SECTION 643 TRAFFIC CONTROL

643.1 Description

(1) This section describes providing, erecting, maintaining, moving, and removing temporary traffic signs, and demountable legend plaques, pavement markings, drums, barricades, flexible tubular markers, arrow boards, and lights.

(2) This section also describes providing barricades and signs that will remain in place at contract completion and become the property of the department.

643.2 Materials

643.2.1 General

(1) Furnish materials conforming to the MUTCD and maintain traffic control devices as follows:

1. Keep the retroreflective sheeting on drums, barricades, and other devices clean.
2. Promptly repair scratches, rips, and tears in the sheeting.
3. Repair or replace devices that have large areas of abrasion, missing reflective sheeting, asphalt splatter, concrete slurry, or other residue.
4. Replace devices that have excessive color fading.
5. The contractor shall not use devices that are fractured, punctured, dented, or deformed severely enough to affect the overall dimensions, stability, visibility, or reflectivity.
6. Maintain the retro-reflectance of all drums, posts, and barricades at a level not less than 50 percent of the minimum value specified in 637.2.2.2 for type H reflective sheeting.

643.2.2 Temporary Pavement Markings

(1) Provide temporary pavement marking materials conforming to 649.2.

643.2.3 Drums

(1) Provide nonmetallic reflectorized traffic control drums fabricated to accept type C or type A warning lights. All drums must conform to the crashworthiness criteria of NCHRP Report 350, test level 3. If the engineer requests, furnish a letter from the manufacturer or distributor certifying that the drums conform to those crashworthiness criteria.

(2) Provide reflective sheeting on all drums. The reflective sheeting material must conform to all the following:

1. Designed specifically for use on reboundable traffic control devices.
2. Conform to 637.2.2.2 for type H reflective sheeting.
3. Received a good or better rating in 1-year NTPEP tests for shrinkage, cracking, blistering, colorfastness, reflectivity, adhesion, flexibility, and impact resistance.

(3) Weight each drum with sand bags, or other engineer-approved material, to keep the drum in its intended location. The contractor shall not fasten together, or alter otherwise, 2-piece drums to perform in a way the manufacturer did not intend.

643.2.4 Barricades

(1) Provide reflective sheeting on all barricades. The reflective sheeting material must conform to all the following:

1. Designed specifically for use on rigid traffic control devices.
2. Conform to 637.2.2.2 for type H reflective sheeting.
3. Received a good or better rating in 1-year NTPEP tests for shrinkage, cracking, blistering, colorfastness, reflectivity, adhesion, and impact resistance.

(2) Provide barricades conforming to the crashworthiness criteria of NCHRP Report 350, test level 3. If the engineer requests, certify in writing that those crashworthiness criteria are met. Include the FHWA acceptance letter WZ-number in that written certification.

(3) For type III barricades with no sign attached, provide barricades 8 feet (2.4 m) long unless the contract indicates otherwise or the engineer approves otherwise. For type III barricades with a sign attached, provide barricades 4 feet (1.2 m) or longer.

(4) Under the Traffic Control Barricades Permanent bid items, provide new barricades with 8 foot (2.4 m) long rails.

643.2.5 Flexible Tubular Markers

643.2.5.1 Flexible Tubular Marker Posts

(1) Provide flexible tubular posts with reflective sheeting as the plans show.

(2) Use flexible tubular marker posts made with materials resistant to extreme temperature changes in the range of –20 F to 160 F (-29 C to 71 C), ultraviolet light, ozone, hydrocarbons, stiffening with age, and a series of direct wheel impacts with speeds varying up to 65 mph (105 km/h), and rebounds to a vertical position if struck by a standard vehicle. Select flexible tubular marker posts from the department's approved products list. The posts must conform to the crashworthiness criteria of NCHRP report 350, test level 3. If the engineer requests, furnish a letter from the post manufacturer or distributor that certifies that the posts conform to the NCHRP 350 crashworthy requirements. Provide posts that exhibit good quality, are free of burns, discoloration, contamination and other objectionable marks or defects that affect appearance or serviceability.

