

**ITEM 630 - TRAFFIC SIGNS AND SIGN SUPPORTS**

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**630.01 Description.** This work shall consist of furnishing and installing reflectorized traffic signs, sign supports and foundations complete and ready for service, in conformance with the types, colors, locations, dimensions, and grades shown in the plans. This work shall also include necessary excavation and backfill, and disposal of discarded materials and restoration of disturbed facilities and surfaces in accordance with Section 901.18.

**630.02 Materials.** Acceptance of materials and products will be based on Certified Test Data, furnished in triplicate, or on test results of samples in accordance with 106.02 as required by the Engineer.

Materials shall be:

Concrete .....	499 Class C, 511
Steel:	
Structural steel.....	730.26
Reinforcing steel.....	509.02
Galvanized steel .....	730.27
Drive posts .....	730.28
Tube and pipe .....	730.01
Anchor bolts and nuts .....	730.02
Poles and arms.....	730.03
Base and arm plates .....	730.04
Handhole covers .....	730.05
Pole caps .....	730.06
Arm caps .....	730.07
Hardware.....	730.08
Stainless steel .....	730.09

Stainless steel hardware .....	730.10
Messenger wire .....	730.25
Aluminum:	
Sheet and plate .....	730.11
Extrusions .....	730.12
Tube and pipe .....	730.13
Castings.....	730.14
Forgings .....	730.15
Welding rods .....	730.16
Hardware.....	730.17
Other materials:	
Reflective sheeting, Type F .....	730.18
Reflective sheeting, Type G.....	730.19
Reflective sheeting, Type D.....	730.19
Reflective sheeting Type V.....	730.191
Nonreflective sheeting .....	730.20
Reflector units .....	730.21
Silk screen paste .....	730.22
Clear coating .....	730.24

**630.03 Working Drawings.** The requirements in Section 625.04, working drawings, shall apply.

Sign support working drawings submitted shall cover all design types such as ground mounted, rigid overhead, span wire mounted, and overpass structure mounted supports. The drawings shall show overall height, sign clearance above foundation, span length, sign locations, sign overall heights and widths, and glare shield height and location if applicable.

Two sets of sign working drawings shall be submitted. The drawings shall show the overall extru-sheet size dimensions including glare shield, panel type and length, temporary overlay sign dimensions and location on the covered sign, lighting support arm notch arrangement in the glare shield if applicable, the type and quantity of assembly and mounting hardware and guide sign legend details.

Guide sign legend details shall include copy type, character size and spacing, and reference or code numbers. The color of guide sign background and legend shall be indicated. Sign layout shall conform to standards maintained by the City. Drawings of standard warning, regulatory, or route marker signs need not be submitted.

The following code for sign materials, colors, and processes shall be adhered to on submitted sign legend working drawings. When special colors are required they shall be so indicated.

<b>Code</b>	<b>Description and Color</b>
RSW-G	Reflective sheeting silver white

RSTR-G	Reflective sheeting silver white, with reverse screen transparent red overlay
RSTB-G	Reflective sheeting silver white, with reverse screen transparent blue overlay
RSTG-G	Reflective sheeting silver white, with reverse screen transparent green overlay
RSTRB-G	Reflective sheeting silver white, with reverse screen transparent red and blue overlay
RSY-G	Reflective sheeting yellow
RSB-G	Reflective sheeting blue
RSG-G	Reflective sheeting green
RSBR-G	Reflective sheeting brown
RSO-G	Reflective sheeting orange
NRSW	Nonreflective sheeting white
NRSG	Nonreflective sheeting green
NRSBK	Nonreflective sheeting black
SPBK	Silk screen paste, black
DAW-G	Direct applied copy, reflective sheeting silver white
DAB	Direct applied copy, nonreflective sheeting black
DCW	Demountable embossed copy, white with reflectors
DCBK	Demountable embossed copy, black
DCFW	Demountable flat copy, reflective sheeting silver white
DCFBK	Demountable flat copy, black

A code followed by - G denotes Type G sheeting.

