (see Figure 5-1):

- 6 feet from edge of shoulder where possible.
- 12 feet from edge of roadway if no shoulder exists and right-of-way allows.
- 2 feet behind guide rail or concrete barrier.
- 2 feet behind a curb, except in urban areas a lateral clearance of 1 foot will be permitted when sidewalk width is limited or when existing poles are too close to the curb. Care should be taken to ensure that warning sign edges do not protrude into the roadway area where they are likely to be hit.
- 30 feet from the edge of roadway for large guide signs

5.4 HEIGHT

The Americans with Disabilities Act (ADA) requires all signs to be mounted at a minimum height of 7 feet where pedestrian movement is likely. Signs on posts should be placed at the minimum height indicated in Figure 5-1. The minimum height is measured from the bottom of the sign to a level line projected from the nearest edge of roadway (this may result in a sign height greater than the minimum required when measured from ground level to the bottom of the sign), except in urban areas the height is measured as indicated. If a supplemental sign is installed below the main sign, the bottom of the sign assembly may be 6 feet above the near edge of pavement.

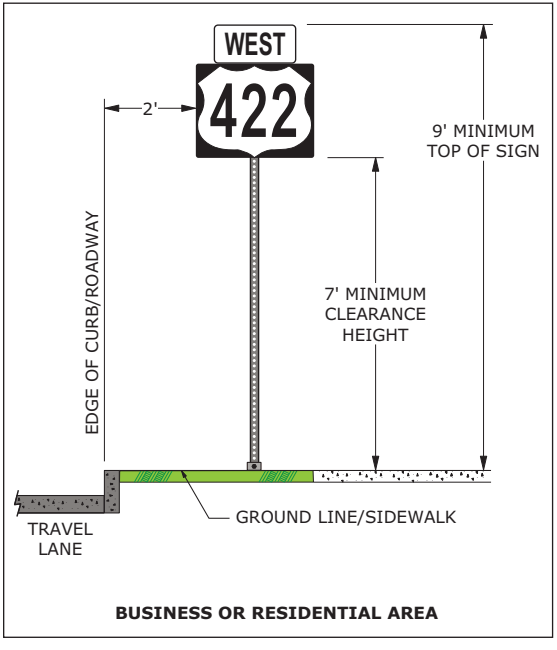
However, in business commercial and residential districts where parking and/or pedestrian movements are likely or where the sign may block visibility, the bottom of all sign installations shall be a minimum of 7 feet above ground.

Although a 7-foot minimum sign height is recommended, in rural districts where the conditions listed in the above paragraph are not likely, signs may be mounted at a minimum clearance height of 5 feet. Although a minimum height is specified, the signs may be placed at a greater height to provide better visibility and to eliminate the need to cut posts to the exact height of the sign. A greater height also helps to reduce the possibility of vandalism by putting the sign out of reach.

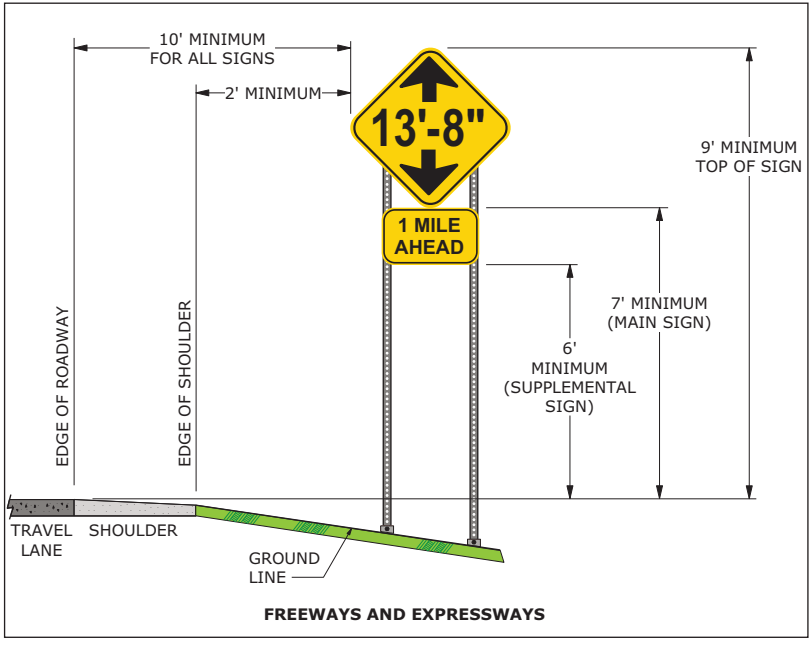
When a sign is within the clear zone and is not protected by a crash-worthy barrier, use posts of sufficient length so the top of the sign is a minimum of 9 feet above grade. This height requirement helps ensure the top of the sign does not penetrate the windshield of an errant vehicle.

CHAPTER 5
GENERAL SIGN INSTALLATION REQUIREMENTS

Figure 5-1

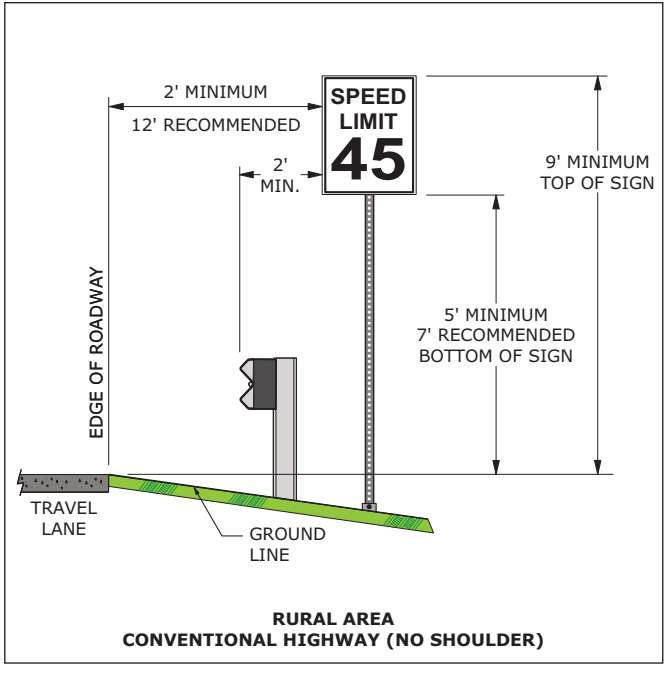


BUSINESS OR RESIDENTIAL AREA

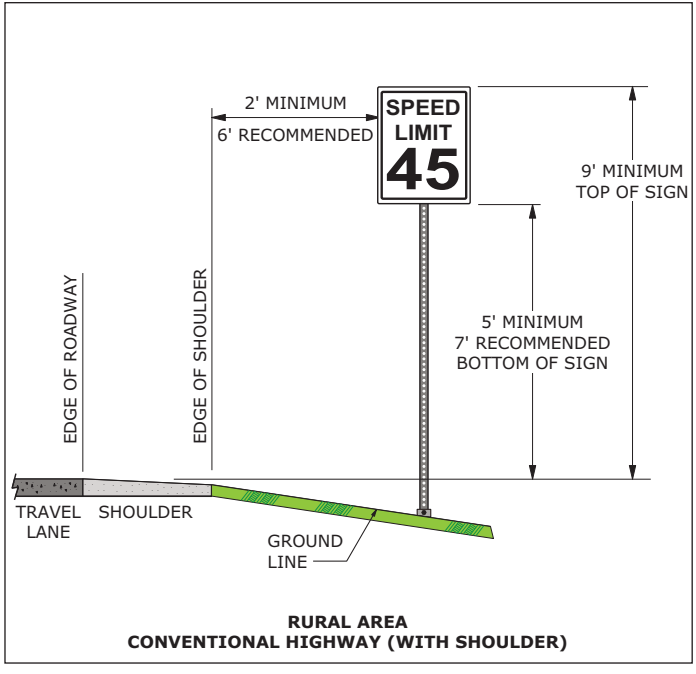


FREEWAYS AND EXPRESSWAYS

Figure 5-1 (Continued)



