

compaction shall be in accordance with the applicable provisions of Subsection 150.64 of these Specifications.

### COMPENSATION

#### 840.80 Method of Measurement.

The foundation, excavation, backfilling and compaction for foundations and the structural supports shall be considered as one lump sum unit.

Breakaway P-5 Post Assembly, single or double, complete in place, shall be considered as one unit.

#### 840.81 Basis of Payment.

Compensation for the work done under Items 840 through 846 shall be by the lump sum bid price and compensation for Items 847 and 848 shall be at the contract bid price each for Sign Support (not Guide) and Route Marker including Breakaway Post Assembly.

The contract price shall be full compensation for designing, furnishing and erecting the supports, including construction of the concrete bases, steel reinforcement and anchor bolts; furnishing and installing post assembly and all excavation including Class B Rock, gravel backfill and compensation.

#### 840.82 Payment Items.

840.101 to 840.199	Supports for Overhead Guide Sign (OD-1 thru OD-99) Steel	Lump Sum
841.101 to 841.199	Supports for Guide Sign (D6-1 through D6-99) Steel	Lump Sum
842.101 to 842.199	Supports for Guide Sign (GF-1 through GF-99) Steel	Lump Sum
843.101 to 843.199	Supports for Guide Sign (D10-1 through D10-99) Steel	Lump Sum
844.101 to 844.199	Supports for Guide Sign (G1 through G99) Steel	Lump Sum
845.1	Supports for Guide Sign (E5-1) Steel	Lump Sum
846.1	Supports for Guide Sign (E5-1A) (I) Steel	Lump Sum
847.1	Sign Support (Not Guide) and Route Marker w/1 Breakaway Post Assembly - Steel	Each
848.1	Sign Support (Not Guide) and Route Marker w/2 Breakaway Post Assembly - Steel	Each

## SECTION 850

### TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

#### DESCRIPTION

#### 850.20 General.

Work under this Section consists of providing, installing and maintaining various traffic control devices for the protection of the traveling public and working personnel during construction and maintenance operations, and includes channelizing devices, signs, barricades, markings, lighting devices, and hand signal devices. The design, application, and installation of all devices shall conform to the "Manual on Uniform Traffic Control Devices" latest edition, Part VI, hereinafter referred to as MUTCD, and/or as directed.

The Contractor shall be responsible for the installation of adequate safety precautions for the protection of the traveling public and his/her own personnel.

All materials provided by the Contractor under the items of this section shall remain the property of the Contractor upon completion of the project.

All work under this Section shall conform to the approved Traffic Control Plan.

**850.21 Safety Controls for Construction Operations.**

Safety Controls for Construction Operations consists of furnishing, positioning, repositioning, maintaining and removing, as needed and/or as directed: traffic cones, high level warning devices, delineators, floodlights, Type I and II barricades, portable flashing and steady burning lights, hand signal devices, lanterns, and pilot cars. This item does not include those specific devices listed below.

**850.22 Safety Signing for Construction Operations.**

Safety Signing for Construction Operations consists of furnishing, positioning, repositioning, maintaining and removing, as needed and/or as directed: regulatory, warning, and guide signs together with their supports.

Signs over 5 square meters will require approval of design calculations and shop drawings of the breakaway support system where the signs will be unprotected.

**850.24 Temporary Pavement Markings and Raised Pavement Markers.**

Temporary Pavement Markings and Raised Pavement Markers consist of furnishing, applying, maintaining and removing temporary white and/or yellow reflectorized and/or black non reflectorized pavement markings during construction and maintenance operations.

For the purpose of this specification, temporary markings shall mean an effective marking for a period of 90 days.

**850.25 Hazard Identification Beacon (Flashing Warning Beacon).**

Hazard Identification Beacon (Flashing Warning Beacon) consists of furnishing and installing complete in-place and in operation, a flashing beacon at a location designated by the Engineer.

**850.26 Special Lighting Unit (Arrow Display).**

Special Lighting Unit (Arrow Display) consists of providing, operating, and maintaining a portable truck mounted or trailer mounted flashing arrow unit on the project at designated locations.