**630.04 Sign Fabrication.** Sign types shall include flat sheet, extru-sheet and temporary overlay. Flat sheet signs shall be one piece units made of aluminum, unless otherwise specified. Legend on flat sheet signs shall be silk screened by the direct or reverse screen process, unless otherwise specified. Extru-sheet signs shall be made up of a number of horizontal panels assembled to form a complete sign. Temporary overlay signs shall be of aluminum sheet to cover portions or entire surfaces of signs when specified. Legend on extru-sheet or temporary overlay signs, except for shields described hereafter, shall be demountable embossed copy, unless otherwise specified. Letter and numeral style shall be in accordance with the FHWA Standard Alphabets for Highway Signs. Sign legend shall be in accordance with the Ohio Manual of Uniform Traffic Control Devices for Streets and Highways.

1. **Sheet or Panel Fabrication.**

- A. Flat sheet signs of aluminum material shall be cut complete from sheets into blanks of the thickness, size and shape specified. Bolt holes shall be drilled or punched to finish size.
- B. Extru-sheet signs consist of horizontal panels assembled to form a sign. Panels shall be continuous for the sign length.

Horizontal panels shall be fabricated of aluminum sheet and extrusions, joined by spot welding or from panels extruded in a single operation; however, extruded panels and spot welded panels shall not be used in the same sign. These panels shall be assembled by bolting of extrusions through channel webs to form tight joints. There shall be no appreciable deviation from flatness on the face of an assembled sign. The effective sign height shall include the minimum number of horizontal panels.

- C. Temporary overlay signs shall consist of 0.063 inch (1.6 mm) aluminum sheeting. Temporary overlay signs may be shop attached to cover the legend of signs or may be separate units for installation in the field. Temporary overlay signs shall be furnished in sections no larger than 8 by 4 feet (2.4 by 1.2 m). The method of attachment shall be by blind rivets at maximum spacing of 18 inches (457 mm) on peripheries and 24 inches (610 mm) within the interior of signs or sign sections. Rivets shall be positioned so as not to disturb copy on the underlying sign.
- D. Double-faced signs shall be aluminum at least 0.063 inch (1.6 mm) thick. Double-faced signs shall be covered with reflectorized sheeting on both sides and shall be furnished with necessary mounting hardware.

2. **Surface Preparation.**

- A. Aluminum sign surfaces shall be thoroughly cleaned and then etched by an acid solution before application of sheeting. The cleaning process shall be by total immersion in a tank containing an alkaline solution of the manufacturer's specification followed by a thorough rinsing with running water. The cleaning shall be followed by a surface etching. The surface shall then be thoroughly dried. Cleaned and etched surfaces shall not be allowed to become contaminated by contact with oil or grease.

3. **Background Sheeting and Application.**

- A. Sheeting for reflectorized surfaces shall be Type G unless otherwise specified. After sign face preparation is completed, sheeting shall be cut, matched, and applied to the surface according to the manufacturer's recommendations. Background sheeting shall be cut oversize and after application shall be trimmed to the exact size specified. The finished application shall have no blisters, wrinkles, tears or blemishes.

4. **Legend Application.** Copy for extru-sheet or temporary overlay signs shall conform to the type, size and arrangement specified and shall consist of letters, numbers, border portions and shields.

A. **Demountable Embossed Copy with Reflector Units.** Copy units of this type shall be manufactured with beveled edges and a recess on the reverse side to accommodate the thickness of reflector units. Material shall be 0.040 inch (1.0 mm) thick aluminum sheet and shall be free of irregularities, burrs and other defects. Reflector openings shall be provided with spacing and diameter suitable for the copy size. Copy units shall be finished with at least two coats of white baked enamel and fitted with reflector units. Attachment shall be by aluminum blind rivets.

B. **Demountable Embossed Copy, Black.** Copy units shall be similar to the foregoing except there shall be no openings for reflector units and the copy shall be finished with at least two coats of black baked enamel.

C. **Demountable Flat Copy, Reflective.** Copy units shall be similar to the foregoing except units shall be finished with black nonreflective sheeting and shall be covered with Type G silver white reflective sheeting, unless otherwise specified. Flat demountable copy when used shall be dimpled to provide a 1/32 inch (0.8 mm) minimum clearance from the sign face. Attachment shall be by aluminum blind rivets.