RURAL AREA
CONVENTIONAL HIGHWAY (NO SHOULDER)



RURAL AREA
CONVENTIONAL HIGHWAY (WITH SHOULDER)

CHAPTER 5
GENERAL SIGN INSTALLATION REQUIREMENTS

5.5 SPECIAL CONSIDERATIONS

5.5.1 COOPERATION WITH PROPERTY OWNERS

Property owners adjacent to our highways often maintain the right-of-way with the same care as they do their own property. Placement of signs often conflict with the property owner's desires. If a sign can be moved a few feet without losing its intended function, every effort should be made to honor the property owner's request. Many times, the District Traffic Unit will have already addressed this problem, however, the sign crew may be approached with a request from the property owner to relocate a sign. If possible place signs at the boundary lines between property owners. Since the exact placement of some signs is critical, it may be necessary to contact the District Traffic Unit to determine if the sign location can be moved. However, as noted in Section 5.2, in most instances a sign can be moved by as much as approximately 50 feet in either direction without affecting the usefulness of the sign.

5.5.2 UNDERGROUND UTILITIES

Gas, water, sewer, electric, highway lighting conduit and telephone lines are frequently located underground. Their locations should be marked, but the plaques or markers may have deteriorated or may have been removed by crashes or vandalism. When markings are not present, other clues such as service valves or subsided trenches could indicate the presence of an underground utility.

When underground utilities are suspected, care and consideration should be practiced before deciding to drive a post into the ground. These areas should be avoided for sign installations if at all possible.

Act 287 was adopted to prevent accidents involving underground utilities. Basically, Act 287 and related Department policy requires the following:

5.5.2 UNDERGROUND UTILITIES (continued)

- At least three working days but not more than ten working days prior to beginning non-emergency work, the county shall contact the One Call System by dialing 811 or 1-800-242-1776 or utilizing the web ticket entry to determine which utilities are located in the scheduled work area. Use of the One Call System is necessary regardless of the method of sign installation (manual or power equipment)
- For replacement of existing signs at or near (within 12” horizontally) its original location, use of the One Call System is not required unless utilities are suspected of being in the area.
- The purpose of making the construction One Call will be to identify the site so that the facility owners (utilities) can provide indications of their lines. The county will meet this requirement if the call (or web ticket entry) to the One Call System is made, the required information is provided and a lawful start date is obtained.
- Any leaks, dents, etc., should be reported to the utility company by the person closest to the work. Alert nearby residents in case of an emergency.

5.5.3 CARE IN HANDLING SIGNS

The Sign Shop manufacturers all signs with high-intensity sheeting. When signs are stacked horizontally, excessive pressure damages cells within the sheeting, causing that portion of the sign where the cells have been damaged to be non-reflective. For this reason, the Sign Shop vertically stacks its sign inventory. This same attention is required throughout the entire process from picking up signs at the Sign Shop, shipping to the districts, storing at the counties and transporting to installation sites.

- Signs shall be transported vertically (or near vertical) and not exposed to outdoor weather conditions when they are in contact with each other.
- Vehicles without overhead protection that transport signs must be covered with a tarp or other suitable covering.
- Vertically stacked signs that are exposed to moisture can be damaged when the slip sheeting between the sign faces becomes wet.

The above measures must be taken to ensure that all signs arrive at their final destinations in good condition and perform effectively for their expected 18-year service life.

In addition, when signs are installed, nylon washers should be used between the sign face and the bolt head. When tightening sign bolts, it is best to tighten from the backside of the sign to prevent the reflective sheeting from being scratched.

5.5.4 DATING OF SIGNS AS INSTALLED

The back of each sign shall be marked with the month, day and year of installation with a permanent marker, paint stick, or wax crayon. It is recommended that the date be marked prior to attaching to the post, but care should be taken to ensure that the marking will not be behind the post when erected. The date code system to be used is as follows:

Initial sign installation……..…**I** - 06/16/17

Replacement in kind……..**R** - 06/16/17

Relocation/**M**oving of sign……....**M** - 06/16/17

5.6 WORK ZONE TRAFFIC CONTROL

Work Zone Traffic Control shall be in accordance with Publication 213 for the type of roadway and operation involved. Pennsylvania Typical Applications (PATA) should be used in determining what traffic control is required.

5.7 DOS AND DON'TS

DO:

- Ensure proper post size is used for the given sign size.
- Install signs plumb.
- Install signs with the required vertical clearance.
- Install signs with the required horizontal clearance, whenever possible.
- Remove branches and foliage or other obstructions that block the view of all signs.
- Ensure notifications are used to record all sign maintenance activities in PM.
- Use anti-theft hardware for Stop and Yield signs, or any other signs prone to theft.
- Install a Left/Right Turn Sign(W1-1) instead of a Left/Right Curve Sign (W1-2) in advance of curves that have advisory speeds of 30 mph or less.

DON'T:

- Place a conflicting regulatory sign near a warning sign with an advisory speed plaque (e.g., a speed limit 45 sign within the view of a curve advisory speed of 35).
- Install a sign where its view will be blocked by trees, utility poles, other signs or any other obstruction.
- Install a sign where it will block the driver's view of other signs or oncoming traffic.
- Place a speed limit sign within a school zone.

CHAPTER 6
SIGN SUPPORTS

6.1 BREAKAWAY CRITERIA

The MUTCD requires that ground-mounted signs shall be breakaway, yielding or shielded with a longitudinal barrier or crash cushion if within the clear zone. FHWA-approved breakaway posts used by the Department are identified in Publication 35 (Bulletin 15) and shown below in Table 6-1. Many other FHWA-approved breakaway systems exist, but are not currently used by the Department.

Table 6-1

	1 Post in a 7-foot Path	2 Posts in a 7-foot Path
Type A	Breakaway Couplings	Breakaway Couplings (not to exceed 17lbs/ft for each post)
Type B	2.5 & 4-lb Channel Bar Posts	2.5 & 4-lb Channel Bar Posts
	Up to 2.25” Steel Square Posts	Up to 2.00” Steel Square Posts
Types C & E	4"x6" Wood Posts (1.5" dia. holes)	4”x6” Wood Posts (1.5” dia. holes)
	6"x6" Wood Posts (2.0" dia. holes)	
	6"x8" Wood Posts (3" dia. holes)	

6.2 POST-MOUNTED SIGNS, TYPE A

Type A posts are used to install major guide signs along freeways and expressways.

Type A sign supports consist of steel W beam posts, breakaway couplings, brackets to attach the post to the couplings, hinge plates and concrete footings.

Installation details for Type A sign supports including post selection tables for determining the required size and number of posts, bracket selection tables and concrete footing details table are found in TC-8702A.

