
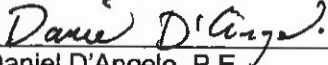


SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15	MODIFIED BY EI 08-043 EFFECTIVE 05/07/09		<i>New York State</i> <i>Department of</i> <i>Transportation</i> ENGINEERING INSTRUCTION	EI 07-019
Title: STANDARD SPECIFICATION CHANGES FOR THE ADOPTION OF THE NATIONAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (FHWA) AND THE NEW YORK STATE SUPPLEMENT				
Distribution: <input checked="" type="checkbox"/> Manufacturers (18) <input checked="" type="checkbox"/> Local Govt. (31) <input checked="" type="checkbox"/> Agencies (32) <input checked="" type="checkbox"/> Surveyors (33) <input checked="" type="checkbox"/> Consultants (34) <input checked="" type="checkbox"/> Contractors (39) <input type="checkbox"/> _____ ()			Approved:  Daniel D'Angelo, P.E. Deputy Chief Engineer, Design 5/25/07 Date	

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of 09/06/2007.
- This EI does not supersede any other issuance.
- The revisions issued with this EI will be incorporated into a future update of the Standard Specifications.

PURPOSE: To implement changes to the Standard Specifications that are required in order to adopt the National Manual on Uniform Traffic Control Devices for Streets and Highways (approved by the FHWA) and the New York State Supplement to the National Manual on Uniform Traffic Control Devices for Streets and Highways.

TECHNICAL INFORMATION:

- The entire Standard Specifications book has been word searched for references to "Manual of/on Uniform Traffic Control Devices" (examples: MUTCD, M.U.T.C.D, New York State MUTCD, etc.). These occurrences are being replaced with a consistent acronym throughout the entire book called MUTCD. MUTCD as defined by the shelf note entitled "*Standard Specifications Update for the adoption of the National MUTCD (FHWA) and the New York State Supplement*" is the Manual on Uniform Traffic Control Devices (FHWA) and the New York State Supplement.
- The shelf note entitled "*Standard Specifications Update for the adoption of the National MUTCD (FHWA) and the New York State Supplement*" changes references to MUTCD in multiple sections of the Standard Specifications.
- The text in Section 619 was revised with EI 07-006 to incorporate changes due to the adoption of the National Manual on Uniform Traffic Control Devices (FHWA) and the New York State Supplement. Therefore, these shelf notes do not address any text changes for that section.
- MUTCD codes were removed from the descriptions of the Section 645 contract pay items. Items with these codes are disapproved from section 645 and new items are introduced.
- MUTCD codes have changed from previous editions of the Standard Specifications. The codes referred to in the Shelf Note entitled "*Signs (MUTCD Update)*" are found in the National Manual on Uniform Traffic Control Devices (FHWA). Codes beginning with the letters NY are found in the New York State Supplement.
- References to *Standard Alphabets for Highways Signs and Pavement Markings* were deleted. This information is now available within the *Standard Highway Signs Book*.

EI 07-019 Page 2 of 3

- The Standard Highway Signs book is incorporated by specific reference to the National Manual on Uniform Traffic Control Devices (FHWA) in Section 1A.11 of the manual.
- The cost impact to projects due to the introduction of this EI will vary. The expenses associated with this adoption cannot be generally determined.

IMPLEMENTATION:

- These changes become effective September 6, 2007.
- Shelf Note entitled *Standard Specifications Update for the adoption of the National MUTCD (FHWA) and the New York State Supplement*, shall be inserted into all projects.
- Shelf Note entitled *Signs (MUTCD update)*, shall be inserted into projects that contain item numbers with the root 645.
- The following Specifications are disapproved:
 - 645.71XX Ground-Mounted Sign Panel MUTCD Codes R, P, W, and M
 - 645.72 Overhead-Mounted Sign Panels, MUTCD Codes R, P, W and M
 - 645.73 Ground-Mounted Sign Panels, MUTCD Codes G and I
 - 645.74 Overhead-Mounted Sign Panels, MUTCD Codes G and I
 - 645.75 Tourist and Motorist Service Sign Panels
 - 645.78 High-Visibility Overhead-Mounted Sign Panel MUTCD Codes R, P, W, and M
- The following Special Specifications are disapproved:
 - 645.01----91 High Visibility Overhead-Mounted Sign Panel, MUTCD Code G – Sheeting Type A
 - 645.02----91 High Visibility Overhead-Mounted Sign Panel, MUTCD Code G – Sheeting Type B
 - 645.79----11 High Visibility Overhead-Mounted Guide Sign Panel
- The following Specifications are approved:
 - 645.5101 Ground-Mounted Sign Panels without Z-bars
 - 645.5102 Ground-Mounted Sign Panels less than or equal to 2.78 SM with Z-bars
 - 645.5103 Ground-Mounted Sign Panels greater than 2.78 SM with Z-bars
 - 645.5201 Ground-Mounted Sign Panels without Z-bars, High-Visibility Sheeting
 - 645.5202 Ground-Mounted Sign Panels less than or equal to 2.78 SM with Z-bars, High-Visibility Sheeting
 - 645.5203 Ground-Mounted Sign Panels greater than 2.78 SM with Z-bars, High-Visibility Sheeting
 - 645.61 Overhead Sign Panels
 - 645.62 Overhead Sign Panels with High-Visibility Sheeting