**850.27 Reflectorized Drums.**

Reflectorized Drums with or without warning lights shall consist of furnishing, positioning, repositioning, maintaining, and removing reflectorized plastic drums and necessary ballast, as needed and/or directed.

**850.28 Pavement Marking Removal.**

Pavement Marking Removal consists of obliterating existing pavement markings as required and as directed.

**850.29 Temporary Precast Concrete Median Barrier.**

Temporary Precast Concrete Median Barrier consists of furnishing, maintaining and removing temporary precast concrete median barriers including delineation when positive barriers are needed for traffic control in construction zones.

**850.30 Temporary Precast Concrete Median Barrier Removed and Reset.**

Temporary Precast Concrete Median Barrier Removed and Reset consists of removing temporary precast concrete barrier units from alignments established along the roadway to new alignments as required by the construction and stage construction operations for the control of traffic or protection of workers.

**850.31 Portable Breakaway Barricades Type III.**

Portable Breakaway Barricades Type III consists of furnishing, installing, moving, maintaining and removing Portable Breakaway Barricades, Type III, where indicated on the plans and as directed.

**850.32 Temporary Anti-Glare Screen (Paddle Type).**

Temporary Anti-Glare Screen (Paddle Type) consists of furnishing, installing and maintaining new approved anti-glare screen panels where indicated on the plans or as directed.

**850.33 Temporary Anti-Glare Screen Removed and Reset.**

This work consists of removing and resetting anti-glare screen where indicated on plans or as directed.

**850.34 Temporary Anti-Glare Screen Removed and Stacked.**

This work consists of removing and stacking anti-glare screen, off the project, as directed.

**850.35 Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset.**

This item shall consist of furnishing and installing temporary impact attenuators in close conformance with the specifications of the manufacturer, and in close conformance with the locations, lines, and grades shown on the plans and/or designated in the Special Provisions. This work also includes maintaining, removing and reinstalling temporary impact attenuators where indicated on the plans, or as indicated by the Engineer.

**850.36 Pavement Marking Masking (Removable Tape).**

This work consists of the masking of existing pavement markings by overlaying with black non-reflective pavement masking tape as required and as directed.

**850.37 Portable Changeable Message Sign.**

This work shall consist of furnishing, maintaining, transporting and using a Portable Changeable Message Sign. All messages displayed shall be approved by the Engineer.

**MATERIALS**

**850.40 General.**

Materials required under this Section need not be new but must be in first class condition and acceptable to the Engineer. The condition of the work zone traffic control devices shall meet the quality standards set forth in the *Quality Standards for Work Zone Traffic Control Devices* compiled by the American Traffic Safety Services Association (ATSSA). Any materials that in the judgment of the Engineer are unsatisfactory in appearance and/or performance shall be removed and immediately replaced by acceptable units.

**850.42 Safety Signing for Construction Operations.**

Materials shall conform to Sections 828 and 840 except the plywood material shall conform to the following: Plywood sign panels and independent Route Markers shall be fabricated from 5 ply 16 millimeter thick Medium Density Overlaid (MDO) Exterior Type, A-B both sides surface in natural color and the whole conforming with the requirements and test for the above as set forth in U.S. Product Standard PS1-74 for Construction and Industrial Plywood. All plywood shall bear the grade trademark of an approved testing agency. The entire sign face shall be reflectorized with reflective sheeting conforming to M9.30.0, Type III, or Type IV, and shall be orange in color.

Background sheeting for the first set of signs on each approach to the work zone shall be of a fluorescent orange color. The maximum spectral radiance factor, in accordance with Section 5.1 of ASTM E 991, for the fluorescence shall be as follows:

New	110% minimum
Weathered	60% minimum

**850.44 Temporary Pavement Markings.**

Paints, tapes, and glass beads used for temporary pavement markings shall conform to Subsections M.7.01.23, M7.01.24, and tapes. Other materials which will provide satisfactory durability and reflectivity may be used with prior approval of the Engineer.

The reflectivity of Temporary Pavement Markings material shall be equal to or better than the Department minimum requirements for a period of 90 days.