D. **Demountable Flat Copy, Black.** Copy units shall be similar to the foregoing except units shall be finished with black nonreflective sheeting or with at least two coats of black baked enamel.

E. **Shields.** Ohio and U.S. shields mounted on guide signs shall be covered with Type G silver white reflective sheeting with legend of silk screened black paste.

Interstate shields mounted on guide signs shall be covered with Type G silver white reflective sheeting with legend of reverse screened red and blue. Numbers shall be white direct applied copy.

Shields shall be mounted as separate and complete units and shall be attached by aluminum blind rivets.

F. **Direct Applied Copy, Reflective.** When specified, legend for extru-sheet, temporary overlay or flat sheet signs shall be direct

applied. The legend shall be cut from Type G silver white reflective sheeting, unless otherwise specified, and applied by the adhesive backing.

- G. **Direct Applied Copy, Black.** Legend shall be applied in the same manner as reflective copy except black nonreflective sheeting shall be used.

5. **Glare Shields.**

- A. Illuminated extru-sheet signs will incorporate a glare shield which shall be an extension of similar construction. The glare shield shall be below the sign unless otherwise indicated. Glare shields made of a rectangular tube and a 6 inch (152 mm) extru-sheet portion do not require notching. Glare shields and tube shall be covered with nonreflective sheeting matching the color of the sign under daylight viewing conditions.

6. **Sign Identification.**

- A. Signs shall be identified by decals of Type G silver white reflective sheeting with silk screened black numerals in accordance with Figure 1.

These sign identification decals shall be 6 inch (152 mm) by 3 inch (76 mm) in size and positioned so they can be read horizontally and are clearly visible, not near bolt holes or rivets. The decals shall be placed on the back side of the sign in the lower right-hand corner of rectangular signs, or in an equivalent location for other sign shapes, approximately 3 inches (76 mm) from side and bottom sign edges (for smaller signs, these dimensions may be less).

Fabrication data shall be coded by punched out numerals by the Sign Fabricator before decal application and shall include the month and year of sign fabrication.

Signs delivered at the site without a properly completed and applied decal with punched fabrication data shall be rejected by the Engineer. Furthermore, the sign erection Contractor shall not erect any such signs, or overlays, that do not have a properly completed and affixed sign decal.

**Figure 1**  
**CITY OF COLUMBUS**  
**WARNING: VANDALS WILL BE PROSECUTED.**  
**TO REPORT DAMAGE CALL 645-7393.**

**MONTH 1 2 3 4 5 6 7 8 9 10 11 12**  
**YEAR 02 03 04 05 06 07 08 09**

**7. Sign Protection for Shipment and Storage.**

- A. Signs shall be suitably protected and identified for shipment and storage. Extrusheet signs shall be kept rigid by backbracing or crating and the sign face covered with protective material. The backbracing shall extend sufficiently below the sign lower edge to keep the sign off the ground.

Extrusheet signs shall be identified by information in a detachable form on the sign back giving the project number and year, sign reference and/or code number, sign legend sketch, and station location. Signs shipped with an attached temporary overlay sign shall also identify the underlying sign.

Extrusheet shall be shipped completely assembled except for signs over 8 feet (2.4 m) in height which may be shipped in two pieces for field assembly. Exit number signs may be shipped separated from the parent sign if desired. Sign hardware shall be shipped in sturdy containers which will not rupture during handling.

Signs shall be stored in such a manner that packaging paper or cardboard material does not become wet. If paper packaging material or slip-sheeting becomes wet, the paper shall be removed from contact with sign faces before it dries to prevent damage to reflective sheeting on the faces.

**630.05 Foundations.** Sign support foundations shall be located so the plane of the sign surface shall be at a right angle to the roadway lanes serviced.

Support foundations shall be located by the Contractor and staked with the proper elevation. When problems such as underground or overhead obstacles are encountered during stake out, and to correct slope and subsurface difficulties, foundation location and orientation may be changed with the approval of the Engineer. The approved location shall provide a safe clearance from overhead power lines for construction operations in compliance with the National Electric Safety Code. The Contractor shall be responsible for the correct location, elevation, and orientation for all poles and pedestals installed on the foundations.

