

SECTION 606

GUARDRAIL

Delete Subsection 606-2.01 MATERIALS and replace with the following:

606-2.01 MATERIALS. Use materials that conform to the following:

Concrete, Class A or W (or an approved, pre-mixed, sacked concrete)	Subsection 501-3.01
Wire Cable	Subsection 709-2.02
Metal Beam Rail	Subsection 710-2.04
Guardrail Posts and Blocks	Subsection 710-2.06
Guardrail Hardware	Subsection 710-2.07
Terminals	Subsection 710-2.11

Terminal Markers. Single piece marker, constructed of a durable UV resistant, continuous glass fiber and marble reinforced, thermosetting composite material.

1. designed for use as road markers
2. impact-resistant temperature range, -40°F to +140°F
3. 0.125 by 3.75 inches by 66 inches long, 18 inch burial depth

Furnish white flexible markers with a 3 inch by 12 inch retroreflective sheeting, color orange, shall meet AASHTO M 268-08 requirements for Type VIII or IX. Alternately, use 3M Diamond Grade DG3 or approved equivalent.

Fabricate guardrail reflector assembly brackets from aluminum alloy, galvanized steel, or polycarbonate. Use reflective sheeting meeting AASHTO M 268-08 requirements for Type VIII or IX. Alternately, use 3M Diamond Grade DG3 or approved equivalent.

SECTION 606

GUARDRAIL

606-3.01 GENERAL. Add the following after paragraph one:

At locations where public traffic is adjacent to guardrail work, have all materials on site, including crashworthy terminals, that are required to completely install a segment of guardrail before beginning work on that segment.

Start guardrail installation at the "upstream" end (the end adjacent traffic will encounter first) by either installing a crashworthy terminal or connecting to an existing barrier. Continue installation in the direction of traffic. Exception: if the guardrail run will connect to existing barrier, buried in the backslope, or guardrail, existing or new bridge railing, or other existing structure at the "downstream" end, guardrail installation may be started at the point of connection.

Do not leave posts installed for guardrail within the clear zone for more than 48 hours before installing the rail. At the end of each work shift, install drums or Type II barricades with flashing warning lights to delineate incomplete sections of guardrail and terminal sections.

If guardrail runs are not completed within 10 calendar days after beginning installation, install temporary crash cushions meeting NCHRP 350 or MASH test level 3 at all non-crashworthy guardrail ends within the clear zone. Apply Traffic Price Adjustment if the Contractor does not comply with the crash cushion requirement.

**STANDARD MODIFICATION
E 71**

10/04/10

SECTION 606

GUARDRAIL

606-3.02 POSTS. *Replace items 3 and 4 in the second paragraph.*

- 1.
- 2.
3. Set wood or steel posts in dug, drilled, or pre-punched holes. Steel posts may also be set by ramming or driving if:
 - a. The underlying material is no larger than six inch; and
 - b. The posts are not damaged during installation.
4. Backfill and compact around posts with material as specified in the typical section to firmly support the post laterally and vertically. Compact under and around posts to the Engineer's satisfaction.

**STANDARD MODIFICATION
E 72**

10/04/10

SECTION 606

GUARDRAIL

Replace paragraph one with the following:

606-3.03 BEAM RAIL. Fabricate metal work in the fabricator's shop. Bend curved guardrail elements with radii less than or equal to 100 feet in the fabricator's shop or with an approved bending apparatus.

**STANDARD MODIFICATION
E 73**

10/04/10

SECTION 606

GUARDRAIL

Delete Subsection 606-3.05 TERMINAL SECTIONS and replace with the following:

606-3.05 TERMINAL SECTIONS. Install terminal sections according to the manufacturer's recommendations. Install where shown on the Plans.

Follow Section 203 for excavation and embankment requirements.

Attach flexible markers, in a vertical position, to the first post of each parallel guardrail terminal using two pipe bracket holders spaced 24 inches apart. Attach to wooden guardrail posts with wood screws and to steel guardrail posts with hex bolts. Attach flexible markers in the same manner to the "P.T." post of Controlled Release Terminals.

**STANDARD MODIFICATION
E 74**

10/04/10

SECTION 606

GUARDRAIL

Delete Subsection 606-5.01 BASIS OF PAYMENT and replace with the following:

606-5.01 BASIS OF PAYMENT.

Payment for temporary crash cushions installed to protect motorists from guardrail installations that have not been completed within 10 calendar days of beginning installation is subsidiary to other items.

1. Guardrail. Guardrail reflectors, flexible markers for terminal sections, posts, blocks, and associated hardware are subsidiary.

Adjusting the height of existing guardrail as needed to extend guardrail is subsidiary.

2. Terminal Sections.

- a. Parallel Guardrail Terminal. The contract price includes rail elements, posts, blocks, pipe sleeves, cable assemblies, guardrail extruders, terminal markers, and all associated hardware required for a complete installation.
- b. Controlled Release Terminals (CRT). The contract price includes all materials from the terminal anchor to and including the modified breakaway cable terminal assembly, terminal posts, CRT posts, rail elements, terminal markers, and associated hardware required for a complete installation.
- c. Buried in Backslope Guardrail Terminal. The contract price includes rail elements, posts, blocks, concrete, rebar, anchors, and all associated hardware required for a complete installation.

3. Guardrail/Bridge Rail Connection. The contract price includes all beam sections, transition pieces, and all posts and associated hardware required for a complete connection of the guardrail section to a bridge rail.

All material required for embankment widening for guardrail and terminal sections is paid for under the appropriate pay items shown in the bid schedule.

Payment will be made under:

Pay Item	Pay Unit
606(1) W-Beam Guardrail	Linear Foot
606(2) Thrie Beam Guardrail	Linear Foot
606(3) Box Beam Guardrail	Linear Foot
606(4) Cable Guardrail	Linear Foot

606(5) Removing and Reconstructing Guardrail	Linear Foot
606(6) Removing and Disposing of Guardrail	Linear Foot
606(7) Raising Existing Guardrail	Linear Foot
606(8) Double-faced, W-Beam Guardrail	Linear Foot
606(9) Controlled Release Terminal (CRT)	Each
606(12) Guardrail/Bridge Rail Connection	Each
606(13) Parallel Guardrail Terminal	Each
606(14) Buried in Backslope Guardrail Terminal	Each

**STANDARD MODIFICATION
E 75 Replaces E 62**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-1.04 WORKSITE TRAFFIC SUPERVISOR and replace with the following:

643-1.04 WORKSITE TRAFFIC SUPERVISOR. Provide a Worksite Traffic Supervisor responsible for maintaining 24-hour traffic operations.