Hinge Plates

Breakaway Couplings

6.3 POST-MOUNTED SIGNS, TYPE B

Type B steel posts are frequently used to erect regulatory, warning and small guide signs. Fasten stop signs, yield signs and signs prone to theft to Type B posts using an approved anti-theft nut and bolt system.

6.3.1 Channel Bar Posts

Channel bar posts are a two-piece system with an anchor and a single upright post.

Channel bar posts are purchased in two different weights: 2.5 pounds/foot and 4.0 pounds/foot. The posts are available with a painted or a galvanized finish in various lengths. Channel bar posts use a 42” anchor. The maximum anchor height for both 2.5 and 4.0 pounds/foot posts is 4 inches above ground level.

Installation details including post selection tables for determining the required size and number of channel bar posts for a sign installation are found in TC-8702B.

6.3.2 Steel Square Posts

Steel square posts are a two-piece system with an anchor and a single upright post.

Steel square posts are either 12 or 14 gauge and 1.75", 2.0" or 2.25" post sizes. The posts are available with galvanized finish in various lengths. Steel square posts use a 36" anchor. The maximum anchor height is 1 inch above ground level.

Installation details including post selection tables for determining the required size and number of steel square posts for a sign installation are found in TC-8702B.

6.4 POST-MOUNTED SIGNS, TYPE C AND E

Wood posts are frequently used to erect guide signs, information signs and route marker assemblies along freeways and expressways and conventional roadways. They can also be used to erect larger-size regulatory and warning signs.

Type C refers to flat sheet aluminum signs installed on wood posts, and Type E refers to signs fabricated with extruded aluminum channel or flat sheet aluminum with stiffeners installed on wood posts. Both installations include concrete (or expandable foam) foundations with metal post sleeves and shim bars/plates. To be considered breakaway, holes are drilled perpendicular to vehicular travel near the bottom of the posts.

Installation details including post selection tables for determining the required size and number of wood posts for a sign installation are found in TC-8702C and TC-8702E.

Type E

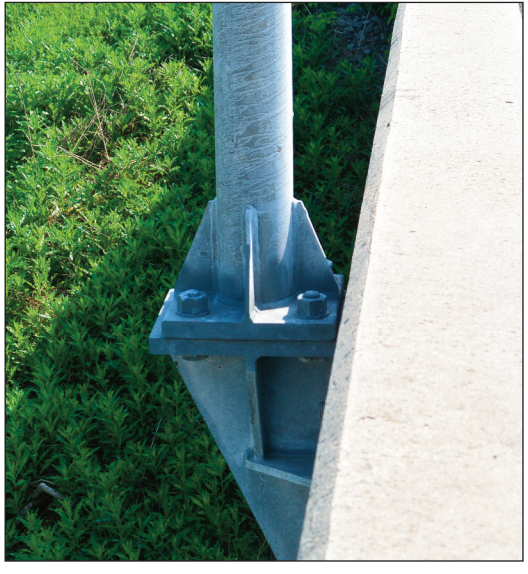
Concrete Foundations with Wood Post Breakaway Feature

Type C

6.5 POST-MOUNTED SIGNS, TYPE D

Type D sign installations consist of flat sheet aluminum signs with stiffeners on steel pipe supports, fastened to fabricated structural steel mounting brackets.

Installation details are found in TC-8702D.



CHAPTER 7
PM PROCEDURES

7.1 GENERAL

SAP PM is used for tracking highway, equipment and sign activities. PM serves as the Department's inventory of signs erected in the field. An accurate sign inventory is necessary to properly implement the 18-year Expected Sign Life method of sign maintenance. This procedure is mandated by the MUTCD for ensuring the minimum retroreflectivity levels for traffic signs. Based on studies by the Department, traffic signs have an average service life of 18 years. After that time, they should be replaced.

7.2 MAINTAINING SIGN EQUIPMENT

New sign equipment is added to the inventory directly into PM via the IE01 transaction. End User Procedures (EUPs) are the work instructions for all the PM Sign transactions. EUPs are found on the IES website or by contacting your District SAP PM power user.

7.3 NOTIFICATIONS

Notifications provide a to do list of sign maintenance needs and serve to track the history of all sign maintenance activities. If work is completed in the field and no associated notification is completed, there will be no record of the work performed. If a notification is completed but the work was not finished, PM will incorrectly indicate that the work was completed. This often occurs when a notification is attached to a work order but for some reason the work is not completed and the notification is not removed from the work order before the work order is TECO'd. All notifications attached to a work order are typically completed when the order is TECO'd.

7.4 WORK ORDERS

Sign work orders (PMS1) are used to capture costs unlike notifications, which capture maintenance history. Sign work orders can have multiple notifications which differs from highway work orders which only have one notification per work order.

Because of this, a sign work order is first created and then notifications are attached rather than creating a work order from a notification as with a highway work order. The number of notifications attached to a work order should be limited to a maximum of 30 in order to keep the work order manageable.

When signs are populated on the component tab, they are populated as either a stocked or non-stocked sign. This is determined by how the sign materials are extended to the county.

Signs which are extended as non-stocked have a PREQ created as soon as the work order is released. The RPC then approves the PREQ through the CSR and a PO/STO is created.

When the Sign Shop issues the finished sign, it is charged directly to the work order. The sign goes into an in-transit and is received by the storekeeper through a goods receipt.

Stocked signs, which are kept in inventory at the county level, create a reservation against the work order which is considered in MRP. The reservation is closed when the sign is issued through the ZIPY payroll process.

When signs are damaged due to negligent operation of a vehicle, a PMS1 work order shall be created using the 612253201 (Repair Damage to Sign) assembly code. The PMS1 work order number shall be provided to the RAR Coordinator who will reference it when seeking reimbursement through an RA Notification. Before and after color digital photos shall be taken in accordance with Publication 23, Chapter 14.

7.5 SIGN EQUIPMENT SELECTION

The IE05 transaction is used to select sign equipment(s) based on a variety of user input criteria (e.g., functional location, construction type, plant, etc.). The list generated will contain columns for the notification(s), the reference date(s) as well as additional fields. The most recent notification linked to a condition code that resulted in a sign replacement will be shown. The reference date is the date the notification was closed and is used to determine the age of signs, especially those over 18 years old. See Table 7-1 for an example.