Excavation for foundations shall be made by an earth auger to specified dimensions and in accordance with Section 503.04. Caution shall be exercised by the Contractor when excavating in areas of underground installations to avoid their disturbance or damage. If a cave-in should occur during excavation, the Contractor may continue excavating using casing, sleeving or other methods, with the approval of the

Engineer. When subsurface obstructions are encountered, the Contractor may remove the obstructions, or may replace the excavated material and relocate the foundation, with the Engineer's approval. When bedrock is encountered, that portion of the specified foundation depth within the bedrock may be reduced up to 50 percent.

Foundation concrete work shall conform to the requirements of Item 511, except that the loading restrictions in Section 511.14 are modified by this section. The concrete shall be placed against undisturbed soil or compacted embankment. The top of the foundations shall be formed to a nominal depth of 6 inches (152 mm) below the ground line.

Prior to the placement of foundation concrete for embedded supports, the supports shall be positioned and braced with any necessary rake to assure that the supports, after tensioning, will be in an essentially vertical position. Foundations for anchor base type supports shall contain required reinforcing rods and have anchor bolts and conduit ells accurately held by a template.

Forms and templates may be removed as soon as the concrete has hardened sufficiently so as not to be susceptible to damage. Bracing for embedded supports may be removed after seven days. Loading of embedded supports and the erection and loading of supports on anchor base foundations shall be permitted after 14 days. Support erection and loading will be permitted after seven days if the tests of two beam specimens of concrete yield an average modulus of rupture of not less than 650 pounds per square inch (4.5 MPa).

**630.06 Sign Supports.** Sign supports consist of ground mounted rigid overhead, span wire, or overpass structure mounted types. Structural aspects of design and materials shall comply with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Fabrication shall be according to applicable sections of Item 513 and welding shall comply with Section 513.21. The approval of fabricators according to Section 501.04 will not apply. Steel structural members shall be hot dipped galvanized in accordance with Section 711.02. Steel hardware shall be galvanized according to Section 730.08.

Threaded fasteners, except where otherwise noted, shall be tightened by the "turn of the nut" method in accordance with Section 513.20.

Anchor bolts shall be provided with a leveling nut, plain washer, lockwasher and anchor nut complying with Section 730.02. Anchor nuts shall be used with a plain washer against the base plate upper surface and a lockwasher under the nut.

Anchor bolt nuts shall be tightened in accordance with Section 513.20 except that under Table 3 the "nut rotation from snug tight condition" shall be from 1/12 to 1/6 turn instead of 1/3 turn.

Anaerobic adhesive complying with Federal Standard MIL S 46163 Type II, Grade N shall be applied to anchor bolts and other threaded connections 1/2 inch (12.7 mm) diameter or larger, according to the manufacturer's recommendations. Anaerobic adhesive shall not be used with torque-limiting nuts.

Alternate designs or materials for sign supports shall be submitted to the City for acceptance at least 21 days in advance of a bid opening date.

Notification of the acceptance or rejection of the alternate design will be given by the Engineer to the bidder at least 7 days in advance of a bid opening date.

1. **Ground Mounted Supports.** Ground mounted supports consist of structural sections of the material and weights required and shall be driven into the earth or embedded in concrete as specified. The support lengths appearing on the plans are approximate and the Contractor shall be responsible for determining the exact length of required supports before fabrication. Sign supports may consist of two or more structural members of the nonbreakaway or breakaway type.

- A. **Post Supports.** Ground mounted supports of the post type shall be made of channels of the section, material and of the weights indicated. Each post shall be marked with a line of paint 6 inches (152 mm) above the specified minimum driving depth. Two posts may be bolted together back to back to form a heavier post when specified.

Posts shall be driven to the specified minimum depth without bending, distortion or end mutilation. When the post cannot be driven at the specified location, the post may be moved with the approval of the Engineer at no additional cost to the City. Posts shall not be placed in drainage ditches.