TRANSMITTED MATERIALS:

- This EI transmits Standard Specification shelf notes:
 1. *Standard Specifications Update for the adoption of the National MUTCD (FHWA) and the New York State Supplement.*
 2. *Signs (MUTCD update)*

BACKGROUND: Refer to EB 07-014.

REFERENCES:

- The MUTCD (FHWA) is available at <http://mutcd.fhwa.dot.gov/index.htm>.
- A draft of the New York State Supplement and a list of major changes are available on the Department's website at <https://www.nysdot.gov/portal/page/portal/divisions/operating/oom/transportation-systems/traffic-operations-section/mutcd>.
- The Standard Highway Signs Book is available at http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm.

CONTACT:

Questions regarding the National Manual on Uniform Traffic Control Devices (FHWA) and/or the New York State Supplement should be directed to either Dave Woodin at (518) 457-1793 (dwoodin@dot.state.ny.us) or Barbara Abrahamer at (518) 457-2095 (babrahamer@dot.state.ny.us) of the Traffic Operation Unit in the Office of Operations Management.

Direct questions regarding this issuance to Loretta Montgomery of the Design Quality Assurance Bureau at (518) 485-9674 or via e-mail at lmontgomery@dot.state.ny.us.

**STANDARD SPECIFICATION UPDATE FOR THE ADOPTION OF THE NATIONAL MUTCD
(FHWA) AND THE NEW YORK STATE SUPPLEMENT**

Make the following changes to the Standard Specifications of May 4, 2006:

Page 21, §101-02 *Definitions of Terms*, delete the definition for *Manual of Uniform Traffic Control Devices (MUTCD)*. In its entirety and replace it with the following:

“Manual on Uniform Traffic Control Devices (MUTCD). Consists of the Manual on Uniform Traffic Control Devices for Streets and Highways (approved by the FHWA) and the New York State Supplement to the National Manual on Uniform Traffic Control Devices for Streets and Highways. These documents prescribe standards for the design, location, use, and operation of traffic control devices.”

In addition to the preceding change, also make the changes as outlined in the following table:

Standard Specification Changes for the MUTCD

Section	Page	delete	replace with
101-01	15	Manual of Uniform Traffic Control Devices	Manual on Uniform Traffic Control Devices
410-3.01 G	270	NYSMUTCD	MUTCD
410-3.01 G	270	254.5 of the Manual on Uniform Traffic Control Devices	6F.54 of the MUTCD
410-3.01 G	270	NYSMUTCD	MUTCD
609-3.07 D	533	Manual of Uniform Traffic Control Devices	MUTCD
640-1	614	NYSMUTCD	MUTCD
640-3.01	614	New York State Manual of Uniform Traffic Control Devices	MUTCD
640-4	615	(MUTCD figure 263-33)	MUTCD Figure 8B-6
646-1	633	N.Y.S.M.U.T.C.D.	MUTCD
685-1	703	NYSMUTCD	MUTCD
685-3.01	703	New York State, Manual of Uniform Traffic Control Devices (MUTCD)	MUTCD
685-4	705	(M.U.T.C.D. figure 263-33)	MUTCD Figure 8B-6
687-1	706	NYSMUTCD	MUTCD
687-3.01	706	M.U.T.C.D.	MUTCD
687-3.04	707	New York State Manual of Uniform Traffic Control Devices	MUTCD
687-4	709	(M.U.T.C.D. figure 263-33)	MUTCD Figure 8B-6
688-1	709	NYSMUTCD	MUTCD
688-3.01	710	New York State Manual of Uniform Traffic Control Devices	MUTCD
688-4 D	712	(M.U.T.C.D. figure 263-33)	MUTCD Figure 8B-6
724-23	960	Part 210 of the New York State Manual of Uniform Traffic Control Devices	Chapter 2B of the MUTCD
727-02 B	964	M.U.T.C.D.	MUTCD
730-21	981	Manual of Uniform Traffic Control Devices	MUTCD
INDEX	1000	MUTCD of uniform traffic control devices	MUTCD