The minimum reflectivity quality shall be determined by comparing the applied marking to the minimum reflectivity standard which is located at the Massachusetts Highway Department Research and Materials Laboratory in South Boston. The comparison shall be made with low beam headlights at a distance of 36.6 meters. Final determination as to pavement marking quality shall be made by the Engineer.

The colors of the marking materials shall be the standard highway colors of white, yellow or black commonly used for pavement markings and as outlined in the MUTCD.

Raised pavement markers shall conform to Subsection M9.30.6.

**850.45 Hazard Identification Beacon (Flashing Warning Beacon).**

Materials shall conform to Section 824. Signal heads shall be 200 millimeters in diameter. Beacon configuration shall be as follows: Type A contains 2 horizontally mounted yellow lenses. Type B contains 2 vertically mounted yellow lenses. Type C contains 2 horizontally and 2 vertically mounted yellow lenses. Type D contains a single yellow lens.

**850.46 Special Lighting Unit (Arrow Display).**

The unit shall consist of a black background panel meeting the requirements of "Manual on Uniform Traffic Control Devices" for Type C and shall contain at least 15 #4412A (or equal) amber lamps of approximately 8000 initial maximum candela each.

Arrow panels shall have the capability of the following mode selections: (1) left or right flashing or sequential arrows; or (2) left or right sequential chevrons; and (3) double flashing arrows; and (4) caution. The caution mode consists of four or more lamps, arranged in a pattern which will not indicate a direction.

Arrow panels shall automatically provide for a minimum of 50 percent dimming from their rated lamp voltage at night. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.

Minimum mounting height should be 2 meters above the roadway to the bottom of the panel, except on vehicle mounted panels which should be as high as practicable.

**850.47 Reflectorized Drums.**

Reflectorized Drums shall conform to Subsection M9.30.9; no steel barrels shall be used. Newly developed products providing equivalent target value and stability that are acceptable to the Engineer may be used under this item.

Warning lights shall conform to the MUTCD for Type A or Type C.

All drums shall be maintained in a satisfactory manner including the removal of dirt or road film that cause a reduction in sign reflective efficiency.

**850.48 Pavement Marking Removal.**

Pavement marking removal methods shall not cause damage to the pavement or cause drastic change in texture, which could be construed as delineation at night, and shall be approved by the Engineer. It is not permissible to paint over existing markings with black paint in lieu of removal.

**850.49 Temporary Precast Concrete Median Barrier.**

Temporary precast concrete median barriers shall be manufactured in accordance with the plans and Section 629 of these Specifications.

The Contractor will be allowed the use of precast barrier he/she may presently own, providing it meets these Specifications and is in good condition.

**850.50 Portable Breakaway Barricades Type III.**

Portable Breakaway Barricades shall conform to the plans and the following requirements:

1. MUTCD, latest edition.
2. Reflectorized sheeting conforming to M9.30.0. Pipe shall be Polyvinyl Chloride (PVC) pressure rated SDR 21 or SDR 26 ASTM D 2241. Fittings may be PVC ASTM D 2665 or Acrylonitrile Butadiene Styrene (ABS) ASTM D 2661 (Drainage Waste and Vent).

The alternating 150 millimeter wide reflectorized stripes shall be orange and white and shall slope downward at 45° toward the end by which traffic is to pass.

**850.51 Temporary Anti-Glare Screen (Paddle Type).**

The anti-glare screen (paddle type) shall conform to the requirements of M8.20.3. The anti-glare screen shall have a minimum height of 600 millimeters.

**850.52 Pavement Marking Masking (Removable Tape).**

The Pavement Marking Masking (Removable Tape) shall be non-reflective and shall have a black matte finish so as to blend with the bituminous concrete road surface. Tape shall exhibit a level of luminance such that the tape distracts the attention of passing motorists as little as possible both in daytime and nighttime applications.

The tape shall exhibit an initial minimum skid resistance value of 55 BPN (British Pendulum Number) when tested according to procedures specified in ASTM E 303.

The tape shall be capable of adhering to a properly prepared bituminous concrete surface for an entire construction season yet be able to be removed quickly and easily intact or in large pieces without the use of heat, solvents, or grinding. The removal of the tape shall not damage the pavement or the permanent markings.