1. Qualifications. The Worksite Traffic Supervisor shall be knowledgeable and experienced regarding the requirements of the ATM and the implementation of those requirements. The Worksite Traffic Supervisor shall be familiar with the Plans, the Specifications, your proposed operations, and certified as one of the following:
 - a. Traffic Control Supervisor, American Traffic Safety Services Association (ATSSA)
 - b. Work Zone Safety Specialist, International Municipal Signal Association (IMSA)

Certify according to Form 25D-105 that the Worksite Traffic Supervisor is competent and capable, and has the authority to perform the duties and responsibilities in accordance with this section.

Worksite Traffic Supervisors shall maintain current certification and be able to show their certification anytime they are on the project.

2. Duties.
 - a. Prepare the TCPs and public notices and coordinate traffic control operations between the Project Superintendent and the Engineer.
 - b. Physically inspect the condition and position of all traffic control devices used on the project at least once each day and once each night. Ensure that traffic control devices work properly, are clean and visible, and conform to the approved TCP. Complete and sign a detailed written report of each inspection on the form provided by the Engineer within 24 hours.
 - c. Supervise the repair or replacement of damaged or missing traffic control devices.
 - d. Review and anticipate traffic control needs. Make available proper traffic control devices necessary for safe and efficient traffic movement.
 - e. Review work areas, equipment storage, and traffic-safety material handling and storage.

- f. Hold traffic safety meetings with superintendents, foremen, subcontractors, and others as appropriate before beginning construction, prior to implementing a new TCP, and as directed. Invite the Engineer to these meetings.
 - g. Supervise all traffic control workers, flaggers, and pilot car drivers.
 - h. Certify that all flaggers are certified as required by Subsection 643-3.04.4. Submit a copy of all flagger certifications to the Engineer.
4. Authority. The Worksite Traffic Supervisor shall have the Contractor's authority to stop work and implement immediate corrective action to unsafe traffic control, in locations where unsafe traffic control is present.

**STANDARD MODIFICATION
E 76 Replaces E 62 and E 56**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-2.01 MATERIALS and replace with the following:

643-2.01 MATERIALS. Provide traffic control devices meeting the following requirements:

1. Signs. Use signs, including sign supports, that conform to Section 615, the ATM, and ASDS.
 - a. Construction Signs: Regulatory, guide, or construction warning signs designated in the ASDS.
 - b. Permanent Construction Signs: As designated on the Plans or an approved TCP.
 - c. Special Construction Signs: All other signs are Special Construction Signs. Neatly mark the size of each sign on its back in 3-inch black numerals.
2. Portable Sign Supports. Use wind-resistant sign supports with no external ballasting. Use sign supports that can vertically support a 48 X 48 inch traffic control sign at the height above the adjacent roadway surface required by the ATM.
3. Barricades and Vertical Panels. Use barricades and vertical panel supports that conform to the ATM. Use Type III Barricades at least 8 feet long. Use reflective sheeting that meets AASHTO M 268 Type II or III.
4. Portable Concrete Barriers. Use portable concrete barriers that conform to the Plans. For each direction of traffic, equip each 10-foot section of barrier with at least two side-mounted retroreflective reflectors or a continuous 4-inch wide horizontal retroreflective stripe mounted 6 inches below the top of the barrier. Use yellow reflectors or stripe if you use barriers at centerline. Use white reflectors or stripe if you use barriers on the roadway shoulder. Use reflective sheeting that meets AASHTO M 268 Type III, IV or V.
5. Warning Lights. Use Type A (low intensity flashing), Type B (high intensity flashing) or Type C (steady burn) warning lights that conform to the ATM.
6. Drums. Use plastic drums that conform to the requirements of the ATM. Use reflective sheeting that meets AASHTO M 268 Type II or III.
7. Traffic Cones and Tubular Markers. Use reflectorized traffic cones and tubular markers that conform to the requirements of the ATM. Use traffic cones and tubular markers at least 28 inches high. Use reflective sheeting that meets AASHTO M 268 Type II or III.

8. Interim Pavement Markings. Apply markings according to Section 670 and the manufacturer's recommendations. Use either:
 - a. Paint meeting Subsection 708-2.03 with glass beads meeting Subsection 712-2.08,
 - b. Preformed Marking Tape (removable or non-removable) meeting Subsection 712-2.14, or
 - c. Temporary Raised Pavement Markers meeting Subsection 712-2.15 or 712-2.16, as appropriate.
9. High-Level Warning Devices. Use high-level warning devices that conform to the ATM.
10. Temporary Crash Cushions. Must have FHWA Acceptance letter for NCHRP 350 or MASH Test Level 3. Use reflective sheeting that meets AASHTO M 268 Type III, IV or V. Application of crash cushion must be appropriate for the intended use and be installed per manufacturer's recommendation. Temporary crash cushions used as rail or barrier end treatments must be redirective. Temporary crash cushions that are barrels or barricade filled with sand or water are considered nonredirective and may only be used when the forecasted temperature during their use is above 32 degrees Fahrenheit.
11. Sequential Arrow Panels. Use Type A (24 X 48 inch), Type B (30 X 60 inch) or Type C (48 X 96 inch) panels that conform to the ATM.
12. Portable Changeable Message Board Signs. Use truck or trailer mounted portable changeable message board signs with a self contained power supply for the sign and with the following features:
 - a. Message sign panel large enough to display 3 lines of 9 inch high characters
 - b. Eight character display per message line
 - c. Fully programmable message module
 - d. The capacity to create, preview, and display new messages and message sequences
 - e. A waterproof, lockable cover for the controller keyboard
 - f. An operator's manual, a service manual, and a wiring diagram
 - g. Quick release attachments on the display panel cover
 - h. Variable flash and sequence rates
 - i. Manual and automatic dimming capabilities on lamp bulb matrix models
 - j. Locate the bottom of the sign panel at least 7 feet above the pavement
 - k. Operate with a battery pack a minimum of 2 hours under full load
13. Plastic Safety Fence. Use 4 foot high construction orange fence manufactured by one of the following companies, or an approved equal:
 - a. "Safety Fence" by Services and Materials Company, Inc., 2200 South "J" Street, Elwood, Indiana, 46036. Phone (800) 428-8185.
 - b. "Flexible Safety Fencing" by Carsonite, 1301 Hot Springs Road, Carson City, Nevada, 89706. Phone (800) 648-7974.
 - c. "Warning Barrier Fence" by Plastic Safety Systems, Inc. P.O. Box 20140, Cleveland, Ohio, 44120. Phone (800) 662-6338.
14. Temporary Sidewalk Surfacing. Provide temporary sidewalk surfacing as required by an approved TCP and the following:
 - a. Use plywood at least 1/2 inch thick for areas continuously supported by subgrade. Use plywood at least 1 inch thick for areas that are not continuously supported.
 - b. Do not use unsupported 1-inch plywood longer than 30 inches.
 - c. Use plywood with regular surfaces. Do not overlap plywood joints higher than 1 inch.
 - d. Use a method that will withstand 25 mph wind velocities to hold temporary surfacing in place.
15. Temporary Guardrail. Use temporary guardrail that meets Section 606, except that posts may require placement under special conditions, such as in frozen ground.
16. Flagger Paddles. Use flagger paddles with 24 inches wide by 24 inches high sign panels, 8 inch Series C lettering (see ASDS for definition of Series C), and otherwise conform to the ATM. Use

reflective sheeting that meets AASHTO M 268 Type VIII or IX. Use background colors of fluorescent orange on one side and red on the other side.