(3) Provide reflective sheeting for the flexible tubular marker posts conforming to 637.2.2.2 and that is suitable to use on reboundable traffic control devices. Use sheeting having acceptable performance and good evaluation ratings in 1-year NTPEP tests, for shrinkage, cracking, blistering, colorfastness, reflectivity, adhesion, flexibility, and impact resistance.

(4) Provide new and unused flexible tubular marker posts if installed at a new location. The contractor may furnish used posts in like-new condition, with new reflective marking installed on the post, as replacement posts.

643.2.5.2 Flexible Tubular Marker Bases

(1) Provide a surface mounted assembly that either bolts to the pavement surface using an engineer-approved or specified bolt adhesive system, or attaches using an engineer-approved or specified asphaltic adhesive. Provide a base designed to hold the post securely using locking pins, or other devices, to withstand a series of direct wheel impacts with speeds up to 65 mph (105 km/h).

(2) On all temporary pavements, or existing pavements later removed, the contractor may attach the base with an epoxy adhesive, or core the pavement and install a sleeve type base as the plans show.

643.2.6 Arrow Board

643.2.6.1 General

(1) Provide arrow boards conforming to the MUTCD requirements for type C arrow panels.

(2) Furnish, service, maintain, repair, or replace the arrow boards as necessary. Arrow boards remain the contractor’s property.

643.2.6.2 Sign Panel

(1) Provide sign panels 48 inches by 96 inches (1220 mm by 2440 mm), non-reflective flat black, trailer mounted, and capable of operating in a stationary setup and while being towed, except, operate solar arrow boards only in stationary setups.

(2) Provide sign panels with at least 15 SAE PAR 46 lamps per panel. Configure the lamps according to Part VI of the MUTCD. Use sealed beam type lamps with yellow lenses, or amber bulbs behind clear lenses, equipped with an upper hood that surrounds not less than 180 degrees of the lamp.

(3) Provide arrow boards capable of these mode selections: left or right flashing shaft with arrow point, flashing shaft with double arrow points, or caution. The engineer will not allow sequential operation of arrow or chevrons.

(4) Ensure the arrow board is continuously visible and identifiable for a distance of one mile (1.6 km) in advance of the beginning of the lane closure taper. Ensure the lamps are visible at a minimum 18 degrees horizontal angle and 8 degrees vertical angle, measured from a perpendicular to the arrow board plane.

643.2.6.3 Control System

(1) Provide electronically operated lamps controlled by a solid-state controller mounted to the frame in a weatherproof, ventilated, lockable enclosure.

(2) Provide lamps capable of at least 50 percent dimming from their rated voltage. The flashing rate shall range from 25 to 40 flashes per minute. Ensure a minimum lamp "on" time of 50 percent. Ensure no lamps remain illuminated during "off" time. The control system shall provide for automatic dimming of lamps by reducing the voltage to 50 percent minimum for nighttime use and for the fail mode default setting. Provide a manual override backup switch.

(3) Include with battery/solar powered arrow boards: a 120 volt AC/12 volt DC battery charger and voltage regulator with standard receptacles, a battery condition indicator with test switch, and a current meter.

643.2.6.4 Power Supply

(1) Provide a reliable energy supply for arrow boards, this supply might be self-contained batteries, solar, a diesel fueled generator, gasoline fueled generator, or electricity from a utility company. If using batteries as the primary power source, they must provide sufficient voltage, between charging, to each of the lamps to provide at least 15 days of continuous operation, in any mode, at full daytime intensity.

(2) Equip diesel/generator and gasoline/generator powered units with a fuel tank of sufficient capacity to operate at least 24 hours without refueling and designed to minimize the danger of rupture or explosion in case of collision. The contractor shall not store additional fuel on or near the trailer.

(3) Provide an auxiliary power supply, available immediately, on the site in case the primary power supply fails.