SIGNS (MUTCD UPDATE)

Make the following changes to the Standard Specifications of May 4, 2006:

Page 626, Delete SECTION 645-SIGNS. In its entirety and replace with the following:

SECTION 645 - SIGNS

645-1 DESCRIPTION. This work shall consist of fabricating, installing and covering traffic sign panels, sign support systems, sign posts, and illuminated sign panels in accordance with the contract documents, standard sheets, the MUTCD and as directed by the Engineer.

645-1.01 Definitions. The following definitions shall apply to all work equipment and materials included under this section:

1. Sign Face - the side of a sign panel with reflective sheeting attached.
2. Sign Face Layout - a dimensional representation of the sheeting mounted on the sign panel.
3. Sign Panel - a uniform sheet of aluminum or fiberglass reinforced plastic with reflective sheeting mounted on it. It may be constructed with or without additional sheets of aluminum or fiberglass reinforced plastic attached on the larger sheet. Multiple sheets of aluminum or fiberglass reinforced plastic may be used provided the sheets are of a uniform material and thickness and not separated.
4. Sign Panel Assembly - a group of contiguous sign panels with a maximum separation of 150 mm.
5. Sign Support System - the apparatus a sign panel is mounted.

645-2 MATERIALS

645-2.01 General. Materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*:

Wood Preservative - Water Borne	708-31
Stress Graded Timber and Lumber	712-14
Stainless Steel Connecting Products	715-16
Rubber Impregnated Woven Cotton-Polyester Fabric	728-01
Rubber Impregnated Random Fiber Pad	728-02
Aluminum Sign Panels	730-01
Reflective Sheeting	730-05
Reflectorized Sheeting Sign Characters (Type IV)	730-12
Reflectorized Sheeting Sign Characters (Type V)	730-13
Stiffeners, Overhead Brackets, and Miscellaneous Hardware	730-22
Fiberglass Reinforced Plastic Sign Panels	730-23
Type A Sign Supports	730-24
Type B Sign Posts	730-25
Breakaway Bases and Hinge Assemblies	730-26
U-Bolts	ASTM F1554, Grade 36

SIGNS (MUTCD UPDATE)

645-2.02 Sign Panels. Fabrication of all components shall produce a finished sign panel. Holes may be punched or drilled. Edges shall be smooth and true and free from burrs or ragged breaks. Sign panels shall be fabricated as shown on the standard sheets. Details for signs that are not shown on the standard sheets shall be similar to the closest shown sign blank size. All sign panels shall be clearly marked in the lower right corner on the back of the sign panel to show the Contract Number and the installation date (month/year). Markings shall be a minimum of 25 mm high and shall be permanently engraved, labels attached with pressure-sensitive adhesives, marked with an indelible ink or paint, or established by another method approved by the Engineer. U-Bolts used to attach sign panels to overhead sign structures shall be Type II galvanized in accordance with §719-01 *Galvanized Coatings and Repair Methods*.

A. Ground-Mounted Sign Panels.

- 1. Ground-Mounted Sign Panels without Z-bars.** Ground-Mounted signs without Z-bars shall be 2.5 mm thick meeting the requirements of §730-01 *Aluminum Sign Panels*. Or 3.5 mm thick meeting the requirements of §730-23 *Fiberglass Reinforced Plastic Sign Panels* for sign panels up to 1.2 m X 1.2 m
- 2. Ground-Mounted Sign Panels less than or equal to 2.78 square meters (with Z-bars).** Ground-Mounted signs with Z-bars less than or equal to 2.78 square meters shall be 2.5 mm thick meeting the requirements of §730-01 *Aluminum Sign Panels*. Or 3.5 mm thick, meeting the requirements of §730-23 *Fiberglass Reinforced Plastic Sign Panels* for sign panels up to 1.2 m X 1.2 m
- 3. Ground-Mounted Sign Panels greater than 2.78 square meters (with Z-bars).** Sign panels for Ground-Mounted Sign Panels greater than 2.78 square meters shall be 3 mm thick meeting the requirements of §730-01 *Aluminum Sign Panels*.