17. Truck Mounted Attenuator, TMA. The TMA shall be mounted on a vehicle with a minimum weight of 15,000 pounds and a maximum weight per the manufacturer's recommendations. The TMA complies with NCHRP 350 Test Level 3 requirements.

**STANDARD MODIFICATION
E 77**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-2.02 CRASHWORTHINESS and replace with the following:

643-2.02 CRASHWORTHINESS. Submit documentation, by the method indicated, that the following devices comply with the requirements of National Cooperative Highway Research Program (NCHRP) Report 350 or the Manual for Assessing Safety Hardware (MASH) (Test Level 3) on the given schedule. Submit documentation of compliance to the Engineer before installing devices on the project.

Work Zone Traffic Control Device Compliance with NCHRP 350		
Category	Devices	Method of Documentation
1	Cones, candles, drums w/o attachments, delineators	Manufacturer's Certification for devices exceeding height and weight limits
2	Barricades, portable sign supports, drums w/lights, other devices weighing less than 100 pounds but not included in category 1	FHWA acceptance letter indicating acceptance at Test Level 3 (when not test level is specified in the letter; it is implied that the tests were run for Test Level 3),
3	Truck mounted attenuators, redirective and nondirective temporary crash cushions	FHWA acceptance letter indicating acceptance at Test Level 3 (when no test level is specified in the letter; it is implied that the tests were run for Test Level 3),
	Portable concrete barriers	FHWA acceptance letter specifying the Test Level required in the Plans or Specifications.

Category 1 devices that exceed the following weights and heights require certification that they meet the evaluation criteria of NCHRP Report 350 or MASH, Test Level 3. This certification may be a one-page affidavit signed by the vendor. Documentation supporting the certification (crash tests and/or engineering analysis) must be kept on file by the certifying organization. No certification is required for devices within the weight and height limitations.

<u>Device</u>	<u>Composition</u>	<u>Weight</u>	<u>Height</u>
Cones	Rubber	20 lb.	36 in.
	Plastic	20 lb.	48 in.
Candles	Rubber	13 lb.	36 in.
	Plastic	13 lb.	36 in.
Drums	Hi Density Plastic	77 lb.	36 in.
	Lo Density Plastic	77 lb.	36 in.
Delineators	Plastic or Fiberglass	N/A	48 in.

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-3.03 PUBLIC NOTICE and replace with the following:

643-3.03 PUBLIC NOTICE. Make sure the Worksite Traffic Supervisor gives a minimum of 3 days notice before major changes, delays, lane restrictions, or road closures to local officials and transportation organizations, including but not necessarily limited to:

- Alaska Carriers Association
- Alaska Trucking Association
- Alaska State Troopers
- Division of Measurement Standards
- Local Police Department
- Local Fire Department
- Local Government Traffic Engineer
- School and Transit Authorities
- Local Emergency Medical Services
- Local Media (newspapers, radio, television)
- Railroads (where applicable)
- U.S. Postal Service
- Major Tour Operators

Provide local traffic enforcement and maintenance agencies 24 hour notice before shutting down a traffic signal system. Provide notice as required by utility companies before repairing or replacing a utility.

Provide the Alaska State Troopers, local police and fire department with the radio frequencies used on the project and the 24-hour telephone numbers of the Worksite Traffic Supervisor and the Project Superintendent. Tell them to use these numbers to alert you when emergency vehicles must pass through the project. When notified of emergencies, use all equipment and make every necessary effort to expedite rapid passage.

Additional notices may be given through the Navigator System for selected projects. Check the special provisions for those requirements.

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-3.04 TRAFFIC CONTROL DEVICES and replace with the following:

643-3.04 TRAFFIC CONTROL DEVICES. Before starting construction, erect permanent and temporary traffic control devices required by the approved TCPs. Use traffic control devices only when they are needed. The Engineer will determine advisory speeds when necessary.

For lane closures on multilane roadways, use sequential arrow panels. During hours of darkness when required by the approved TCP use flashing warning lights to mark obstructions or hazards and steady-burn lights for channelization.

Use only one type of traffic control device in a continuous line of delineating devices, unless otherwise noted on an approved TCP. Use drums or Type II barricades for lane drop tapers.

During non-working hours and after completing a particular construction operation, remove all unnecessary traffic control devices. Store all unused traffic control devices in a designated storage area which does not present a nuisance or visual distraction to traffic. If sign panels are post mounted and cannot be readily removed, cover them entirely with either metal or plywood sheeting. Completely cover signal heads with bags.

Keep signs, drums, barricades, and other devices clean at all times.

Use only traffic control devices that meet the requirements of the "Acceptable" category in ATSSA (American Traffic Safety Services Association) "Quality Guidelines for Temporary Traffic Control Devices" and meet crashworthiness requirements per Section 643-2.02.

Immediately replace any devices provided under this Section that are lost, stolen, destroyed, inoperable or deemed unacceptable while used on the project. Stock repair parts for each Temporary Crash Cushion used on the project. Repair damaged crash cushions within 24 hours.

Maintain pre-existing roadside safety hardware at an equivalent or better level than existed prior to project implementation until the progress of construction necessitates removing the hardware. All existing hazards that are currently protected with roadside safety hardware or new hazards which result from project improvements shall be protected or delineated as required in the plans, specifications, and approved TCPs until permanent roadside safety hardware is installed. All temporary roadside safety hardware shall meet NCHRP 350 or MASH Test Level 3 unless otherwise noted.

All items paid under this Section remain your property. Remove them after completing the project.

1. Embankments. Install portable concrete barrier, plastic drums, barricades, tubular markers, plastic safety fence, and cones as specified on the Plans or TCPs to delineate open trenches, ditches, other excavations and hazardous areas when they exist along the roadway for more than one continuous work shift.
2. Adjacent Travel Lane Paving. Limit pavement-edge and lane-edge drop-offs as specified in Section 401. When paving is deeper than 2 inches and you cannot finish paving adjacent travel lanes or paved shoulders to the same elevation before the end of the paving shift, install one of the following, as appropriate: CW24-1 (Uneven Lanes), CW8-9A (Low Shoulder), CW14-3 (No Passing Zone), R4-1 (Do Not Pass), and R4-2 (Pass with Care). If the section is longer than 1/2 mile, place additional signs every 1500 feet.
3. Fixed Objects. Use flashing warning lights on all vehicles when they are working within 15 feet of the edge of traveled way. Use emergency flashers, flashing strobes or rotating beacons.