643.2.7 (Vacant)

643.2.8 Hand Signaling Devices

(1) Use the sign paddle as the primary hand-signaling device. Limit flag use to emergency situations. Mount the sign paddle on a rigid handle with a 5-foot (1520 mm) minimum mounting height to the bottom of the sign.

643.2.9 Signs

643.2.9.1 General

(1) Layout signs according to the FHWA Manual of Standard Highway Signs or the department's Sign Plate Book, unless the plans show otherwise.

(2) Provide the sign size the contract specifies. If the contract does not specify the size, provide the size the MUTCD specifies for higher-speed locations or a larger size, except the engineer may allow smaller signs if space is limited and the MUTCD allows.

(3) Use the materials and methods specified in section 637, for type II signs, to manufacture and assemble signs. In addition, the contractor may use the following:

1. For any sign, an exterior grade A-B plywood sign base 1/2-inch (13 mm) or thicker.
2. For signs mounted on portable sign supports or barricades, one or more of the following:
    - 2.1 A sheet aluminum sign base 0.080 inches (2.0 mm) or thicker.
    - 2.2 A corrugated polypropolylene or polyethylene plastic sign base.
        - 2.2.1 Provide a base 0.4 inches (10 mm) thick with wall thickness of 0.035 inches (0.9 mm) and cell size of 0.4 inches (10 mm).
    - 2.3 An aluminum/plastic laminate sign base.
        - 2.3.1 Provide an aluminum faced composite base 0.080 - 0.100 inches (2.0-2.5 mm) thick, with aluminum outer layers 0.010 - 0.020 inches (0.25-0.50 mm) thick surrounding a core of polyethylene or other thermoplastic material.
    - 2.4 A retroreflective roll-up sign.

(4) Prepare the sign base as the sheeting manufacturer recommends.

(5) Provide a sign support system as follows:

1. For signs mounted on posts, use posts from the FHWA list of accepted breakaway sign supports. *[1]*
2. For signs mounted on portable sign supports or barricades, use signs and supports conforming to the crashworthiness criteria of NCHRP Report 350, test level 3.*[1]*

[1] If the engineer requests, provide written certification that the breakaway or crashworthiness criteria are met. Include the FHWA acceptance letter WZ-number or SS-number in that written certification.

(6) Provide sign face material for signs R1-1 stop, R1-2 yield, R5-1 do not enter, and R5-1a or R5-9 wrong way conforming to 637.2.2.2 for type H reflective sheeting. For all other sign face material, provide standard reflective sheeting conforming to 637.2.2.1, except as specified in the contract, or in 643.2.9.2 for orange work zone traffic control signs.

(7) If a sign has an associated secondary sign mounted on the same assembly, ensure that the color of the secondary sign matches the primary sign unless the plans show, or the engineer directs, otherwise.

(8) Stencil all messages and borders directly on the sign background of standard construction signs, except as specified in 643.2.9.4 for sign overlays.

(9) Keep the retroreflective sheeting on signs clean. Promptly repair scratches, rips, and tears in the sheeting. Repair or replace signs with abrasions, asphalt splatter, or concrete slurry on the sign face that makes the message or any letters illegible. Replace signs with noticeable color fading.

(10) Maintain the level of retroreflectance for signs as follows:

1. Standard reflective sheeting; 75 % of the minimum value specified in 637.2.2.1 or greater.
2. Type H reflective sheeting; 50 % of the minimum value specified in 637.2.2.2 or greater.
3. Prismatic reflective sheeting; 50 % of the minimum value specified in 643.2.9.2 or greater.

643.2.9.2 Orange Work Zone Traffic Control Signs

(1) For sign face material, provide fluorescent orange, prismatic, retroreflective sheeting with a minimum initial coefficient of retroreflection as follows:

OBSERVATION ANGLE	ENTRANCE ANGLE	MINIMUM INITIAL COEFFICIENT OF RETROREFLECTION in either cd/fc/ft^2 or cd/lx/m^2
0.2 deg	-4 deg	200
0.2 deg	+30 deg	80
0.5 deg	-4 deg	72
0.5 deg	+30 deg	34

(2) Conform to the sheeting color chromaticity coordinates and the minimum luminance factor as follows:

SHEETING COLOR	CHROMATICITY COORDINATES								LUMINANCE FACTOR
	1		2		3		4		Y MINIMUM
	X	Y	X	Y	X	Y	X	Y	
Fluorescent Orange	0.583	0.416	0.535	0.400	0.595	0.351	0.645	0.355	25%

(3) The department may require independent verification of the initial coefficient of retroreflection and sheeting color.