B. Overhead-Mounted Sign Panels. Sign panels for Overhead-Mounted Sign Panels shall be 3 mm thick meeting the requirements of §730-01 *Aluminum Sign Panels*.

C. Sign Panels with Multiple Sheeting types. The panel thickness for sign panels with multiple types of sheeting types shall be determined using the total area of the sign panel, and meet the materials requirements above.

D. Reflective Sheeting. Reflective sheeting materials used on sign panels shall conform to the requirements of §730-05 *Reflective Sheeting*. Type I (Class A) sheeting may be used on tourist and motorist services signs. Type III (Class B) sheeting shall be used on regulatory, warning, route marker, and guidance signs unless specified otherwise below.

Type I (Class A) sheeting shall be used whenever brown reflective sheeting is specified, and may be processed by a sign fabricator in its shop. The legend for a sign with brown background shall be made by applying cut-out letters or symbols of Type I (Class A) yellow sheeting.

- 1. High-Visibility Sheeting.** Signs with the following MUTCD codes shall be fabricated using Type IX (Class E) sheeting: R1-1, R1-2, R1-4, R1-5, R3-1, R3-2, R3-4, R3-18, R5-1, and R5-1a.

SIGNS (MUTCD UPDATE)

2. High-Visibility Fluorescent Yellow Sheeting. Signs with the following MUTCD codes shall be fabricated using Type IX (Class E) fluorescent yellow sheeting for the yellow portion of the sign face, and the appropriate nonfluorescent Type IX (Class E) color for the remainder of the sign face: E11-1, E11-1a, E11-1b, E11-1c W1-6, W1-7, and W1-8.

3. High-Visibility Fluorescent Yellow-Green Sheeting. Signs with the following MUTCD codes shall also be fabricated using Type IX (Class E) fluorescent yellow-green sheeting for the yellow portion of the sign face, and the appropriate nonfluorescent Type IX (Class E) color for the remainder of the sign face: NYR2-7, NYR2-8, S1-1, S3-1, S4-3, S4-5, W11-1, W11-2, W11-9, W15-1, W16-1, and W16-7p. In addition, signs with the following MUTCD codes mounted on the same support system shall also be fabricated using Type IX (Class E) fluorescent yellow-green sheeting for the yellow portion of the sign face, and the appropriate nonfluorescent Type IX (Class E) color for the remainder of the sign face: W16-2, W16-2a, W16-3, W16-3a, W16-4, and W16-9p.

E. Sheeting Sign Characters. Characters include letters, numerals, route shields, symbols, and borders. Characters shall be the size, series and color specified in the MUTCD and as specified in the contract documents. Only Type IV or Type V Characters, as appropriate, shall be used. White legends and borders shall be formed with directly-applied Type IV Characters. Interstate shields for signs shall be either demountable panels or directly-applied panels with Type V reverse-screened characters. Sign face characters and background shall be reflective, but black portions of a sign face shall not be reflective.

F. Sign Face Layouts. Sign face shape, color, dimensions, and characters shall be in accordance with:

1. Manual on Uniform Traffic Control Devices for Streets and Highways (FHWA).
2. New York State Supplement to the National Manual on Uniform Traffic Control Devices for Streets and Highways
3. Standard Highway Signs Book – (FHWA)

After contract award, two copies of non-standard sign face layouts will be provided to the Contractor. The Contractor shall verify dimensions on the sign face layouts prior to fabrication. (Standard sign face layouts for MUTCD codes without the prefix NY are shown in the Standard Highway Signs Book written by the Federal Highway Administration.)

G. Sign Structure Bearing Pads. Type A Sign Structure Bearing Pads shall be made from Rubber Impregnated Woven Cotton-Polyester Fabric. Type B Sign Structure Bearing Pads shall be made from Rubber Impregnated Random Fiber Pad

645-2.03 Type A Sign Posts. Type A sign posts shall be selected from the Department's Approved List of Type A Sign Supports. The standard strength (i.e., moment capacity) of a Type A sign post shall be 2800 N•m, although weaker or stronger posts may be substituted.

A. Type A Sign Posts With Extra Embedment. Type A sign posts with extra embedment (more than 1 m) shall meet the requirements of the Materials Details for Type A Sign Supports.

B. Soil Plates for Type A Sign Posts. Type A sign posts with soil plates shall meet the requirements of the Materials Details for Type A Sign Supports.

SIGNS (MUTCD UPDATE)

C. High-Capacity Type A Sign Posts. High-Capacity Type A sign posts are defined as any Type A sign post system shown in the Materials Details for Type A Sign Supports that has a total combined capacity for the entire two- or three-post system higher than 10600 N•m. The Contractor shall calculate the design moment of the sign panel, and select an appropriate High-Capacity Type A sign post system capable of resisting that moment, subject to the Engineer's approval.