Posts located in paved areas shall be driven through a hole provided by sleeving or core drilling. After the post is in position the hole shall be patched with asphaltic concrete or an approved bituminous material.

Groupings of flat sheet signs in multiple arrangements mounted on posts shall have sign backing assemblies.

One-way sign posts include, in addition to the post, a square tubular top extension for mounting signs at right angles to other signs on the post.

Temporary sign supports and their placement shall meet the requirements of the Ohio Manual of Uniform Traffic Control Devices.

- B. **Beam Supports Assembled.** Ground mounted supports of the beam type shall be rolled steel sections of the nonbreakaway or breakaway type, sizes, and weights specified. The alternate design shown on ODOT Standard Drawing TC-91.10 is not acceptable in the City of Columbus.

Slip base breakaway beam connections shall allow the beam under impact to separate at a slip base and bend at a hinge point under the sign. Beams shall consist of three parts, a bottom stub for concrete embedment and a two piece upper portion. The pieces of each beam shall be bolted together and the assembly bolts given a pre-load before delivery to the project. Assembled breakaway beams shall be carefully handled during transportation and erection. Upon erection the final specified torquing shall be performed on all threaded fasteners.

At least four weeks following the erection of signs on breakaway beams, the breakaway feature shall be inspected by the Contractor for evidence of shifting or loose fasteners. All loose fasteners shall be re-torqued to specified values. Slip base plate fasteners shall be loosened and re-torqued even if no shifting or looseness is detected. However, if the base plate connection was made with torque limiting nuts, re-torquing will only be required if looseness can be detected. Re-torqued conventional nuts shall have anaerobic adhesive applied or, as an alternate, new torque limiting nuts of the proper range may be used.

## 2. **Rigid Overhead Supports.**

- A. Rigid overhead supports consist of single poles with cantilevered arms, or span types supported between end frames. Supports shall include brackets for attachment of disconnect switch and ballast wiring enclosures, and pipe couplings for sign wiring. Anchor bolts and conduit ells (at least one 2 inch (50 mm) minimum diameter) for installation in the foundation shall be furnished with the supports. Support poles and end frames upon erection shall be set on their foundations and plumbed using the leveling nuts followed by secure tightening of the nuts on the anchor bolts. Poles supporting cantilevered signs shall be plumbed following erection of signs as required. Concrete grouting shall not be used in the space between the foundation surface and support base.

Cover bases or individual anchor bolt covers shall be provided on support anchor bases located in sidewalks, traffic islands, curbed areas, and seeded areas.

Overhead sign supports shall be furnished with sign attachment assemblies for the mounting of extru-sheet signs to the support chords. Each sign attachment assembly shall consist of a mounting bracket, U-bolts, clamps, and hardware. When overhead signs are to be lighted, overhead sign supports shall be furnished with luminaire support assemblies. Each luminaire support assembly shall consist of a support arm, other necessary structural members, and miscellaneous hardware. Anaerobic adhesive shall be used on all threaded connections higher than 10 feet (3.0 m) above the base plates.

Single pole supports may have cantilevered arms which are symmetrical or non-symmetrical. Single arms or dual arms are made up of tapered or non-tapered members.

Rigid span supports consist of a box truss supported by single plane truss end frames. Box trusses shall be fabricated of aluminum or steel tubular members with built-in camber and each section shall be marked "TOP". Box trusses may be erected provided at least one sign is in place within 8 hours, or the trusses are fitted within the same period with damping devices approved by the Engineer.

Combination overhead sign supports with light pole extension shall provide for the attachment of a luminaire bracket arm.

### **3. Span Wire Supports.**

- A. Span wire supports shall include strain poles of the anchor base type. Components for span wire sign supports shall consist of strain poles, messenger wire, sign hanger assemblies and 3 bolt clamps. Alternate span wire attachment will require span wire clamps, anchor shackles and thimbles. Poles shall be furnished with anchor bolts and conduit ells for installation in the foundation. Sign hanger assemblies shall consist of all parts necessary to attach an individual sign and shall include span wire hangers, hanger braces, lengths of post, and miscellaneous hardware.