(4) The contractor may use standard reflective sheeting conforming to 637.2.2.1 for the following:

1. G20-2a end road work signs.
2. M4-9/M4-8 series detour signs, and MO5-x/MO6-x arrow plaques used in detour sign assemblies.
3. Special fixed message signs as specified in 643.2.9.3.
4. Orange plaques that supplement or cover a portion of existing green guide signs.

(5) If using plywood sign bases with fluorescent orange prismatic sheeting, use new plywood. For other sign base types, the contractor may use a reconditioned base if all previous sheeting materials are removed before applying the new fluorescent orange prismatic sheeting. Do not remove messages and reapply new messages to existing signs with prismatic sheeting, except as specified for overlays in 643.2.9.4.

643.2.9.3 Fixed Message Signs

(1) For the sign base, provide a good exterior grade A-B plywood with a 1/2 inch (13 mm) minimum thickness. Provide reflective sheeting conforming to 637.2.2.1 for standard reflective sheeting and provide sign message material conforming to 637.2.3.3 for stencil paste.

643.2.9.4 Sign Message Overlays

643.2.9.4.1 General

(1) The contractor may alter the message on standard construction signs by applying demountable plaque overlays or direct-applied, pressure-sensitive sheeting overlays. Do not apply more than one overlay per sign. The contractor shall not encompass more than one line of the sign message with the overlay. On W20-5 or W20-58 series signs, the contractor may use 2 overlays to independently alter the right/left lane message and the ahead/distance message.

(2) The message on the demountable plaque or sheeting overlay shall conform to the FHWA Manual of Standard Highway Signs or the department's Sign Plate Book, and match the specified letter height, letter series, and letter stroke width of the message on the sign on which mounting the plaque or overlay.

(3) Ensure that the reflectivity and the color of the sheeting on the plaque or sheeting overlay, and the base sign are similar enough that the composite sign, both daytime and nighttime appearance, exhibits the visual impact of one integral sign.

(4) Match the sign face material for overlays to the base sign reflective sheeting material.

(5) The contractor shall not use sign overlays for non-word messages, except for the lane reduction transition sign, WO4-2.

643.2.9.4.2 Demountable Plaque Overlay

(1) For the base material, use sheet aluminum conforming to 637.2.1.3.

(2) Use reflective sheeting for sign face material conforming to the requirements for signs in 643.2.9.

(3) Apply the sign message using stencil paste conforming to 637.2.3.3 and 637.3.2.5.

643.2.9.4.3 Sheeting Overlay

(1) Use pressure-sensitive sheeting conforming to the requirements for signs in 643.2.9.

643.2.9.5 Sign Covering Material

(1) Use material of sufficient durability to withstand the effects of weathering, but will not damage the reflective face of the sign, during the time the covering is used. Do not apply any kind of tape to the face of the sign to fasten covering material.

643.3 Construction

643.3.1 General

(1) Perform this work according to part VI of the MUTCD for temporary traffic controls except as noted below, in the contract, and as the engineer directs.

(2) Under the Traffic Control bid items, perform all of the work described below, except work specifically covered by other traffic control and pavement marking items contained in the contract.

(3) Under the Traffic Control Drums bid item, furnish, install, maintain, move, and remove traffic control drums.

(4) Under the Traffic Control Barricades bid items, furnish, install, maintain, move, and remove barricades of the specified type.

(5) Under the Traffic Control Barricades Permanent bid items, provide permanent barricades and associated signs in the locations the plans show. Maintain the barricades and associated signs until the engineer accepts the work as specified in 105.11. These barricades and signs become the property of the department at contract completion.