Locate private vehicles, idle construction equipment, construction material stockpiles and other items deemed by the Engineer to be fixed objects at least 30 feet from the edge of traveled way at all times. Do not park equipment in medians.

If you cannot meet the preceding restrictions because of land features or lack of right-of-way, park equipment as far away as practical but at least 15 feet from the edge of traveled way, as approved by the Engineer. Use drums or Type II barricades with flashing warning lights to delineate parked equipment. These traffic control devices are subsidiary.

4. Flagging. Furnish trained and competent flaggers and all necessary equipment, including lighting of the flagging position during nighttime operations, to control traffic through the traffic control zone. The Engineer will approve each flagging operation before it begins and direct adjustments as conditions change.

Flaggers must be certified as one of the following:

- a. Flagging Level I Certification by IMSA (International Municipal Signal Association)
- b. Flagger Certification by ATSSA (American Traffic Safety Services Association)
- c. Traffic Control Supervisor, ATSSA
- d. Work Zone Safety Specialist, IMSA
- e. ATSSA Flagging Instructor

Flaggers shall maintain current flagger certification. Flaggers must be able to show their flagger certification anytime they are on the project.

Flaggers must maintain their assigned posts at all times, unless another qualified flagger relieves them, or the approved traffic control plan terminates the flagging requirements. Remove, fully cover, or lay down flagger signs when no flagger is present. Keep the flaggers' area free of encumbrances, such as parked vehicles, so that flaggers can be seen easily.

Provide approved equipment for two-way radio communications between flaggers when flaggers are not in plain, unobstructed view of each other.

Obtain the Engineer's written approval before flagging signalized intersections. When you flag a signalized intersection, either turn off and cover the traffic signal or place it in the All-Red Flash mode. Coordinate changing traffic signal modes and turning off or turning on traffic signals with the agency responsible for signal maintenance and operation and the Engineer. Get their written approval in advance. Only uniformed police officers are permitted to direct traffic in an intersection with an operating traffic signal.

5. Pilot Cars. You may use pilot cars if the route through a traffic control zone which is particularly hazardous, involved, or frequently altered to preclude adequate signing, or if the Engineer deems one-way traffic necessary. Do not use pilot cars to avoid localized traffic control at several locations.

Organize construction operations so the total of all stoppages experienced by a vehicle traveling through a project does not exceed 20 minutes. However, this does not imply that you may allow 20 minutes in all cases. Coordinate multiple pilot-car operations within a project or adjoining projects to minimize inconvenience to the traveling public. You may use two or more pilot cars to provide two-way traffic through the traffic control zone to reduce the waiting period. The flagger or pilot car operator must record each pilot car's departure time in a bound field book furnished by the Engineer. Whenever practical, the flagger should tell the motorist the reason for and approximate length of the delay. Make every reasonable effort to yield right-of-way to the public and prevent excessive delay.

Use an automobile or pickup as the pilot car, with your company logo prominently displayed. Equip the pilot car with a two-way radio for contact with flaggers and other pilot cars. Mount a G20-4 sign (Pilot Car Follow Me) on the rear at least 5 feet above the driving surface. Identify the last vehicle in the column.

When pilot cars are authorized, use them before beginning work and continue until no longer necessary or until you have properly placed and checked functioning of all traffic control devices required for non-working hours.

6. Street Sweeping and Power Brooming. Keep free of loose material all paved portions of the roadway and haul routes open to the public, including sections of roadway off the project where your operations have deposited loose material. Use a power broom that can eject the material outside the traveled way. Use a street sweeper that can collect the material.

7. Watering. Furnish, haul, and place water for dust control and pavement flushing, as directed. Use water trucks that can provide a high-pressure water stream to flush the pavement and a light-water spray to control dust. If the flushing operations contaminate or fill adjacent catch basins, clean and restore them to their original condition. This requirement includes sections of roadway off the project where flushing is required. The Engineer will control water application.

If you take water from a lake, stream, or other natural water body, first obtain a water removal permit from the Alaska Department of Natural Resources. Comply with the Alaska Department of Fish and Game screening requirements for all water removal operations.

8. Portable Changeable Message Board Signs. Furnish Changeable Message Signs when approved on a TCP. Display only messages approved on the TCP. Follow application guidelines in the ATM.
9. Truck Mounted Attenuator, TMA. TMAs are mounted on the rear of work vehicles. Impact attenuators are defined by NCHRP 350 as a category III device. TMA shall be mounted on a vehicle with a minimum weight of 15,000 pounds and a maximum weight in accordance with the manufacturer's recommendations. TMA shall have an adjustable height so that it can be placed at the correct elevation during usage and to a safe height for transporting. Approach ends of TMAs shall have impact attenuator markings in accordance with the MUTCD. Do not use a damaged attenuator in the work. Replace at your expense, an attenuator damaged from an impact during work.

**STANDARD MODIFICATION
E 80**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Delete Subsection 643-3.06 TRAFFIC PRICE ADJUSTMENT and replace with the following:

643-3.06 TRAFFIC PRICE ADJUSTMENT. A Traffic Price Adjustment, under Item 643(23), will be assessed for unauthorized lane closures or reductions.

Authorized lane closures and/or lane reductions are those shown in the Contract, an approved TCP, or authorized in writing. Unauthorized lane reductions include unacceptable driving surfaces, such as severe bumps, ruts, washboarding, potholes, excessive dust or mud, and non-conforming or out of place traffic control devices. They shall include when temporary crash cushions required to protect motorists from incomplete guardrail installations, as described in Section 606-5.01 are not installed. The Engineer will make the sole determination as to whether the roadway is acceptable for full unimpeded use by the public.

Adjustment Rates are listed in Table 643-1. These rates are liquidated damages which represent highway user costs, based on Average Daily Traffic (ADT). The Engineer will use the rate shown for the current ADT for this project, as published in the Regional Traffic Volume Report prepared by the Department's Planning Section.

**TABLE 643-1
ADJUSTMENT RATES**

Published ADT	Dollars/Minute of Delay/Lane
Less than 1,000	\$2
1,000-4,999	\$10
5,000-9,999	\$30
10,000+	\$40

**STANDARD MODIFICATION
E 81**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Add new item number 16 to Subsection 643-4.01 METHOD OF MEASUREMENT:

16. Steel F Shaped Barrier. Shall be measured and paid for by the linear foot.

**STANDARD MODIFICATION
E 82**

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

Add new item number 16 to Subsection 643-5.01 BASIS OF PAYMENT and new Pay Item and Pay Unit:

643-5.01 BASIS OF PAYMENT.