The span wire sag under load shall not be greater than 5 percent or less than 4 percent of the span. Poles shall be adjusted so that under span wire tensioning within the above sag limits the poles will be in an essentially vertical position.

4. **Overpass Structure Mounted Supports.**

- A. Overpass structure mounted supports shall be designed for the attachment of extru-sheet signs. The supports shall be a flush mounted type or a skew mounted type. The supports shall be mounted on the overpass structure so the bottom of signs shall be in a level position regardless of bridge slope. Anaerobic adhesive shall be used on all threaded connections.

5. **Miscellaneous Attachment for Signs.**

- A. Signs suspended from signal messenger wire or mast arm shall be attached by a sign hanger assembly consisting of all parts necessary to attach an individual sign. Signs mounted on poles or bridge parapets shall be attached by a support assembly.

**630.07 Sign Erection.** Signs shall be erected on ground mounted or overhead supports in conformance with the schematic signing layout.

1. **Flat Sheet Sign Erection.** Typical placement of flat sheet signs shall use steel bolts of the specified grade and plating, wide washers, lockwashers and nuts. Bearing plates shall be placed between the sign and post at each bolt.

Flat sheet signs mounted on messenger wire or mast arms shall be field drilled to match holes in brackets.

2. **Extru-sheet Sign Erection.** Typical placement of extru-sheet signs on ground mounted or overhead supports shall be as specified. Sign attachment shall be by self-aligning aluminum mounting clips. Hardware for clips shall be an aluminum bolt with rectangular head, aluminum washer and stainless steel elastic stop nut.

Exit number panels and supplemental guide signs, when required, shall be attached to guide signs by sign backing assemblies consisting of post members and clips. Large extru-sheet signs which are delivered in 2 pieces shall be assembled with all demountable sign legend attached prior to erection.

3. **Temporary Overlay Sign Erection.** Temporary overlay signs which are shipped separately and are to be erected on existing guide signs shall be attached according to the instructions of 630.04 Section 1C.
4. **Revised Demountable Copy on Existing Signs.** When demountable copy on existing signs is to be changed, the specified existing copy shall

be removed, the remaining copy respaced as necessary, and new copy installed with aluminum blind rivets. Any single revised line of legend shall have all new copy and reflector units, or all reused compatible copy and reflector units.

**630.08 Sign Storage.** When the plans state the signs are to be furnished by the City and erected by the Contractor, the Contractor shall be responsible for the storage and care of the signs after transfer to him. Adequate covering or shelter acceptable to the Engineer shall be provided. Extrusion sheet signs shall be stored in a vertical position with the sign top upward. Flat sheet signs with Type G sheeting shall be stored in a vertical position.

**630.09 Signs Refurbished.** Sign refurbishment shall include cleaning, installation of overlay signs, repair of panels, replacement of damaged and missing copy.

**630.10 Covering of Signs.** Temporary covers shall be installed and subsequently removed and disposed of when indicated by the plans or when directed by the Engineer. Covering material shall be a sturdy opaque material and the proposed method of covering and attachment shall be approved by the Engineer. No tape or adhesive shall be used on the face of any sign.

**630.11 Barrier Wall Assembly for Sign Supports.** Where an existing overhead sign support is located in a median in which concrete barrier is to be placed, a barrier wall assembly shall be provided as detailed on the plans.

**630.12 Removal, Storage or Re-erection of Signs and Supports.** Signs and sign supports indicated for removal shall be carefully dismantled and stored on the project for salvage by the City, re-erection or for disposal by the Contractor. To assure maintenance of adequate traffic control at all times, signs shall be removed only with the approval of the Engineer.

Sign supports shall be removed in a manner avoiding damage. Sign service to the support shall also be removed by disconnecting and removing cables at the service pullbox. Connection of remaining cables shall conform to Section 1000.14. Support foundations shall be removed to at least 1 foot (0.3 m) below subgrade or finished ground line. Backfilling, restoration of surfaces and disposal of surplus material shall be in accordance with Sections 901.07, 901.17, and 901.18.