(6) Review all traffic signs and control devices furnished and erected for location, position, visibility, adequacy, and manner of use under specific job conditions immediately after each setup and at least once every 24 hours and more frequently as necessary, to ensure all the signs and control devices are continuously in compliance with this section. Review the signs and devices from the same direction that approaching traffic views them.

(7) Provide equipment, forces, and materials to promptly restore any traffic control devices or pavement markings damaged or disturbed.

(8) All traffic control devices remain the property of the contractor upon completion of the work unless specified otherwise.

(9) On the back face of each sign, a rail of each barricade, and on each drum and arrow board place the name and telephone number of the agency, contractor, supplier, or person responsible for 24-hour emergency service. Provide this information in non-reflective letters at least 3/4 inch (19 mm) but no more than 2 inches (50 mm) high.

(10) If the plans or special provisions contain specific sign details, sequence of erection or special instructions for handling traffic, conform to them unless the engineer directs otherwise.

(11) Ensure the proper placement and operation of all signs and control devices before beginning construction work affected by those signs or devices. If performing work of a progressive nature, like resurfacing operations on a road open to traffic, then relocate the signs concurrently.

(12) If, in the engineer's judgment, the contractor has not provided and maintained proper provisions for traffic control according to these specifications, the engineer may restrict construction operations affected by defective signs, devices, or markings until the contractor establishes and maintains the proper provisions. The department may also take steps to place them in proper condition at no expense to the department.

643.3.2 Surveillance and Maintenance

(1) Under the Traffic Control Surveillance and Maintenance bid items, provide personnel to inspect and maintain the traffic control devices, furnished, and installed, in proper condition.

(2) If this bid item is included in the contract, provide one person, called the traffic control specialist, responsible for inspecting and maintaining traffic control signs or devices; the contractor may need to provide other personnel to accomplish the inspection and maintenance; and provide all necessary vehicles, equipment, tools, and repair materials.

(3) Inspection and maintenance includes all traffic control signs or devices included in the contract, including those on detour routes. Begin when the first traffic control sign or device is put into operation and end when the last traffic control sign or device is removed from operation.

(4) The traffic control specialist shall inspect the traffic control signs and devices at least once each calendar day during daytime hours. During the inspection, clean, repair, or replace each traffic control sign or device not performing as intended, as necessary.

(5) The control specialist shall also inspect each reflective traffic control sign or device at least once each week during hours of darkness. View the signs and devices using low beam vehicle headlights to ensure reflectorization is unimpaired. Clean, repair, or replace each reflectorized traffic control sign or device not performing as intended, as necessary, before sunset of the next calendar day, or as the engineer directs otherwise.

(6) Before each workday daytime or night inspection, the control specialist shall meet with the department representative responsible for traffic control under the contract to discuss possible problems with the existing traffic control.

(7) The control specialist shall submit a written report weekly to the project engineer. The report shall document the daily daytime and weekly night inspections.

(8) Make the control specialist, or other contractor designated person, available 24 hours per day, 7 days per week to clean, repair, or replace traffic control devices not performing as intended throughout the period traffic control signs and devices are operating under this contract. Provide to the engineer, the County Sheriff, and the State Patrol Region Headquarters responsible for that county the telephone number to contact the control specialist or other contractor designated person. Ensure that the control specialist, or other designated person, is able to reach any location within the contract limits, or on detour routes, within 2 hours of being contacted, and can promptly accomplish the necessary cleaning, repair, or replacement.

643.3.3 Temporary Pavement Markings

(1) Apply as specified for temporary pavement markings in 649.3.

643.3.4 Flexible Tubular Markers

643.3.4.1 Posts

(1) Under the Traffic Control Flexible Tubular Marker Posts bid item, furnish, install, maintain, and remove flexible tubular marker posts with reflective sheeting.

(2) Attach the posts to the base using a locking pin or other engineer-approved system.

643.3.4.2 Bases

(1) Under the Traffic Control Flexible Tubular Marker Bases bid item, furnish, install, maintain, and remove bases for flexible tubular marker posts.