16. Steel F Shaped Barrier. The contract price includes all resources required to provide, install, maintain, move and remove each barrier

643(29) Steel F Shaped Barrier	Linear Foot
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STANDARD MODIFICATION
E 83 Replaces E 64

10/04/10

SECTION 710

FENCE AND GUARDRAIL

Delete Subsection 710-2.04 METAL BEAM RAIL and replace with the following:

710-2.04 METAL BEAM RAIL. Meet AASHTO M 180-00, Class A, Type II. Galvanize the rail per ASTM A653 after factory roll formed and punched.

STANDARD MODIFICATION
E 84

10/04/10

SECTION 710

FENCE AND GUARDRAIL

Delete Subsection 710-2.06 GUARDRAIL POSTS AND BLOCKS and replace with the following:

710-2.06 GUARDRAIL POSTS AND BLOCKS. Furnish posts and blocks, as specified, meeting the following requirements.

1. Wood Posts and Blocks. Use timber with a stress grade of 1200 psi or more. Testing must meet the standards of the West Coast Lumber Inspection Bureau. Use timber for posts and blocks that is either rough sawn (unplaned) or S4S with nominal dimensions indicated. Allowable size tolerance of rough sawn blocks in the direction of the bolt holes is $\pm 1/4$ inch. Only one combination of post and block finish may be used for any one continuous length of guardrail. Treat all timber to meet Section 714.
2. Steel Posts and Blocks. Meet the section and length specified or shown on the Plans. Use copper bearing steel when so specified. Use steel meeting the requirements of ASTM A 36 and galvanized per ASTM A 123/A.
3. Synthetic Blocks. Products made from alternate materials may be used if accepted by the FHWA for use on the National Highway System.

STANDARD MODIFICATION
E 85 Replaces E 64

10/04/10

SECTION 710

FENCE AND GUARDRAIL

Delete Subsection 710-2.11 GUARDRAIL TERMINALS and replace with the following:

710-2.11 GUARDRAIL TERMINALS. Meet coating requirements of AASHTO M 180, Class A, Type II. Galvanize after fabrication. Fabrication includes forming, cutting, shearing, punching, drilling, bending, welding and riveting. Provide one of the following terminal types, as shown on the plans, for single-rail W-beam guardrail. Provide terminals that pass NCHRP 350 or MASH Test Level 3 and meet the following requirements:

- 1) Controlled Release Terminal. Meet the requirements of Standard Drawing G-25.
- 2) Parallel Terminal.
 - a) Requirements:
 - (1) Crashworthiness: Provide terminals that pass NCHRP 350 or MASH Test Level 3.
 - (2) Length: 50 feet.
 - (3) End Offset: 0 to 2 feet (25:1 or flatter straight taper) Offset end as shown on the plans.
 - (4) Posts: Use posts that are:
 - (i) Steel post with hinge or
 - (ii) Yielding or breakaway steel post in steel tube
 - b) Acceptable models include the following or approved equivalent:
 - (1) Sequential Kinking Terminal (SKT) manufactured by Road Systems, Inc., 3616 Old Howard County Airport, Big Spring, Texas 79720, Telephone 432-263-2435.
 - (2) Extruder Terminal (ET-Plus) manufactured by Trinity Highway Products, L.L.C., 950 West 400 South, Centerville, Utah 84014, Telephone 801-292-4461.
 - c) Install AASHTO M 268, Type III, IV, or V retro-reflective sheeting (2.0 square feet, minimum) on the end section of parallel terminals consisting of yellow and black bars sloping 45 degrees downward toward the traffic side of the terminal.
- 3) Buried in Backslope Terminal: Meet the requirements of Standard Drawing G-15.

**STANDARD MODIFICATION
E 86**

10/04/10

SECTION 730

SIGN MATERIALS

Delete Subsection 730-2.01 SHEET ALUMINUM and replace with the following:

730-2.01 SHEET ALUMINUM. Use alloy 6061-T6, 5052-H36, 5052-H38, or recycled aluminum meeting alloy 3105, as specified in ASTM B 209. Meet the thickness of aluminum sheet designated on the Plans. Verify alloy and temper designations by mill certification.

Before January 1, 2011, treat the aluminum base metal sheets with chromate conversion coating for aluminum to meet ASTM B 449, Class 2.

After January 1, 2011, treat the aluminum base metal sheets with a rinsed non-hexavalent chromium conversion coating for aluminum and aluminum alloys that meets ASTM B 921, class one. Handle the cleaned and coated base metal only by a mechanical device or by operators wearing clean cotton or rubber gloves. After cleaning and coating operations, protect the panels at all times from contact or exposure to greases, oils, dust or other contaminants.

Make each sign panel a continuous sheet for all lengths 72 inches or less in the horizontal direction. Use no more than one vertical splice for signs up to 144 inches in length and 48 inches or less in height.

Meet the panel dimensions specified with a tolerance of 1/16 inch. Furnish metal panels that are cut to size and shape and free of buckles, warp, dents, cockles, burrs and any other defects resulting from fabrication. Complete all possible fabrication, including shearing, cutting and punching of holes prior to the base metal preparation.

SECTION 740

SIGNALS AND LIGHTING MATERIALS

Delete 740-2.14 VEHICULAR SIGNAL HEADS and replace with the following:

740-2.14 VEHICULAR SIGNAL HEADS. Provide Light Emitting Diode, (LED) Signal Heads that conform to the following publications:

- Circular Indications: *Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement, 6/27/05* (ITE Publication ST-052). This is hereafter referred to as "VTCSH-Circular-05".
- Arrow Indications: *Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement, 7/1/07* (ITE Publication ST-054). This is hereafter referred to as "VTCSH-Arrow-07".

"The applicable ITE Specification", as used in this specification, means VTCSH-Circular-05 for circular LED indications and VTCSH-Arrow-07 for arrow LED indications.

1. Signal Heads.

Use signal heads that: are the adjustable, vertical type with the number and type of lights specified; provide a light indication in one direction only; are adjustable through 360 degrees about a vertical axis; and are mounted at the location and in the manner shown on the Plans. Ensure that all vehicular signal heads at any one intersection, except for programmed visibility signal heads, are of the same make and type.

Provide a removable aluminum tunnel visor with an open slot at the bottom for each optical unit.