Signs to be re-erected may require field drilling and the furnishing of mounting hardware. Anchor bolts and conduit elbows for installation in the foundation shall be furnished when overhead supports are re-erected.

Temporary overlay signs shall be removed so as not to damage the underlying sign. The legend of the underlying sign shall be inspected and any loose or missing rivets shall be replaced. The underlying sign shall be cleaned as directed by the Engineer.

**630.13 Inspection.** After erection, signs will be inspected under both day and night conditions, and any deficiencies in lateral position or visibility shall be corrected to the satisfaction of the Engineer.

To assure a proper functioning of the breakaway feature, the Contractor shall verify bolt torques on breakaway beam connections at least four weeks following installation.

**630.14 Method of Measurement.** Measurement will be made for specific items, furnished and installed in place, complete and accepted, in accordance with the following items.

Foundation concrete will be measured as the number of cubic yards (cubic meters) as determined by calculations from plan dimensions, including excavation, reinforcing steel, concrete, backfilling, and disposal of surplus excavation. No deduction will be made for the volume of beams, reinforcing steel, anchor bolts, conduit ells, and pole butts within the concrete.

Ground mounted supports will be measured as the actual length in, and shall include driving and the furnishing of patching materials for excavations in paved areas.

One-way sign supports will be measured in a manner similar to ground mounted supports. The linear measurement will be the length from the support bottom to the top of the tubular extension. The supports shall include the post, tube, spacers and necessary hardware.

Temporary sign supports shall be measured as the length in the number of each furnished, erected, maintained, and removed.

Street name sign supports will be measured as the number of pipe supports, including excavation and concrete embedment.

Breakaway beam connections will be measured as the number of sets of connection parts with necessary welding and drilling of holes as required for the breakaway function in one beam. Beams shall include base plates, fuse plate, hinge plate, bolt retainer plate, and bolts assembled to specified torques.

Rigid overhead sign supports will be measured as the number of supports, including anchor bolts and conduit ells furnished for the foundation, sign attachment assemblies, luminaire support assemblies when required, and cover bases.

Sign attachment assemblies separately itemized will be measured as the number of assemblies, including one overhead sign bracket, U-bolts, clamps, and miscellaneous hardware.

Luminaire support assemblies separately itemized will be measured as the number of assemblies, including one support arm, other necessary structural members, bracing rods when required, and miscellaneous hardware.

Combination overhead sign supports with light pole extension will be measured in a manner similar to rigid overhead sign supports. Bracket arms and luminaires for roadway lighting are not included.

Span wire sign supports will be measured as the number of each support, including two strain poles with span wire clamps and anchor shackles, anchor bolts, and conduit ells, furnished for foundations, messenger wire, clamps, thimbles, and sign hanger assemblies with hangers, braces, and miscellaneous hardware.

Overpass structure mounted sign supports will be measured as the number of each support, including attachment work and hardware.

Miscellaneous attachment of small signs to signal messenger wire or mast arms will be measured as the number of hanger assemblies. Hanger assemblies shall consist of all parts necessary to attach one individual sign.

Pole mounted sign supports shall be measured as the number of each, including bands, brackets, hardware and posts sufficient to attach each sign or set of signs to an individual pole.

Bridge mounted sign supports shall be measured as the number of each, including post, hardware and attachment work.

Signs will be measured as the area in square feet (square meter) of signs, including the furnishing of identification decals, sign backing assemblies, mounting bolts, washers, nuts, bearing plates, clips, rivets and reflector units for object markers. Measurement for square, rectangular, circular, or irregular shaped signs will be determined by multiplying the largest dimensions of width and height. Measurement for triangular shaped signs will be determined by multiplying the largest dimension of width and one-half the largest dimension of height. The area of the glare shields for lighted signs will be included with and measured as an integral part of the sign.

Double-faced signs will be measured as the number of double-faced signs, including mounting fittings and hardware.

Sign backing assemblies when separately itemized will be measured as a single assembly of back bracing for each group of flat sheet signs attached to a post, or a single assembly for the backing posts used to attach exit and supplementary signs to a guide sign.