(2) Use bases designed for temporary installation that resist twisting or displacement from impact forces, and do not pose a hazard to vehicles.

(3) Remove the base in a manner that does not damage the final pavement. Repair all damaged pavement at no expense to the department. Remove bolts flush with the pavement surface; no part of the bolts may protrude above the pavement surface.

643.3.5 Warning Lights

(1) Under the Traffic Control Warning Lights bid items, furnish, install, maintain, move, and remove the specified warning lights.

643.3.5.1 High Intensity Flashing Warning Lights

(1) Install type B, high Intensity flashing, warning lights on warning signs or barricades as the plans show or the engineer directs.

(2) Mount each light installed with a warning sign on the back of the sign. Position the light so that the lens is outside the edge of the sign, to the traffic side, and between the midpoint and the top of the sign. Use a one-way light or lens-directed light visible only to traffic approaching the message side of the sign, unless the engineer orders otherwise.

643.3.5.2 Low Intensity Flashing and Steady Burn Warning Lights

(1) Install type A, low intensity flashing, or type C, steady burn, warning lights on traffic control drums, barricades, and signs as the contract specifies or the engineer directs. Warning light attachments must conform to the crashworthiness criteria of NCHRP Report 350, test level 3 as follows:

1. Traffic control drums: Firmly affix the warning light to the drum with vandal resistant hardware. If the engineer requests, furnish a letter from the manufacturer or distributor certifying that the drums and warning light attachments conform to NCHRP crashworthiness criteria.
2. Barricades used on National Highway System routes: If the engineer requests, certify in writing that the barricades and warning light attachments conform to NCHRP crashworthiness criteria.

(2) Mount each type A light installed in conjunction with a warning sign on the back of the sign. Position the light so that the lens is outside the edge of the sign, to the traffic side, and between the midpoint and the top of the sign, unless the plans show otherwise. Use a one-way light or lens-directed light visible only to traffic approaching the message side of the sign, unless the engineer orders otherwise.

(3) The engineer will not require type A lights on signs with fluorescent, or non-fluorescent orange prismatic retroreflective sheeting.

643.3.6 Arrow Boards

(1) Under the Traffic Control Arrow Boards bid item, furnish, install, maintain, move, and remove arrow boards.

(2) Operate all arrow boards during the hours of darkness at an illumination level of not more than 50 percent of the daytime level.

(3) Place arrow boards as the plans show, or as the engineer directs. The engineer will not allow the display of an arrow or chevrons by lighting in sequence from left to right, or right to left.

(4) Remove and replace any arrow board that repeatedly fails with a properly functioning arrow board.

643.3.7 (Vacant)

643.3.8 Signs

643.3.8.1 General

(1) If the sign message is no longer relevant, promptly remove it or cover the sign face completely so that the reflectivity and message are not evident.

(2) Install post-mounted temporary traffic control signs with the bottom of the sign 7 feet (2.1 m) or higher above the top of curb or near edge of pavement. In rural areas with no view obstructions, the contractor may reduce the minimum mounting height to 5 feet (1.5 m). Mount associated secondary signs no lower

than one foot (0.3 m) below these minimums. Do not install signs on existing posts unless the plans show or the engineer or post owner allows.

(3) Trim posts neatly with top of sign, so that no portion of the post protrudes above the sign.

643.3.8.2 Traffic Control Signs

(1) Under the Traffic Control Signs bid item, furnish, install, maintain, move, and remove temporary traffic signs including all posts and other sign supports.

643.3.8.3 Fixed Message Signs

(1) Under the Traffic Control Signs Fixed Message bid item, furnish, install, and remove fixed message signs, including all posts.

(2) If fastening a fixed message sign to an existing sign, completely cover the underlying sign message that is not applicable. Securely attach the fixed message sign to the existing sign using a sufficient number of bolts or screws, but do not use tape.