645-2.04 Type B Sign Posts. Type B sign posts shall be fabricated in accordance with the requirements of §730-25 *Type B Sign Posts*.

A. Rustic Type B Sign Posts. Rustic Type B sign posts shall be ungalvanized weathering steel meeting the requirements of ASTM A588M or A242M.

B. Breakaway Bases and Hinge Assemblies. Breakaway bases and hinge assemblies shall be fabricated in accordance with the requirements of §730-26 *Breakaway Bases and Hinge Assemblies*.

645-2.05 Concrete Foundations. Cast-in-place concrete for foundations shall meet the requirements of Class A concrete in Section 501, *Portland Cement Concrete-General*. Precast concrete foundations shall meet the requirements of §704-06 *Precast Concrete Cribbing*. The batching, mixing and curing methods, and the inspection facilities shall meet the approval of the Department. The Contractor may submit a mix at least equivalent to Class A Concrete for approval by the Engineer.

645-2.06 Breakaway Wooden Sign Posts. Breakaway wooden sign posts shall be either Grade 2 Southern Yellow Pine or Grade 2 Douglas Fir-Larch, surfaced four side (S4S) as designated by the National Design Specification (NDS) for Wood Construction, and meeting the requirements of §712-14 *Stress Graded Timber and Lumber*. The bending stress (Modulus of Rupture) shall not be less than 27000 kPa using the clear wood properties of ASTM D2555. Posts shall be pressure treated in accordance with §708-31 *Wood Preservative - Water Borne*, dried to a maximum moisture content of 15% before and after pressure treating. The embedded portion of each post shall be sealed to 50 mm above the ground surface or above the steel tube insert, with a heavy coat (0.3 mm dry film thickness) of an emulsified asphalt conforming to AASHTO M140.

All 89 mm x 140 mm posts shall have two 38 mm diameter breakaway holes drilled through the center of the post parallel to the sign face 100 mm and 450 mm above grade and filled with flexible caulk. All 140 mm x 190 mm posts shall have two 75 mm diameter breakaway holes drilled through the center of the post parallel to the sign face 100 mm and 450 mm above grade and filled with flexible caulk. Nails and fasteners shall be stainless steel meeting the requirements of §715-16. Cuts and holes made at the contract site shall be field treated with copper naphthenate having a minimum 2% metallic solution, in accordance with AWPAs Standard M4. Breakaway holes shall be field treated with copper naphthenate before filling with flexible caulk.

645-2.07 Pole-Mounted Sign Support System. Bands, brackets, hardware, and fasteners necessary to mount a sign panel or a sign panel assembly on traffic signal poles, street lighting poles or other poles shall be stainless steel. Bands shall be a minimum of 20 mm x 0.5 mm. Other methods of attachment may be substituted with prior written approval of the Engineer. A sign panel assembly is defined as a group of contiguous sign panels with a maximum separation of 150 mm.

645-2.08 Illuminated Signs. Illuminated Sign Panels shall be aluminum alloy 3 mm thick meeting the requirements of §730-01, *Aluminum Sign Panels*. All materials necessary to illuminate the sign panels shall be as shown in the contract documents.

SIGNS (MUTCD UPDATE)

645-2.09 Sign Covering Material. Material used to cover sign panels shall be of an opaque, porous, and windproof fabric. Plastic, mesh, translucent or transparent materials will not be allowed. The covering material shall be a single neutral color, except orange or yellow, and shall not contain any wording or images.

645-3 CONSTRUCTION DETAILS

645-3.01 General. Sign panels, overhead panels, overhead vertical brackets, vertical and horizontal Z-bars, sign support systems, sign posts, breakaway bases and hinge assemblies, and foundations for Type B sign posts shall be constructed in accordance with the contract documents, standard sheets, MUTCD and materials details. Sign locations shown in the contract documents are approximate, and the exact location for each sign will be approved by the Engineer in the field.

The Contractor shall erect new signs and remove existing signs in such a manner that the traveling public is provided all necessary regulatory, warning, and guidance information at all times. Certain items may be designated to be performed prior to other items of work.

An inspection of installed signs will be made in the daylight for color, reflectivity, location, vertical post alignment, visibility, and appearance. The installed signs will also be inspected at night for color, orientation and reflectivity, traits which will be more conspicuous at night.