TABLE 7-1
IE05 SIGN EQUIPMENT LIST

Functional Loc.	Equipment	User Status	Description of Technical Object	Const Type	Construc. Type Desc.	Notification	Ref. Date	Segment	Offset	Wid...	Height	Position	Facing Direction	Post Type
784-0840-S-2001	300134422	C000	R 4 1	305982	SIGN 24X30 DO NOT PASS (#8)	1300713602	10/28/1998	0030	2,476 Feet	24"	30"	R	D	
784-0840-S-2001	300134424	C000	W 3 1	306362	SIGN 48X48 STOP AHEAD (#35)	1300713607	10/28/1998	0040	490 Feet	48"	48"	R	D	
784-0840-S-2001	300134428	C000	W 1 7	306325	SIGN 48X24 LARGE ARROW (DOUBLE) (#20)	1301254642	02/07/2012	0070	187 Feet	48"	24"	R	A	3 Type B - Square
784-0840-S-2001	300134430	C000	W 1 8 Enlarge to 30 x 36	306330	SIGN 30X36 CHEVRON MRKR (#21)	1300934465	06/03/2011	0070	807 Feet	30"	36"	R	D	3 Type B - Square
784-0840-S-2001	300134432	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792811	05/02/2011	0100	52 Feet	24"	30"	R	D	3 Type B - Square
784-0840-S-2001	300134436	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792812	05/02/2011	0030	2,281 Feet	24"	30"	R	D	3 Type B - Square
784-0840-S-2001	300137168	C000	R 1 1 S R 2 0 0 1	305806	SIGN 36X36 STOP (#2)	1301570919	06/19/2015	0080	45 Feet	36"	36"	R	D	3 Type B - Square
784-0840-S-2001	300137180	C000	W 1 8	306329	SIGN 30X36 CHEVRON MRKR (#21)	1300713589	10/21/1998	0100	956 Feet	24"	30"	R	D	
784-0840-S-2001	300171025	C000	R 1 - 1 0 P	328732	SIGN 24X18 EXCEPT RIGHT TURN PLAQ (#2)	1300045638	04/04/2008	0080	45 Feet	24"	18"	R	D	3 Type B - Square
784-0840-S-2001	300171127	C000	W 1 0	306329	SIGN 24X30 CHEVRON MRKR (#21)	1300713590	10/21/1998	0100	956 Feet	24"	30"	L	A	
784-0840-S-2001	300237349	C000	W 1 2 R	306285	SIGN 30X30 RIGHT CURVE (#17)	1301570953	06/19/2015	0030	2,015 Feet	30"	30"	R	A	
784-0840-S-2001	300237361	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792814	05/02/2011	0030	2,549 Feet	24"	30"	R	D	3 Type B - Square
784-0840-S-2001	300237369	C000	W 1 2 R	306285	SIGN 30X30 RIGHT CURVE (#17)	1300713608	10/28/1998	0040	1,607 Feet	30"	30"	R	D	
784-0840-S-2001	300237380	C000	W 1 2 R	306285	SIGN 30X30 RIGHT CURVE (#17)	1300713555	10/21/1998	0070	264 Feet	30"	30"	R	A	
784-0840-S-2001	300237385	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792815	05/02/2011	0070	1,070 Feet	24"	30"	R	D	3 Type B - Square
784-0840-S-2001	300237392	C000	W 1 4 L L	306313	SIGN 30X30 LEFT REVERSE CURVE (#19)	1300713576	10/21/1998	0100	163 Feet	30"	30"	R	A	
784-0840-S-2001	300237394	C000	W 1 2 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792816	05/02/2011	0100	1,253 Feet	24"	30"	R	A	3 Type B - Square
784-0840-S-2001	300299893	C000	W 1 2 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792817	05/02/2011	0010	193 Feet	24"	30"	R	A	3 Type B - Square
784-0840-S-2001	300299901	C000	R 1 1 S R 2 0 0 1	305807	SIGN 48X48 STOP (#34)	1301417666	12/19/2013	0040	33 Feet	48"	48"	R	D	
784-0840-S-2001	300299904	C000	W 3 1	306361	SIGN 36X36 STOP AHEAD (#17)	1300713615	04/11/2006	0050	1,532 Feet	36"	36"	R	D	3 Type B - Square
784-0840-S-2001	300299907	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792818	05/02/2011	0070	306 Feet	24"	30"	R	D	3 Type B - Square
784-0840-S-2001	300299908	C000	W 1 3 L	306308	SIGN 48X48 LEFT REVERSE TURN	1300713593	10/21/1998	0100	1,365 Feet	48"	48"	R	D	
784-0840-S-2001	300304015	C000	W 1 8	306329	SIGN 24X30 CHEVRON MRKR (#21)	1300713578	10/21/1998	0100	443 Feet	24"	30"	L	D	3 Type B - Square
784-0840-S-2001	300364359	C000	W 1 1 3	306505	SIGN 30X30 DEER CROSSING (#8)	1300883913	10/28/1998	0010	351 Feet	30"	30"	R	A	
784-0840-S-2001	300364363	C000	W 1 3 L	306307	SIGN 30X30 LEFT REVERSE TURN (#18)	1301570957	06/19/2015	0030	1,200 Feet	30"	30"	R	D	3 Type B - Square
784-0840-S-2001	300364378	C000	R 2 1 4 0	305842	SIGN 24X30 SPD LIMIT 40 MPH (#4)	1300792819	05/02/2011	0050	1,638 Feet	24"	30"	R	A	3 Type B - Square
784-0840-S-2001	300364381	C000	W 1 8 Enlarge to 30 x 36	306330	SIGN 30X36 CHEVRON MRKR (#21)	1300934539	06/03/2011	0070	606 Feet	30"	36"	L	A	3 Type B - Square
784-0840-S-2001	300364385	C000	W 1 1 L S	327763	SIGN 36X36 LEFT TURN W SIDE RD STR AHD	1301570958	06/19/2015	0070	2,010 Feet	36"	36"	R	A	
784-0840-S-2001	300364389	C000	W 2 2	306341	SIGN 30X30 SIDE ROAD (#8)	1300713584	10/21/1998	0100	766 Feet	30"	30"	R	A	
784-0840-S-2001	300364393	C000	W 1 3 1 P 3 0	306574	SIGN 24X24 ADVS SPD (30) BLK/YEL	1300883914	10/21/1998	0100	1,365 Feet	24"	24"	R	D	
784-0840-S-2001	300371225	C000	W 1 8	306329	SIGN 24X30 CHEVRON MRKR (#21)	1300713579	10/21/1998	0100	443 Feet	24"	30"	R	A	3 Type B - Square

CHAPTER 8

DELINEATION DEVICES

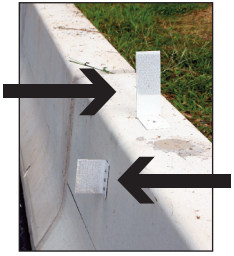
8.1 GENERAL

The types, location, spacing, placement, and color of delineators are indicated in Traffic Control Standard TC-8604.

8.1.1 TYPES OF DELINEATORS

- Flexible post delineators are designed to withstand several high-speed impacts and return to their original position. All models which are currently approved are listed in Section 937 of Bulletin 15. Surface-mounted delineators are installed with an adhesive to a paved surface and are typically 36” high. Ground-mounted delineators are installed in un-paved areas using a galvanized metal soil anchor and are typically 48” high. Flexible post delineators have either 3”x12” or 7.5”x12” area of reflective sheeting at the top of the delineator post depending on if the post is round or flat at the top. If the sheeting becomes damaged, replace with new strips of white or yellow sheeting. Flexible delineator posts should be installed in accordance with the manufacturer’s recommendations.
- Barrier delineators typically attach to the top or sides of the barrier by a pressure-sensitive or epoxy adhesive. They are available single-sided and two-sided. Barrier delineators should be installed in accordance with the manufacturer’s recommendations.
- Guide rail delineators typically attach to the face or top of strong or weak post guide rail. They are available single-sided and two-sided. Guide rail delineators should be installed in accordance with the manufacturer’s recommendations.