(3) Install post-mounted fixed message signs at the height specified in 643.3.8.1. If the sign is larger than 50 square feet (5 m^2), install with the bottom of the sign at least 7 feet (2.1 m) above the ground.

643.3.8.4 Sign Message Overlays

(1) The contractor may overlay a direct-applied sheeting overlay by additional sheeting overlays, or by a demountable plaque. Do not overlay a demountable plaque overlay with another demountable plaque or by sheeting.

(2) Use an overlay conforming to the sign message overlay specified in 643.2.9.4.

(3) Non-word messages cannot be a sign overlay, except for the lane reduction transition sign, WO4-2.

(4) Fasten the plaque overlay to the base sign with 4 bolts or screws, one in each corner of the plaque. Apply sheeting overlays so that no curling or lifting of the overlay occurs during the sign's usage. Promptly replace the sign if any part of the overlay curls of lifts.

(5) Position the plaque or sheeting overlay on the base sign so that they appear to be an integral part of the message. Ensure that the plaque or sheeting overlay completely covers the underlying sign message that is no longer applicable. Do not overlay any other part of the base sign message, or let it extend beyond the base sign border.

643.3.8.5 Traffic Control Detour Signs

(1) Under the Traffic Control Detour Signs bid item, furnish, erect, maintain, review, and remove M-series signs or signs the plans indicate, including all posts and other sign supports, on the designated detour or detours.

(2) Erect signing at engineer-approved locations. Use engineer-approved mounting methods.

(3) Cover all detour signs placed before the detour takes effect until needed.

(4) If the detour signing occurs on a county or local road, coordinate with the local jurisdiction about placing the detour signing on existing posts.

(5) Place all requested additional signing within 48 hours of the engineer’s notification.

(6) Immediately remove or cover signing when the detour is no longer in effect.

643.3.9 Traffic Control Detour

(1) Under the Traffic Control Detour bid items, perform all work necessary to sign the designated detour or detours including but not limited to flagging and guiding of traffic and covering or uncovering signs, except that work specifically covered by other contract bid items for detour traffic control is not included under this item.

(2) Partially or fully cover any sign messages conflicting with detour traffic as the plans show or as the engineer directs.

643.4 Measurement

643.4.1 Traffic Control

(1) The department will measure the Traffic Control (project) and Traffic Control Detour (project) bid items as each individual unit of work acceptably completed and will not include any work performed under other specific traffic control or pavement-marking contract bid items.

643.4.2 Traffic Control Surveillance and Maintenance

(1) The department will measure the Traffic Control Surveillance and Maintenance bid items by the day acceptably completed. The measured quantity will equal the number of calendar days from the date the first traffic control sign or device is placed into operation through the date the last traffic control sign or device is removed from operation.

643.4.3 Traffic Control Items

(1) The department will measure Traffic Control Arrow Boards, Traffic Control Drums, the Traffic Control Barricades bid items, the Traffic Control Warning Lights bid items, and Traffic Control Signs by the day acceptably completed. The measured quantity will equal the number of calendar days the sign or device is in use. For each day that the device or sign is out of service for more than 2 hours, when it is required, will result in one day being deducted from the quantity measured for payment.

(2) The department will measure Traffic Control Detour Signs by the day acceptably completed. The measured quantity will equal the number of calendar days the sign is in use. The department will measure each sign of an assembly separately for payment. If any sign of an assembly is missing or does not comply with specifications, the department will not measure any of the signs on that assembly for the days the sign is missing or is not in compliance.

(3) The department will not measure a traffic control sign or device on days that the bid item is not required, as the engineer determines.

(4) The department will measure Traffic Control Flexible Tubular Marker Posts and Traffic Control Flexible Tubular Marker Bases as each individual installation and removal acceptably completed. The department will measure replacing damaged posts and bases by each post and base replaced.

(5) The department will measure Traffic Control Signs Fixed Message by the square foot acceptably completed, measured as the area of the sign face.

(6) The department will measure the Traffic Control Barricades Permanent bid items as each individual permanently installed 8-foot barricade acceptably completed.