Furnish housing, backplates and visors factory finished with a single coat of environmentally safe, ultraviolet-resistant, polyester powder coating that is applied electrostatically at 90kV and baked for 20 minutes at 400 degrees Fahrenheit per ASTM D-3359, ASTM D-3363 and ASTM D-522. Coating to be a Dull Black finish meeting Federal Standard 595b-37038.

a. LED Optical Units. Use LED optical units and lenses meeting the requirement of the applicable ITE specification for all indications. Also meet the following requirements:

(1) Gaskets. Use one-piece EPDM (ethylene propylene rubber) gaskets to seal LED modules.

(2) Markings. Provide LED Signal module with manufacturer applied markings listed in Section 3.6, Module Identification, of the applicable ITE Specification. For circular indications marking shall include: "Manufactured in conformance with the ITE Vehicle Traffic Control Signal Heads: LED Vehicle Circular Traffic Signal Supplement (June 27, 2005)." For arrow indications marking shall include: "Manufactured in conformance with the ITE Vehicle Traffic Control Signal Heads: LED Vehicle Arrow Traffic Signal Supplement (July 1, 2007)."

(3) Compatibility. Use LED signal modules that are operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors).

(4) Testing Requirements.

(a) All LEDs Functional. LED modules with any non-functioning individual LEDs at the final inspection will be rejected.

(b) Burn-in. Manufacturer shall energize each new LED module for a minimum of 24 hours at operating voltage before shipment to ensure electronic component reliability.

(c) Production Testing and Inspection. Submit manufacturer's certification that all tests in Section 6.3 of the applicable ITE Specification have been successfully completed on each LED module to be used on the project.

Show results of each individual test on the certification.

(d) Design Qualification and Quality Assurance Testing by an Independent Lab. Have ETL/Intertek or other approved OSHA "Nationally Recognized Testing Laboratory" do the following:

- a. Perform an initial assessment of the manufacturer's factory, engineering and manufacturing systems, and procedures to confirm compliance with ISO 9000.
- b. Perform initial Design Qualification Testing as specified in Section 6.4 of the applicable ITE specification.
- c. Every 6 months, conduct a factory inspection and perform Quality Assurance Tests on two samples of each certified LED module in accordance with the following sections of the applicable ITE specification:

6.4.2 Conditioning

6.4.4.1 - 6.4.4.4 Luminous Intensity

6.4.4.6 Chromaticity

6.4.6.1 Current Consumption

6.4.6.6 Power Factor

6.4.6.7 Total Harmonic Distortion

- d. Provide a certification label on each certified LED traffic signal module verifying the manufacturer's factory and modules passed the tests listed in a. through c. above.

(e) Warranty. Provide written warranty by the signal module manufacturer that covers defects in materials,

workmanship, and compliance with the applicable ITE specification for a period of 60 months after the manufacture date. No new LED module will be accepted if its manufacture date is more than 12 months before the date of installation. Begin warranty period for modules that replace failed modules on the date of installation.

The warranty shall require the manufacturer to replace LED modules that fail within the warranty period with new LED modules at no cost to the Department, and to cover the cost of shipping failed modules. The warranty does not include the cost of removing failed modules or

reinstalling new modules. Warranty shall require the manufacturer to send the Department prepaid authorization to return the failed module and provide a toll free telephone number for notifying them when it becomes necessary to return failed LED modules.

The warranty shall require the manufacturer to deliver replacement LED modules within 5 working days of receiving failed modules to the location specified by the Department.

2. Housing.

- a. Use die cast aluminum, meeting ASTM B 85, for all parts of the housing, including the doors and end plates. Ensure all parts are clean, smooth, and free from flaws, cracks, blow holes, or other imperfections.
- b. Use a one-piece housing with integral top, bottom, sides, and with square doors, for each signal section.
- c. Use stainless steel for all exposed bolts, screws, hinges, pins, and door-locking devices. Use stainless steel or approved non-ferrous, corrosion-resistant material for all interior screws and fittings .
- d. Provide an opening in the top and bottom of each housing to accommodate standard 1-1/2 inch pipe fittings and brackets.
- e. Provide the top and bottom openings of each housing with integral serrated bosses that will provide positive positioning of the signal head in 5-degree increments to eliminate undesirable rotation or misalignment of the signal head as well as between sections. Provide a total of 72 teeth in the serrated boss. Ensure teeth are clean and sharp to provide positive positioning with the grooves of the mating section or framework.
- f. Fasten individual signal sections together with a cadmium-plated tri-stud connector, lockwashers, and nuts with access holes for the passage of electrical conductors from one section to another.
- g. Provide 2 integral hinge lugs on the left side of each signal housing for mounting the door.
- h. Provide 2 latches with stainless steel wing nut assemblies on the right side of each signal housing to engage the door latches.
- i. Provide each signal housing door opening with a one-piece EPDM gasket around the periphery to provide a weather tight seal in a NEMA Type 3R enclosure.
- j. Provide a round opening designed to accommodate any standard traffic signal lens in each signal housing door.

3. Backplates. Furnish and attach backplates to all vehicle signal heads except post-mounted flashers.

Construct backplates of 0.1-inch minimum thickness aluminum alloy sheet meeting ASTM B 209, alloy 3003-H14. Use 8 inch wide backplate extensions for 12-inch displays and 5-1/2 inch wide backplate extensions for 8-inch displays. When there are 2 or more backplate sections, fasten them together with aluminum rivets or bolts and peen after assembly to prevent loosening.

Use 5 or 5-1/2 inch wide backplate extensions (borders) for all post mounted and pole side mounted vehicle signal heads. Provide nominal 5-inch wide backplate extensions on all 5 section overhead cluster mounted signals. Provide backplates with nominal borders of 8 inches for the 8-inch sections and 5 inches for 12-inch sections on all combination 8-inch/12-inch vertical mounted signal heads.

Factory finish the back and front faces of backplates with a single coat of environmentally safe, ultraviolet-resistant, polyester powder coating that is applied electrostatically at 90kV and baked for 20 minutes at 400 degrees Fahrenheit per ASTM D-3359, ASTM D-3363 and ASTM D-522. Coating to be a Dull Black finish meeting Federal Standard 595b-37038.

SECTION 740
SIGNALS AND LIGHTING MATERIALS

Delete 740-2.15 PEDESTRIAN SIGNALS and replace with the following:

740-2.15 PEDESTRIAN SIGNALS. Use LED Pedestrian Countdown modules that use the international "HAND/WALKING PERSON" symbols. Except for the countdown indication and as otherwise noted in this specification, use modules that conform to "Pedestrian Traffic Control Signal Indications - Part 2: Light Emitting Diode (LED) Pedestrian Traffic Signal Modules" Institute of Transportation Engineers, 3/19/2004, (hereafter referred to in this document as "PTCSI-04") and to the applicable Sections of the current Alaska Traffic Manual.