Ground Mounted
Type GM-2



Guide Rail
Type B

Surface Mount
Type SM-1

CHAPTER 8

DELINEATION DEVICES

8.1.2 LOCATION

- Lighted Through Roadways - Do not place delineators on the through roadway between interchanges where fixed source lighting is installed unless otherwise specified.
- Unlighted Through Roadways - On roadways without fixed source lighting, continuously place delineators along the right side of the through roadways. Place delineators on the left side of through roadways at the following locations:
  - ✧ Where guide rail or concrete barrier is located on the left within 6’ of the edge of shoulder.
  - ✧ Along right-hand horizontal curves with a radius of 2000’ or less.
  - ✧ Along combinations of over-verticals and right-hand horizontal curves with a radius less than 2900’.
  - ✧ On the approach and throughout left lane drops or pavement width transitions.
  - ✧ Within the limits of median crossovers (as shown on sheet 3 of 4 in TC-8604).
  - ✧ Within the limits of variable median widths (as shown on sheet 3 of 4 in TC-8604).
  - ✧ Along paved medians with curbing.
- Interchange Areas - Place delineators along the right side in all interchange areas and along the left side within the limits of all left-hand ramps. Place delineators along acceleration, deceleration and speed change lanes; along the right side of the through roadway and along the outside or both sides as specified on all ramps.
- Bridge Parapets - Place delineators on parapets of all bridges where snowplowable raised pavement markers (RPMs) are used on approach roadway.
- Special Purpose Delineation - Place object and clearance marker group (OM series) along the through roadway and within the interchange area as specified in addition to the above specified delineators.
- Maintenance Markers - Place one red flexible delineator post adjacent to near edge of maintenance appurtenance (end pipe, end wall, inlet, etc.). Match reflective sheeting color with the nearest pavement marking edge line color.

8.1.3 LONGITUDINAL SPACING

- Right Side of Through Roadways - Install delineators at 264' except in interchange areas with right-hand ramps, acceleration or deceleration lanes and along horizontal curves.
- Left Side of Through Roadways - When required, install delineators at 264' except in interchange areas with left-hand ramps, acceleration or deceleration lanes, on median barriers and along horizontal curves.
- Interchange Areas - Space delineators in interchange area at 132'.
- Horizontal Curves - Space delineators as indicated in the table "GROUND/SURFACE-MOUNTED DELINEATOR SPACING ON CURVES," sheet 3 of 4 in TC-8604.
- Exit Gores, Channelizing Islands and Ramp Terminals The design varies sufficiently at these locations making typical spacing unavailable for every situation. Determine delineator spacing and application on site and as directed by the Engineer. However, use a minimum spacing of 20' except as indicated.
- Special Purpose Delineation - Place special purpose delineation (OM series) along the roadway without regard to longitudinal spacing. Space delineation on median barriers in accordance with note 4 on sheet 2 of 4 in TC-8604.
- Median Crossovers - place delineators at 100' spacing as indicated on sheet 3 of 4 in TC-8604 with a minimum of five delineators on the approach to the crossover and three delineators beyond the crossover.
- Maintenance Markers - place maintenance markers along the roadway without regard to longitudinal spacing.

8.1.4 VERTICAL PLACEMENT

- Install delineator so that the tops are approximately 4 feet above the ground. Install on concrete barriers or guide rail as indicated on sheet 2 of 4 in TC-8604.

CHAPTER 8
DELINEATION DEVICES

8.1.5 LATERAL PLACEMENT

- No Guide Rail - Install delineators 2' to 8' behind the outer edge of the shoulder, or as directed.
- Guide Rail - Install delineators in the web of guide rail or on guide rail posts as indicated on sheet 2 of 4 in TC-8604, if the guide rail is less than 8' from the outer edge of shoulder. Do not use ground-mounted delineators in areas with guide rail. If the guide rail is more than 8' from the outer edge of the shoulder, install delineators 2' to 8' behind the outer edge of the shoulder, or as directed.
- Curb in Place - Install delineators immediately behind curb provided placement will not exceed 8' behind the edge of shoulder. If the curb is more than 8' from the edge of shoulder, install delineators 2' to 8' behind the outer edge of the shoulder, or as directed.
- Obstruction Markers - Install obstruction marker delineators adjacent to near edge of the obstruction.
- Maintenance Markers - Install markers adjacent to near edge of the appurtenance (end pipe, end wall, inlet, etc.).

8.1.6 COLORS

- White Delineators - Place on right side of through roadways, along right-hand acceleration, deceleration and speed-change lanes, ramps and on channelizing or divisional islands where traffic in the same direction may proceed on both sides of the island.
- Yellow Delineators - Place on left side of through roadways, ramps and on channelizing or divisional islands where traffic in the same direction travels to the right of the island and along left-hand acceleration, deceleration and speed change lanes and on far side of median crossovers.
- Red Delineators - Place on right, left, or both sides of roadways or ramps to indicate wrong-way movement. Also, place on both sides of run-away truck escape ramps.
- Special Purpose Delineator (OM1-3) Markers - Place markers at locations shown on sheet 3 of 4 in TC-8604.
- Maintenance Markers - Place red post with white reflective sheeting on right side of through highway. Place red post with yellow reflective sheeting on left side of through highway.

CHAPTER 8
DELINEATION DEVICES

8.2 CHEVRONS

The chevron emphasizes changes in roadway alignment at locations where additional accent is required. Chevrons are signs and should be mounted as such, and back-to-back mountings are beneficial.

Chevron spacing should be such that the motorist always has at least two chevrons in view. Generally, chevrons should be spaced at approximately twice the delineator spacing shown in Sheet 3 of 4 in TC-8604. Also, six chevrons should be used, at equal spaces, on a 90-degree turn.

8.3 DELINEATION OF IMPACT ATTENUATORS

On impact attenuators, follow the manufacturer's recommendations for delineating the leading edge of the attenuator in the manufacturer's provided space for delineation. Additional clearance markers (OM-3R or OM-3L) shall not be attached to the leading edge of impact attenuators.

On inertial barriers (sand barrels), pressure sensitive reflective sheeting without a rigid substrate should be applied directly to the first barrel or nose section. An aluminum substrate with reflective sheeting may be mounted to the front barrel provided a clearance is received from the manufacturer.

Surface-mounted or ground-mounted flexible post delineators are permitted to be placed 3 feet or more in advance of impact attenuators to provide additional delineation. In no case shall a clearance marker be erected on a post in front of the impact attenuator.

See TC-8604 for complete details on guide rail and barrier delineation.

CHAPTER 9

SIGN, DELINEATOR, AND MARKER MAINTENANCE

9.1 GENERAL

It is important that all signs be kept in proper position, clean and legible at all times. Damaged signs, especially knocked-down regulatory signs shall be repaired or replaced as soon as possible. Stop, Yield, Do Not Enter and One-Way signs shall have the highest priority. See Section 3.2 for prioritization of signs.

Since signs are continually subjected to damage by wind, crashes, and vandalism, it is important to establish a suitable schedule for inspecting, cleaning, and replacing signs.

Inspection can be routinely performed, when traveling to and from work sites, by checking for missing signs and damage to signs, supports or accessories. An accurate sign inventory is invaluable as assistance in this area.

Special attention and necessary action should be taken to remove signs no longer required. Approval by the District Traffic Unit is required prior to the removal of an existing sign. Another item of importance is to check that any vegetation does not obscure the face of any sign. Refer to Publication 23, Maintenance Manual for details on vegetation removal for signs.

When replacing a sign or sign support, refer to the applicable requirements of this manual and Publication 111 regarding installation. In addition, check the entire installation for other repairs that could be done to prevent an unnecessary return to the same site.