643.5 Payment

643.5.1 General

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
643.0100	Traffic Control (project)	EACH
643.0200	Traffic Control Surveillance and Maintenance (project)	DAYS
643.0300	Traffic Control Drums	DAYS
643.0400 - 0449	Traffic Control Barricades (type)	DAYS
643.0450 - 0455	Traffic Control Barricades Permanent (type)	EACH
643.0500	Traffic Control Flexible Tubular Marker Posts	EACH
643.0600	Traffic Control Flexible Tubular Marker Bases	EACH
643.0700 - 0799	Traffic Control Warning Lights (type)	DAYS
643.0800	Traffic Control Arrow Boards	DAYS
643.0900	Traffic Control Signs	DAYS
643.1000	Traffic Control Signs Fixed Message	SF
643.2000	Traffic Control Detour (project)	EACH
643.3000	Traffic Control Detour Signs	DAYS

643.5.2 Traffic Control

(1) Payment for the Traffic Control (project) bid items is full compensation for constructing, assembling, painting, hauling, erecting, re-erecting, maintaining, restoring, and removing traffic signs, drums, barricades, and similar control devices, including arrow boards, unless provided otherwise; for providing, placing, and maintaining lights, including the fuel or power unless provided otherwise; and for providing,

applying, and removing pavement markings, unless provided otherwise. If Traffic Control (project) is not specified, but is later found necessary and is required, the department will pay for this work as extra work.

(2) Payment for the Traffic Control Detour (project) bid items is full compensation for supplying and performing all flagging and guidance services; and for providing, installing, partially or fully covering or uncovering, reviewing, maintaining, and removing signs associated with guidance services. If the bid item Traffic Control Detour (project) is not specified, but is later found necessary and is required, the department will pay for this work as extra work.

643.5.3 Traffic Control Surveillance and Maintenance

(1) Payment for the Traffic Control Surveillance and Maintenance bid items is full compensation for providing all labor, materials, tools, equipment, vehicles, and incidentals, including reports and telephone charges, necessary to complete the work. The department will not pay for replaced traffic control signs or devices under this bid item; replacement is incidental to the respective contract bid item or items.

643.5.4 Traffic Control Items

(1) Payment for Traffic Control Arrow Boards is full compensation for providing, installing, moving, and removing portable, self-contained flashing arrow boards, including auxiliary power supply.

(2) Payment for Traffic Control Drums is full compensation for providing, installing, moving, and removing drums, including the weights.

(3) Payment for the Traffic Control Barricades bid items is full compensation for providing, installing, moving, and removing the barricades.

(4) Payment for the Traffic Control Barricades Permanent bid items is full compensation for providing barricades and associated signs and for maintaining the installation until the engineer accepts the work as specified in 105.11.

(5) Payment for the Traffic Control Warning Lights bid items is full compensation for providing, installing, moving, and removing warning lights of the specified type, including mounting hardware, batteries, and hold down devices.

(6) Payment for Traffic Control Signs is full compensation for providing, installing, moving, and removing traffic control signs, including all posts, signs, mounting hardware, orange flags, and hold down devices.

(7) Payment for Traffic Control Signs Fixed Message is full compensation for providing all materials; for the manufacture and assembly of the sign, including all messages; and for hauling, handling, installing and removing the signs, including posts, fasteners and necessary hardware and vertical supports.

(8) Payment for Traffic Control Flexible Tubular Marker Posts is full compensation for providing, installing, and maintaining the flexible tubular marker posts, and for removing the posts.

(9) Payment for Traffic Control Flexible Tubular Marker Bases is full compensation for providing, installing, and maintaining the flexible tubular marker bases; for removing bases; and for repairing damaged pavements. The department will not pay to replace bases inadequately secured to the pavement.

(10) Payment for Traffic Control Detour Signs is full compensation for providing, erecting, partially or fully covering or uncovering, reviewing, maintaining, and removing M-series detour signs or detour signs the plans indicate, including posts, channels, signs, mounting hardware and flags.

(11) The department will pay for temporary pavement marking bid items as specified in 649.5.