A. Wind Loads. The wind pressures given on the standard sheets have been calculated according to the procedure in the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (1994)*. All wind loading shall be adjusted for height, drag, and gusting in accordance with AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (1994)*. Allowable sign areas shall be reduced when the sign centroid height is at an elevated site condition (e.g., an overpass) where the influence of the ground on the wind is reduced. For example, a sign centroid between 8.84 m and 14.94 m above the existing ground would result in a 37.5% increase in wind pressure (refer to the section "Loads" in aforementioned AASHTO Specifications).

	Region	Wind Velocity (km/h)	Wind Pressure at Panel Centroid \leq 4.27 m (N/m ²)	Wind Pressure at Panel Centroid $>$ 4.27 m (N/m ²)
Type A Post	1, 2, 6, 8, and 9	97	690	919
	3, 4, 5, 7, 10, and 11	113	977	1207
Type B Post	1, 2, 6, 8, and 9	113	NA	1207
	3, 4, 5, 7, 10, and 11	129	NA	1609

NOTE: Panel centroid height measured above the surrounding terrain.

645-3.02 Sign Panels. Sign panels shall be installed as shown on the standard sheets or as shown in the contract documents. Nominal widths are based on a conversion factor of 25 mm per inch. Layout of sign panels and assemblies shall be as shown in the contract documents. Aluminum Overhead Mounted Sign Panels shall be separated from steel overhead sign structures in order to prevent corrosion by a Type A Sign Structure Bearing Pad or a Type B Sign Structure Bearing Pad as shown in the contract documents.

SIGNS (MUTCD UPDATE)

645-3.03 Type A Sign Posts. The Contractor shall install Type A sign posts individually or in groups to provide the required moment resistance. Type A sign posts with Extra Embedment, and Soil Plates for Type A sign post, shall be installed where extra embedment depth and/or soil plates are required. High-Capacity Type A sign posts shall also be installed where extra moment capacity is required.

The number of Type A sign posts indicated in the contract documents is based on the information available during design. The number and strength of Type A sign posts installed shall be based on conditions at the final sign location approved by the Engineer. The Contractor shall determine the required moment resistance for the Type A sign post(s) due to the wind loads indicated in §645-3.01A.

Wind Loads, and propose an appropriate number and strength of Type A sign posts for the approval of the Engineer. The Contractor shall submit the approved Materials Details, and any computations, to the Engineer, and install the required number of Type A sign posts subject to the following criteria:

1. For signs with a nominal width greater than 750 mm, at least two posts are required, except that the nominal 750 mm x 750 mm diamond panel and the nominal 900 mm wide "YIELD" panel require only one post.
2. The maximum number of posts installed within a 2.13 m path shall be as described on the approved Materials Details.
3. For single flanged channel post installations only, the required moment resistance for the post shall be increased by 25% to account for torsional shear. The Materials Details include this adjustment.

645-3.04 Type B Sign Posts. The Contractor shall install Type B sign posts, breakaway bases, hinge assemblies and foundations in accordance with the details shown on the standard sheets or the manufacturer's approved materials details.

The Type B sign post type, size and number shown in the contract documents are based on the information available during design. The sign post type, size and number to be installed by the Contractor shall be based on conditions at the final location approved by the Engineer. The Contractor shall determine the required moment resistance for the Type B sign post(s) based on the wind loads indicated in §645-3.01A. *Wind Loads* and verify the sign post type, size, number, hinge capacity and 2.13 m wheel path criteria for the approval of the Engineer. The Contractor shall submit any computations to the Engineer.

The Contractor may install breakaway type bases under the contract pay item for nonbreakaway type posts provided that nonslotted hinge plates are used on both flanges and the installation is outside the clear zone or otherwise protected.

A. Rustic Type B Sign Posts. Rustic Type B sign posts shall be installed in the same manner as Type B sign posts.

B. Breakaway Bases and Hinge Assemblies. Breakaway bases and hinge assemblies shall be installed in accordance with the standard sheets or the manufacturer's approved materials details.

When breakaway bases and hinge assemblies are used with rustic Type B sign posts, the breakaway bases and hinge assemblies shall be installed as follows:

1. The front (approach) flange hinge plate of rustic Type B sign posts shall be installed as shown on the contract drawings, except that an additional galvanized steel flat washer shall be installed on all four bolts between each post and the slotted hinge plate to assure proper slippage.
2. All miscellaneous visible galvanized steel hardware, except in the vicinity of the hinge plate slots, shall be painted with Weathered Brown Guide Rail Paint.