For example, check:

- The condition of the sign, support(s) and foundation(s)
- For loose or broken fasteners and/or other accessories
- If the sign is still required based on current conditions

CHAPTER 9

SIGN, DELINEATOR, AND MARKER MAINTENANCE

9.2 PRIORITIES

Routine maintenance schedules, which include the district's sign work orders and the sign replacement program must be adjusted to give priority to damaged or missing signs that could be considered an emergency. Emergency repairs should be prioritized in accordance with Section 3.2.

For regulatory signs, priority should be given to those signs that prevent a conflict between vehicles. For warning signs, priority should be given to those signs that warn of a reduction of roadway width or number of traffic lanes, curves, narrow or one-lane bridges or underpasses, or changes in traffic patterns.

9.3 DEFECTIVE, MISSING OR DAMAGED SIGNS

Determining the need to replace a missing sign is obvious, however determining when a sign is defective or if a damaged sign should be repaired or replaced is not always so evident.

A sign would be determined defective when its condition is found to be undesirable due to discoloration, fading, alligator cracks, tears, etc. In determining whether a damaged sign should be repaired or replaced, consideration must be given to the economics involved in repair or replacement and if the repair will result in a functional sign. In addition, check with the District Traffic Unit to see if the sign in question is scheduled for replacement as part of the 18-year replacement cycle.

9.4 EXPECTED SIGN LIFE

The Federal Highway Administration has mandated that all states have a method to maintain their traffic signs so that they comply with the minimum retroreflectivity levels found in the MUTCD. The Department has elected to use the Expected Sign Life Method to maintain the minimum level of retroreflectivity of our signs. Traffic signs fabricated from Type III retroreflective sheeting material can be expected to give a minimum of 18 years of satisfactory performance. Signs with a Reference Date in SAP PM older than 18 years shall be replaced. See Chapter 11 in Publication 23 for additional information.

9.5 SUPPORTS

9.5.1 GENERAL

Sign posts, breakaway hardware and other accessories are generally available on the statewide Post and Accessories Contract.

9.5.2 TYPE A (STEEL BEAM POSTS)

Steel W-beam posts are used to support Type A Signs (flat sheet aluminum with stiffeners and extruded aluminum channel).

The current breakaway system is shown on Standard Drawing TC-8702A. This system uses a bolt-on aluminum bracket on the front and back flange of each post and breakaway couplings in each of the four corners of the bracket.

Very little maintenance is required on this system, except in the event of wind or crash damage.

See Section 6.2 and TC-8702A in Publication 111.

9.5.3 TYPE B (CHANNEL BAR & SQUARE POSTS)

Maintenance of Type B Posts will normally be limited to repairing the breakaway connection or replacing bolts on the sign face. Repairs or replacement shall be in accordance with the installation requirements for the particular model of Type B Post. See Section 6.3 and TC-8702B in Publication 111.

9.5.4 TYPES C & E (WOOD POSTS)

Due to the nature of this post, required maintenance will normally consist of replacing the post. Replacement shall be in accordance with the installation requirements for wood posts. See Section 6.4 and TC-8702C and TC-8702E in Publication 111.

9.5 SUPPORTS (continued)

9.5.5 TYPE D (STRUCTURE-MOUNTED SIGNS)

Maintenance of structure-mounted signs will normally be restricted to emergency repairs. Since structure-mounted signs, lighting fixtures and supports are vulnerable to damage by wind and oversized vehicles, they should be periodically inspected by the sign crew or district personnel. Common maintenance problems include missing posts clips, deteriorated U-bolts, cracked welds, loose anchor nuts, and missing/non-functional sign lighting bulbs. Detected damages should be repaired, if possible. If not, report the damages to the Maintenance District.

9.5.6 DELINEATORS

Maintenance of delineators consists of re-installing dislodged posts or missing delineators, replacing missing or damaged retroreflective sheeting or straightening up posts.

CHAPTER 10

SIGNS AND MARKERS INSTALLED AND MAINTAINED BY OTHERS

10.1 GENERAL

Title 67 Pa. Code Chapter 212.5 identifies the signs that local authorities are responsible for installing and maintaining on state and local roads with or without Department approval.

Table 10-1 summarizes the responsibilities for the installation and maintenance of signs on State-designated conventional highways listed in Chapter 212.5. For State-designated expressways and freeways, local authorities may not install or revise signs on the expressway or freeway or at an intersection with an expressway or freeway without written Department approval, unless noted otherwise in Chapter 212.

Observed maintenance problems involving signs installed by others should be reported to the responsible party. In case of a missing or knocked down Stop sign, if the responsible party cannot be contacted in an expeditious manner, it is imperative to temporarily install a Department sign until the appropriate party can install their sign.

Table 10-1

Traffic Control Device	Responsible Authority
Regulatory Signs	
Pedestrian Group Signs (R9 Series)	Local Authority
Railroad	
Railroad Crossbuck Sign (R15-1)	Railroad Company
Track Sign (R15-2), Emergency Notification Sign (I-13a)	Railroad Company
Other signs, gates, or lights within railroad company's ROW	Railroad Company
Snowmobile Road Closed to All Other Vehicles Sign (R11-11)	Local Authority
Speed Limit Signs (R2-1), 35 mph or less, except	Local Authority
Hazardous grade speed limit signs	Department
Bridge speed limit signs	Department
Department rest areas speed limit signs	Department
Department welcome center speed limit signs	Department
Department weigh station speed limit signs	Department
Stopping, Standing, or Parking Signs (R7 and R8 series)	Local Authority
Street Closed (R11-10)	Local Authority
Traffic Signal Group Signs (R10 Series)	Local Authority
Weigh Stations not owned or operated by the Department	
All Truck Must Enter Weigh Station (R13-1)	Local Authority
Weigh Station signs (D8 Series)	Local Authority
Traffic Control Device	**Responsible Authority**
Warning Signs	
Children Group Series (W15 Series)	Local Authority
Entrance and Crossing Signs (W11 Series), except	Local Authority
Deer Crossing (W11-3)	Department
Elk Crossing (W11-20)	Department
Horsedrawn Vehicle (W11-14)	Department
Left Turns and Cross Traffic Sign (W11-105)	Department
Left Turns (W11-106)	Department
Watch for Turns Sign (W11-107)	Department
Signal Ahead Sign (W3-3)	Local Authority
Guide Signs	
Bicycle Route Sign (D11-1)	Local Authority
Parking Area Sign (D4-1)	Local Authority
Street Name Signs (D3 Series)	Local Authority
Telephone Directional Signs (D9-1)	Local Authority
Traffic Control Device	**Responsible Authority**
General Information Signs	
Snowmobile and All Terrain Vehicle Group Signs (I12 Series)	Local Authority
Traffic Signal Speed Sign (I1-1)	Local Authority
Trail Group Sign (I4 Series)	Local Authority
School Signs	
School signs (S Series)	Local Authority
School Zone Speed Limits	Local Authority
Traffic Signals and Traffic Signaling Devices	
All associated signs included on the Department-approved traffic signal plan	Local Authority
All Other Traffic Control Devices	Department
Miscellaneous not covered in Chapter 212	

CHAPTER 10

SIGNS AND MARKERS INSTALLED AND MAINTAINED BY OTHERS

10.2 LOGO SIGNS

Logo signs are installed and maintained by the Pennsylvania Tourism Signing Trust (PTST) on many freeways and limited access roadways. These signs identify specific trademarks or business names for gas, food, lodging, camping and attractions and are provided for the convenience of the motorist.