1. Pedestrian Signal Modules: Provide Portland Orange "HAND" and "COUNTDOWN DIGITS" and lunar white "WALKING PERSON." Locate COUNTDOWN DIGITS adjacent to the associated UPRAISED HAND. Make "HAND" and "WALKING PERSON" symbols a minimum of 11 inches high and 7 inches wide and COUNTDOWN DIGITS a minimum of 9 inches high and 7 inches wide. Provide incandescent looking WALKING PERSON, HAND and COUNTDOWN DIGITS. Ensure the WALKING PERSON, UPRAISED HAND and COUNTDOWN DIGITS are not readily visible when not illuminated. Provide "AlInGaP" Portland Orange LEDs or equivalent, rated for 100,000 hours or more at 77°F and 20 mA. Provide "InGaN" White LEDs.

Make all exposed components of modules suitable for prolonged exposure to the environment, without appreciable degradation that would interfere with function or appearance.

Provide modules with an installed gasket to seal the junction with the signal housing.

- a. Lens. Use modules with internal masks to prevent the icons and digits from being visible when not in operation. No external silk-screen is permitted. Provide a smooth or textured lens of transparent polycarbonate material, frosted to prevent sun phantom. Use lenses that will not crack, craze or yellow due to solar UV exposure typical for a south-facing Arizona desert installation, after a minimum of 60 months in service.
- b. Retrofit. When a module will replace an existing module in an existing signal housing, furnish signal modules designed as retrofit replacements for existing neon type pedestrian signals (ICC 4090 and/or 4094). Provide modules that do not require special tools for installation. Provide modules that fit securely into existing pedestrian signal housings without any modification to the housing, connect directly to existing electrical wiring, and form a weather-tight seal. Provide modules and components constructed so each retrofit of existing pedestrian signals only requires the removal of the existing neon message module, gasket, and power supply and installation of the new LED pedestrian countdown module. Provide all necessary components to complete conversion including a one piece gasket.
- c. Photometric Requirements. Meet the following requirements:
 - Minimum Luminance. Maintain the following minimum luminance values for at least 60 months, under the operating conditions defined in Sections 3.3.1 and 5.2.1 of PTCSI-04 (when measured normal to the plane of the icon surface):

- WALKING PERSON 2,200 cd/m²,
 - UPRAISED HAND 1,400 cd/m²,
 - DIGITS 1,400 cd/m² (when “88” is displayed).
- Maximum Luminance. Provide modules for which the actual luminance of a module does not exceed three times the minimum maintained luminance, as defined in Section 4.1.1 of PTCSI-04, when operated within the temperature range -40°F to +165°F
 - Uniformity: Provide modules for which the uniformity of the signal output across the emitting section of the module lens (i.e. icons or digits) does not exceed a ratio of 5 to 1 between the maximum and minimum luminance values as measured in 0.5 in. diameter spots.
 - Markings. Permanently mark the back of each LED signal module with:
 - Manufacturer’s name, trademark, and other necessary identification
 - Warranty information
 - Rated voltage and power consumption in volt-amperes
 - An up arrow or the word “UP” or “TOP” for orientation within a signal housing.
- d. Electrical. Provide LED pedestrian countdown signal modules that:
- (1) are operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors).
 - (2) have a maximum of 4 each secured, color coded, 36 inches long, 600V, 18 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +221°F for electrical connection.
 - (3) operate from a 60 ±3 Hz AC line over a voltage range of 80 VAC to 135 VAC. Test voltage for all photometric performance measurements shall be 120 ±3 volts rms.
 - (4) use LED circuitry that prevents perceptible flicker over the voltage range specified above.
 - (5) include voltage surge protection against high-repetition noise transients and low-repetition noise transients as stated in Section 2.1.8, NEMA Standard TS-2, 2003. Module must meet the following test requirements: Section 8.2 IEC 1000-4-5 & Section 6.1.2 ANSI/IEEE C62.41.2-2002, 3kV, 2 ohm and Section 8.0 IEC 1000-4-12 & Section 6.1.1 ANSI/IEEE C62.41.2-2002, 6kV, 30 ohm.
 - (6) have a current draw sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units. When the module is switched from the On state to the Off state the terminal voltage shall decay to a value less than 10VAC RMS in less than 100 milliseconds when driven by a maximum allowed load switch leakage current of 10 milliamps peak (7.1 milliamps AC).
 - (7) have a maximum power consumption at 77°F of: Hand 11.0 watts, Walking Person 8.0 watts, Digits 10.0 watts (when display shows “88”)
 - (8) have waterproof strain relief and anti-capillary wires, or have electrical wires that do not penetrate the LED module housing. This is intended to prevent water seepage between the back cover and the electrical wires, or between the copper and insulation of the wires (Connection may be made by use of an over molded connector).

- (9) will default to the hand symbol for abnormal conditions when nominal voltage is applied to the unit across the two phase wires (rather than being applied to the phase wire and the neutral wire).
- (10) have three separate power supplies: one each for the Walking Person, the Upraised Hand and the countdown digits. Use separate circuitry to power the LED Walking Person icon and the LED Upraised Hand icon, in order to virtually eliminate the risk of displaying the wrong icon.

e. Testing Requirements.

- (1) All LEDs Functional. LED modules with any non-functioning individual LEDs at the final inspection will be rejected.
- (2) Burn-in. Manufacturer shall energize each new LED module for a minimum of 24 hours at operating voltage before shipment to ensure electronic component reliability.
- (3) Production Testing and Inspection by Manufacturer. Submit manufacturer's certification that all tests in Section 6.3 of PTCSI-04 have been successfully completed on each LED module to be used on the project. Show result of each individual test on the certification.
- (4) Design Qualification and Quality Assurance Testing by an Independent Lab. Have ETL/Intertek or other approved OSHA "Nationally Recognized Testing Laboratory" do the following:
 - a. Perform an initial assessment of the manufacturer's factory, engineering and manufacturing systems, and procedures to confirm compliance with ISO 9000.
 - b. Perform initial Design Qualification Testing as specified in Section 6.4 of the PTCSI-04.
 - c. Every 6 months, conduct a factory inspection and perform Quality Assurance Tests on two samples of each certified LED module in accordance with the following sections of PTCSI-04:

6.4.2 Conditioning

6.4.4.1 - 6.4.4.4 Luminous Intensity

6.4.4.6 Chromaticity

6.4.6.1 Current Consumption

6.4.6.6 Power Factor

6.4.6.7 Total Harmonic Distortion

- d. Provide a certification label on each certified LED traffic signal module verifying the manufacturer's factory and modules passed the tests listed in a. through c. above.
- f. Warranty. Provide a manufacturer's written warranty that covers defects in materials, workmanship, and compliance with PTCSI-04 for a period of 60 months after the manufacture date. No new LED module will be accepted on a project if its manufacture date is more than 12 months before the date of installation. Begin warranty period for modules that replace failed modules on the date of installation.