Existing signs revised with demountable copy will be measured as the number of signs revised. Revised copy will include the removal of existing copy, respacing of existing copy, and the furnishing of mounting hardware.

Refurbishing signs will be measured as the area in square feet (square meter) of signs refurbished, and shall include the furnishing and installation of overlay signs, adjustment of demountable copy, replacement of missing or damaged copy, repair of panels, clear coating, or other required work.

Covering of signs will be measured as the area in square feet (square meter) of sign face covered, including the subsequent removal and disposal of the covering.

Barrier wall assemblies will be measured as the number of assemblies.

Removal and storage or re-erection of signs and supports will be measured as the number of ground mounted signs and supports, overhead mounted signs and supports, and overlay signs, removed and stored or re-erected. Major signs are defined for measurement as being 40 square feet (3.7m<sup>2</sup>) or larger. Support removal shall include removal of foundations and restoration of surfaces. Re-erection, when required, shall include furnishing of anchor bolts and conduit ells, necessary field drilling and hardware.

Signs erected will exclude the furnishing of signs and mounting hardware. This item will be measured as the area in square feet (square meter) of signs erected. Signs erected shall include the assembly of signs delivered in more than one piece and the installation of required sign backing assemblies. Measurement for square, rectangular, circular, or irregular shaped signs will be determined by multiplying the largest dimensions of width and height. Measurement for triangular shaped signs will be determined by multiplying the largest dimension of width and one-half the largest dimension of height. The area of the glare shields for lighted signs will be included with and measured as an integral part of the sign. Temporary overlay signs which are shipped attached to extru-sheet signs and erected with the signs are included with the signs for erection payment. Temporary overlay signs which are shipped separately and erected on existing extru-sheet signs will be paid for under this item.

**630.15 Basis of Payment.** Quantities of specific items measured as provided above, in place, complete and accepted, will be paid for under:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
630	Cubic Yard (Cubic Meter)	Concrete for Anchor Base Foundations
630	Cubic Yard (Cubic Meter)	Concrete for Embedded Foundations
630	Linear Foot (Meter)	Ground-Mounted Supports, ____ Post
630	Linear Foot (Meter)	Ground-Mounted Supports, ____ Beam
630	Linear Foot (Meter)	One Way Supports, ____ Post
630	Linear Foot (Meter)	Temporary Sign Supports, or Each
630	Each	Street Name Sign Support

630	Each	Breakaway Beam Connection, Type TC-____, Design _____, _____ Feet
630	Each	Overhead Sign Support, Type TC-____, _____ Feet
630	Each	Combination Overhead Sign Support, Type TC-, Design, Feet (Span or Arm)
630	Each	Sign Attachment Assembly
630	Each	Luminaire Support Assembly, Type TC-
630	Each	Span Wire Sign Support, Type TC-17.10, _____ Design _____, Span _____
630	Each	Overpass Structure Mounted Sign Support, Type TC-____, Design _____
630	Each	Sign Hanger Assembly, (Span, Wire, Mast Arm)
630	Each	Sign Support Assembly, (Pole or Bridge Mounted)
630	Square Foot (Square Meter)	Signs, (Flat Sheet, Extru-Sheet, Temporary Overlay)
630	Each	Signs, Double Faced, (Street Name, Urban Mile Marker)
630	Square Foot (Square Meter)	Signs Erected, (Flat Sheet, Extru-Sheet, Temporary Overlay)
630	Each	Sign Backing Assembly
630	Each	Existing Signs Revised With Demountable Copy
630	Square Foot (Square Meter)	Refurbishing Signs
630	Square Foot (Square Meter)	Covering of Signs
630	Each	Barrier Wall Assembly, Type TC-, _____ Design
630	Each	Removal of Ground Mounted (Major) Sign and (Storage, Re-Erection, or Disposal)
630	Each	Removal of Ground Mounted (Beam, Post) Support and (Storage or Disposal)
630	Each	Removal of Overhead Mounted Sign and (Storage, Re-Erection, or Disposal)
630	Each	Removal of Overhead Sign Support and (Storage, Re-Erection, or Disposal), Type TC-_____
630	Each	Removal of Overlay Sign