Logo signs are funded by the participating businesses, but are Department property. However, except for clearing and grubbing, maintenance is the responsibility of the PTST. Therefore, if logo signs need repair, the PTST shall be notified. Clearing and grubbing should be performed around and in front of logo signs at the same time this work is done for the other Department signs.

10.3 TOURIST ORIENTED DIRECTIONAL SIGNS

Tourist Oriented Directional Signs (TODS) are installed and maintained by the PTST on conventional roadways. These signs guide travelers to commercial, cultural/institutional, historical/architectural, recreational, tourist services and transportation related destinations.

TODS are funded by the participants, but are Department property. However, except for clearing and grubbing, maintenance is the responsibility of the PTST. Therefore, if TODS need repair, the PTST shall be notified. Clearing and grubbing should be performed around and in front of TODS at the same time this work is done for other Department signs.

10.4 HISTORICAL MARKERS

Two types of historical markers currently exist along our roadways:

- Cast aluminum markers are installed and maintained by the Pennsylvania Historical and Museum Commission (PHMC).

- Cast iron markers on a keystone were installed by the Department approximately 60 years ago on cast iron posts. Because of the weight of these signs and posts, these markers are only authorized at locations where they are protected by guiderail, bridge abutments, or non-mountable curbs. Therefore, if these markers are located at vulnerable locations, the District Traffic Unit should be contacted for direction on the removal or relocation of the markers.

CHAPTER 11

EQUIPMENT AND PUBLICATIONS FOR SIGN CREWS

EQUIPMENT

- Crew cab with flashing or revolving yellow light
- Power pack or generator
- Electric drill (preferably cordless)
- Drill bits
- Portable electric band saw
- Hydraulic post puller
- Level (at least 2 feet in length)
- Tape measure and ruler
- Ladder
- Sledge hammers
- Wrecking bar
- Saws (hand and hack)
- Drift pins
- Mechanic's hammer
- Various hand tools (screwdrivers, punches, wrenches, pliers, etc.)
- Cold chisels
- China pencil for marking signs
- Torque wrench
- Flexible delineator post driver
- Bandit tool
- Pop rivet gun
- Distance Measuring Instrument (DMI)
- Drive caps
- Black Permanent Marker
- Measuring wheel
- Line level and string
- Chainsaw
- Extension cords
- Air compressor
- Impact wrench
- Pioneer tools (axe, pick, and shovels)
- Pruning tools
- Complete first aid kit
- Post driver (hydraulic, pneumatic, or electric)

PUBLICATIONS

- Pub 23 Maintenance Manual
- Pub 111 Traffic Control Standards
- Pub 113 Maintenance Foreman's Manual
- Pub 212 Official Traffic Control Devices
- Pub 213 Temporary Traffic Control Guidelines
- Pub 236 Handbook of Approved Signs

CHAPTER 12
SIGN RETURN POLICY

12.1 RETURN POLICY FOR TRAFFIC SIGNS

This policy outlines procedures for returning traffic signs to the Department's Sign Shop when a county identifies inventory that is considered excess or unusable based on individual county business needs.

The *Analysis of Material Usage Report*, located in Business Warehouse (BW), can be used to determine annual usage for a given sign material. Based on annual usage, a determination can be made if excess on-hand stock exists.

Note, if a sign is not stocked at the Sign Shop, districts and counties should probably not be stocking the sign although there can be exceptions. For a list of recommended county stocked signs, see Table 12-1.

Once excess signs are identified, the organization must first attempt to decrease excess stock by notifying other organizations of its availability. When another organization is found that agrees to accept the stock, an MB1B (Transfer Posting) transaction can be used to electronically transfer the materials between plants using goods movement Type 303 and receiving county will complete the process with a goods movement Type 305.

If excess signs remain after making signs available to other organizations, consideration may be given to returning the signs to the Sign Shop only after completing the following steps:

1. Excess Stocked Signs

a. Consume materials internally.

b. Ensure that the MRP Area 1 Reorder Points are reduced to a manageable level to avoid the recurrence of excess stock. See Table 12-1.

2. Excess Non-Stocked Signs (that are not custom signs)

a. Temporarily change the material from a non-stocked sign to a stocked sign by removing the "YC" in the Strategy Group field on the MRP 3 tab.

b. Set the MRP Type field on the MRP Area 1 tab to "ND" for no planning.

c. Create a tickle system to track the depletion of inventory until it is reduced to zero. Once the inventory is depleted, the material shall be returned to a non-stocked sign by switching the MRP 3 tab, Strategy Group field back to the "YC" indicator.

CHAPTER 12
SIGN RETURN POLICY

3. Excess Non-Stocked Custom Signs

a. Sign Modification – See Table 12-2 for a list of signs that can be modified. Order from the Sign Shop necessary numbers and letters to modify the signs for use.

b. For signs that are not on the Sign Modification List and/or are damaged or considered unusable, follow the normal statewide surplus procedures detailed below:

   i. County surplus coordinator completes an STD-551, Surplus State Property Report, to surplus signs to the DGS Surplus website.

   ii. If DGS approves the surplus disposition, skip to Section c.

   iii. If DGS rejects the surplus disposition, skip to Step 4.

c. After you receive approval for scrap from DGS Surplus, use MIGO (Movement Type 551, GI Scrapping) to remove material from inventory. The county then returns signs via pony truck to the Sign Shop for scrapping through the DGS Scrap Metal Contract.

4. Return Excess Signs to Sign Shop

a. The Sign Shop Manager's approval must be received prior to returning signs to the Sign Shop. If it is necessary to return excess signs to the Sign Shop, the following information must be provided on an Excel spreadsheet and sent via email to the Sign Shop Manager:

   i. STO # associated with each sign being returned

   ii. Material Number – Material Description

   iii. Annual Usage

   iv. On-hand Quantity

   v. Return Quantity

   vi. Moving Average Price

   vii. Plant

   If the request is denied by the Sign Shop Manager, follow the DGS surplus disposition process described in 3.b.

b. Approved requests will require the following:
    i. County Receiver reverses Goods Receipt (GR) for sign(s) on STO.
    ii. Every sign approved to be returned will need to be properly packaged to avoid any type of damage while in transit such as scratches, dents and bends.
    iii. Every package must contain the STO number(s) that correlate to the sign(s) contained therein clearly marked on the outside of the package.
    iv. Return packaged sign(s) to the Sign Shop via pony truck.

    NOTE: At any time, the Sign Shop reserves the right to return signs received from the districts or counties due to an unacceptable condition for reuse.

c. Once delivery of the signs is confirmed and sign condition is found acceptable, the Sign Shop will enter a reversal of the warehouse issue.