The warranty shall require the manufacturer to replace LED modules that fail within the warranty period with new LED modules at no cost to the Department, and to cover the cost of shipping failed modules. The warranty does not include the cost of removing failed modules or reinstalling new modules. Warranty shall require the manufacturer to send the Department prepaid authorization to return the failed module and provide a toll free telephone number for notifying them when it becomes necessary to return failed LED modules.

The warranty shall require the manufacturer to deliver replacement LED modules within 5 working days of receiving failed modules to the location specified by the Department.

g. Countdown Module Functions.

- (1) General. Begin the countdown at the beginning of the FLASHING HAND indication. End the countdown at "0" at the end of the FLASHING HAND indication. Make the countdown display dark from the end of one FLASHING HAND indication until the beginning of the next. Display steady, not flashing, countdown digits. Do not provide user accessible switches, controls, or options that would allow modification of cycle time, icons, digits or that would allow the countdown to operate while the WALKING PERSON or STEADY HAND is displayed.
- (2) Learning Cycle. At power on, make the countdown display dark for one learning cycle in which it will determine the duration of the FLASHING HAND indication.
- (3) Normal Operation. Display the countdown/FLASHING HAND for the duration measured in the learning cycle for every cycle until the module measures a different FLASHING HAND duration.
- (4) Countdown Duration Modification. When a different duration is measured, make the countdown dark for the next cycle, and enter a Learning Cycle as previously described. Resume Normal Operation with the new FLASHING HAND duration if the measured FLASHING HAND duration for the next cycle is the same as for the first cycle when a change was detected. Continue Learning Cycles, if the duration is different, until the measured FLASHING HAND duration is the same for two cycles. Resume Normal Operation with the new duration when that happens.
- (5) Countdown Truncation. Make the digits dark if the controller output displays a STEADY HAND or if both the HAND and WALKING PERSON go dark, regardless of whether the countdown to zero has been completed.
- (6) Preemption. Handle preemption events as described under Countdown Duration Modification and, if necessary, Countdown Truncation.
- (7) Recycling. Allow for consecutive cycles without display of the STEADY HAND .
- (8) Power Outage. Maintain an uninterrupted countdown during short power failures (<1.5 seconds). Make the digits dark after a loss of power of more than 1.5 seconds and enter a Learning Cycle when the power is restored.

2. Housing:

- a. Provide signal housings that have maximum overall dimensions of 18-1/2 inches wide, 18-3/4 inches high, and 9 inches deep, including Z-crate-type visor and hinges.
- b. Provide a dustproof and weatherproof housing that allows easy access to and replacement of all components.
- c. Provide a one-piece, corrosion-resistant, aluminum-alloy die-cast case complete with integrally cast top, bottom, sides and back. Provide 4 integrally cast hinge lug pairs, 2 at the top and 2 at the bottom of each case, for operation of a swing-down door.
- d. Provide 1 of the following 3 versions of the case, according to project specifications:

- Clamshell mount, with hardware, for “pole left of message” installation. These need not include upper and lower openings, but when provided the openings must be plugged to be weather-tight.
 - Clamshell mount, with hardware, for “pole right of message” installation. These need not include upper and lower openings, but when provided the openings must be plugged to be weather-tight.
 - Make suitable for either post top or bracket mounting with upper and lower openings to accommodate standard 1-1/2 inch pipe brackets. Plug unused openings to be weathertight. Integrally cast a shurlock boss into the bottom opening of the signal case. Make the dimensions of the shurlock boss as follows: outside diameter, 2-5/8 inch; inside diameter, 1-31/32 inch; number of radial teeth, 72; and depth of teeth, 5/64 inch. Use clean and sharp teeth that provide full engagement to eliminate rotation or misalignment of the signal.
- e. Make the door frame a one-piece, corrosion-resistant, aluminum-alloy die-casting, complete with 2 hinge lugs cast at the bottom and 2 latch slots cast at the top of each door. Attach the door to the case by means of two Type 304 stainless steel spring pins. Attach 2 stainless steel hinged bolts with captive stainless steel wing nuts and washers to the case with the use of stainless steel spring pins. Provide a door that will latch and unlatch without the use of tools.
3. Conductors: Meet IMSA specifications 20-1 with No. 14 AWG or larger.
 4. Load Switches: Place all load switches for operation of pedestrian signals in the controller cabinet.
 5. Fasteners. Use machine screws, studs, and washers that are stainless steel.
 6. Gaskets: Use gaskets that conform to ASTM D 1056, Grade 2C2.
 7. Terminal Blocks: Mount a terminal block in the unit for field wiring, as specified in Subsection 740-2.14.
 8. Finish. Factory finish the outside of pedestrian signal head housings and visors and signal visor interiors with a single coat of environmentally safe, ultraviolet-resistant, polyester powder coating that is applied electrostatically at 90kV and baked for 20 minutes at 400 degrees Fahrenheit per ASTM D-3359, ASTM D-3363 and ASTM D-522. Coating to be a Dull Black finish meeting Federal Standard 595b-37038.

STANDARD MODIFICATION
E 90 Replaces E 56

10/04/10

SECTION 643

TRAFFIC MAINTENANCE

643-3.01 GENERAL CONSTRUCTION REQUIREMENTS. *Add the following:*

Immediately notify the Engineer of any traffic related accident that occurs within the project limits as soon as you, an employee, or a subcontractor becomes aware of the accident.

Add the following new Subsection:

643-3.11 HIGH VISIBILITY GARMENTS. Ensure all workers within project limits wear outer garments that are highly visible and comply with the following requirements:

1. Standards.

Use high visibility garments conforming to the requirements of ANSI/ISEA 107-2004, Class 2 for tops or Class E for bottoms, and Level 2 retroreflective material.

2. Labeling.
Use garments labeled in conformance with Section 11.2 of ANSI/ISEA 107-2004; except you may use previously purchased garments labeled in conformance with ANSI/ISEA 107-1999 until 1/1/08.
3. Tops.
Wear high visibility vests, jackets, or coverall tops at all times.
4. Bottoms.
Wear high visibility pants or coverall bottoms during nighttime work (sunset to sunrise). Worksite traffic supervisors, employees assigned to traffic control duties, and flaggers wear high visibility pants or coverall bottom at all times.
5. Outer Raingear.
Wear raingear tops and bottoms conforming to the requirements of this Subsection 643-3.11.
6. Exceptions.
When workers are inside an enclosed compartment of a vehicle, they are not required to wear high visibility garments.
7. Condition.
Furnish and maintain all vests, jackets, coveralls, rain gear, hard hats, and other apparel in a neat, clean, and presentable condition. Maintain retroreflective material to Level 2 standards.

Payment for high visibility garments for workers is subsidiary to other traffic contract items.