See next pages for Table 12-1 and Table 12-2

CHAPTER 12
SIGN RETURN POLICY
Table 12-1 Suggested County Sign Safety Stock

Nomenclature	Size	Description	SAP Material Number	Safety Stock Quantity
R1-1	30x3030	Stop	305805	6 Signs or 3 mo.
R1-2	36x36	Yield	305816	2 Signs or 3 mo.
R2-1(35)	24x30	Speed Limit (35)	305838	2 Signs or 2 mo.
R2-1(40)	24x30	Speed Limit (40)	305842	3 Signs or 2 mo.
R2-1(45)	24x30	Speed Limit (45)	305846	2 Signs or 2 mo.
R4-1	24x30	Do Not Pass	305982	2 Signs or 2 mo.
R4-7	24x30	Keep Right	305998	2 Signs or 2 mo.
R5-1	30x30	Do Not Enter	306029	1 Sign or 3 mo.
R5-1	36x36	Do Not Enter	306030	1 Sign or 3 mo.
R5-1A	36x24	Wrong Way	306057	1 Sign or 3 mo.
R6-1R	36x12	One Way Right	306065	2 Signs or 2 mo.
R6-1L	36x12	One Way Left	306067	2 Signs or 2 mo.
R8-3	24x24	No Parking Symbol	306115	1 Sign or 2 mo.
R11-2	48x30	Road Closed	306164	1 Sign or 2 mo.
R12-1	24x30	Weight Limit 10 Tons	306176	4 mo.
R12-1	24x30	Weight Limit ( ) Tons (ptlfn)*	305681	4 mo.
R12-1-2	24x12	Bridge	306183	4 mo.
R12-1-1	24x18	( ) Mile Ahead	329130	4 mo.
R12-1-1	24x18	( ) Miles Ahead (ptlfn)*	305686	4 mo.
R12-5A	24x18	Except Combinations ( ) Tons	306188	4 mo.
W1-1R	30x30	Right Turn	306273	2 Signs or 2 mo.
W1-1L	30x30	Left Turn	306277	2 Signs or 2 mo.
W1-2R	30x30	Right Curve	306285	2 Signs or 2 mo.
W1-2L	30x30	Left Curve	306295	2 Signs or 2 mo.
W1-4R	30x30	Right Reverse Curve	306309	1 Sign or 2 mo.
W1-4L	30x30	Left Reverse Curve	306313	1 Sign or 2 mo.

Nomenclature	Size	Description	SAP Material Number	Safety Stock Quantity
W1-6	48x24	Large Arrow (Single)	306322	2 Signs or 2 mo.
W1-8	18x24	Chevron Marker	306328	3 Signs or 2 mo.
W1-8	24x30	Chevron Marker	306329	3 Signs or 2 mo.
W2-1	30x30	Cross Road	306335	2 Signs or 2 mo.
W2-2	30x30	Side Road	306341	2 Signs or 2 mo.
W2-4	30x30	Side Road	306353	2 Signs or 2 mo.
W3-1	36x36	Stop Ahead	306361	2 Signs or 2 mo.
W3-5	36x36	Speed Reduction (x)	319563	1 Sign or 2 mo.
W14-3	48x36	No Passing Zone Pennant	306606	2 Signs or 2 mo.
W5-2	36x36	Narrow Bridge	319473	2 Signs or 2 mo.
W13-1P	18x18	Advisory Speed (20)	306567	1 Sign or 2 mo.
W13-1P	18x18	Advisory Speed (25)	306570	1 Sign or 2 mo.
W13-1P	18x18	Advisory Speed (30)	306573	1 Sign or 2 mo.
W13-1P	18x18	Advisory Speed (35)	306576	1 Sign or 2 mo.
W13-1P	18x18	Advisory Speed (40)	306579	1 Sign or 2 mo.
OM1-3	18x18	Object Marker	306633	1 Sign or 2 mo.
OM-3R	12x36	Right Clearance Marker (B & Y)	306636	5 Signs or 2 mo.
OM-3L	12x36	Left Clearance Marker (B & Y)	306638	5 Signs or 2 mo.
W21-7	36x36	Work Area Ahead (Plastic)	148581	1 Sign or 2 mo.
W21-10	24x24	Stop and Slow Paddle	148586	1 Sign or 2 mo.
M2-1	21x15	Junction Marker (B & W)	307437	2 Signs or 2 mo.
M3-1	24x12	Card Direct Marker North	307441	2 Signs or 2 mo.
M3-2	24x12	Card Direct Marker East	307447	2 Signs or 2 mo.
M3-3	24x12	Card Direct Marker South	307451	2 Signs or 2 mo.
M3-4	24x12	Card Direct Marker West	307457	2 Signs or 2 mo.
M6-1	21x15	Directional Arrow 90 Deg.	307497	2 Signs or 2 mo.

* ptlnf - partially finished

Table 12-2 Signs that Can Easily Be Modified

SAP Material Number	Nomenclature	SAP Description
305827	**R 1-1-2**	SIGN 48X24 RAMP
305864	**R 2 2-1**	SIGN 36X48 TRUCKS OVER (X) LBS SPD (X)
305862	**R 2 2-1**	SIGN 30X36 TRUCKS OVER (X) LBS SPD (X)
305891	**R 2 9**	SIGN 48X30 NEXT (X) FEET OR MILES
306166	**R11 3A**	SIGN 60X30 RD CLSD (X) MI AHD
306178	**R12 1**	SIGN 24X30 WEIGHT LIMIT (X) TONS
306179	**R12 1**	SIGN 36X48 WEIGHT LIMIT (X) TONS
306186	**R12 1-4**	SIGN 24X18 SEASONAL WEIGHT LIMIT (X)
306188	**R12-5A**	SIGN 24X18 EXCEPT COMBINATIONS (X) TNS
306189	**R12-5A**	SIGN 36X24 EXCEPT COMBINATIONS (X) TNS
306190	**R12-6**	SIGN 24X36 102 WD TRLR ADV PRHBTD ( )
306191	**R12-6**	SIGN 36X48 102 WD TRLR ADV PRHBTD ( )
306194	**R12-6**	SIGN 36X48 102 WD 1/2 MI ADV PRHBTD ( )
306223	**R14-14**	SIGN 48X60 TRCKS OVR (X) LBS STOP X FT
306225	**R14-15**	SIGN 72X36 TRCKS OVR (X) LBS W/ ARROW
306226	**R14-15**	SIGN 96X48 TRCKS OVR (X) LBS W/ ARROW
306216	**W 7 3AP**	SIGN 24X18 NEXT (X) MILES
306417	**W 7 3AP**	SIGN 30X24 NEXT (X) MILES
306418	**W 7 3BP**	SIGN 24X18 (X) GRADE (X) MILES
306419	**W 7 3BP**	SIGN 30X24 (X) GRADE (X) MILES
306546	**W12 2**	SIGN 36X36 LOW CLR (X)FT (X)IN (BLK/YEL)
306548	**W12 2**	SIGN 48X48 LOW CLR (X)FT (X)IN (BLK/YEL)
327883	**W12-2A**	SIGN 78X24 LOW CLR OVRHD X X (NO ARROWS)
327884	**W12-2A**	SIGN 84X24 LOW CLR OVRHD X X 1 ARROW L/R
327885	**W12-2A**	SIGN 90X24 LOW CLR OVRHD X X (2 ARROWS)
306723	**W23-101**	SIGN 96X48 THIS(X) TO BE CLOSED FOR(X)
327904	**W16-103P**	SIGN 24X18 DISTANCE AHEAD PLAQUE (FEET)
329129	**W16-103P**	SIGN 24X18 DISTANCE AHEAD PLAQUE (MILE)
329130	**W16-103P**	SIGN 24X18 DISTANCE AHEAD PLAQUE (MILES)
327905	**W16-103P**	SIGN 36X24 DISTANCE AHEAD PLAQUE (FEET)
340430	**W16-103P**	SIGN 36X24 DISTANCE AHEAD PLAQUE (MILE)
340431	**W16-103P**	SIGN 36X24 DISTANCE AHEAD PLAQUE (MILES)
307897	**I80 1**	SIGN 48X60 WATER SPPLY AREA NXT X MI X