**850.53 Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset.**

All materials used in the foundation and anchorage of temporary impact attenuators shall meet the requirements specified in Division III, Materials.

The temporary impact attenuator may be any impact attenuator which meets the requirements of *National Cooperative Highway Research Program, Report 230* and its subsequent revisions, and has been accepted by the Federal Highway Administration for general use in the location intended. Impact attenuators which have not been accepted by the Federal Highway Administration, or which have been designated as approved for experimental use by the Federal Highway Administration shall be rejected by the Engineer. The manufacturer must provide evidence of the suitability and acceptance by the Federal Highway Administration of the impact attenuator.

The temporary impact attenuator shall be designed to fit within reasonably close tolerance of the dimensions given on the plans or in the Special Provisions for a given location. The manufacturer shall design the temporary impact attenuator for the design speed given on the plans or other such speed designated in the Special Provisions. Copies of the design shall be given to the Engineer for inclusion in the contract record.

**850.54 Portable Changeable Message Sign.**

The Portable Changeable Message Sign shall be capable of performing all functions at ambient temperatures ranging from -35 °C to 74 °C. There shall be no degradation of operation due to fog, rain or snow.

All components of the Portable Changeable Message Sign shall be readily accessible for ease of maintenance. Standard commercially available parts shall be used where possible.

The sign shall require no special scheduled maintenance. Maintenance shall include periodic cleaning. When not being used, at the discretion of the Engineer, the sign shall be stored in an approved secure area.

As a minimum, the following documentation shall be supplied with each Portable Changeable Message Sign:

1. Operating Manual
2. Parts Manual
3. Wiring Diagrams
4. Troubleshooting Guide

The Portable Changeable Message Sign shall meet the requirements of this specification and shall consist of the following major components:

**A. Message Board.**

1. Type – The display can be either Flip Disk, LED or a combination of both Flip Disk and LED (Hybrid).
2. Size – The message board shall have a minimum height of 1.85 meters, maximum height 2.0 meters and a minimum width of 2.5 meters, maximum width of 2.9 meters.
3. Colors – The display shall be either fluorescent yellow or ITE amber.
4. Lines – The sign board shall have the capability of displaying at least three lines of 450 millimeter characters with 1 to 9 characters per line.
5. Visibility and Viewing Angle – The sign shall be visible from a minimum distance of 275 meters with a viewing angle of no less than 30 degrees. The sign shall be either internally or externally illuminated for nighttime visibility.

**B. Operator Interface.**

A means of creating and controlling the on-site display message(s) shall be provided with each sign. The operator interface shall contain as a minimum the following:

1. Operator's Display terminal with keyboard will provide a full screen display to allow the operator to preview the message content and format before it is sent to the sign panel. The keyboard shall be of a standard design.
2. Controller (CPU).
3. Lockable weatherproof enclosure for interface components.

**C. Controller.**

The controller shall possess, as a minimum, the following features:

1. Full 32K user memory with the option for an additional 32K archive memory.
2. Capacity to store a minimum of 199 pre-defined messages and a minimum of 50 user-created messages (not to exceed 32K).
3. Changeable message flash rate capability.
4. A minimum of 24 hour battery back-up.
5. Password activation shall be software available.

**D. Power Supply.**

The sign shall be capable of operation from the following sources:

1. A diesel powered generator with a battery backup.
2. A battery with diesel generator charging or solar charging.
3. The power supply shall have a cover for weather protection and shall be lockable for security.

**E. Towable Trailer.**

The trailer shall be of rugged construction suitable for towing at highway speeds and at low speed over rugged construction site terrain. The trailer shall have at least the following features:

1. A Registry of Motor Vehicles licensed trailer.
2. A single axle with two (2) 380 millimeter wheels (3500 GVW rated).
3. A 50 millimeter ball coupler with heavy duty safety chains.
4. Four (4) corner-located leveling swivel jacks capable of leveling the trailer on a 1:6 (1 vertical to 6 horizontal) slope and capable of stabilizing the trailer in high winds of up to 130 kilometers per hour. In addition, a tongue leveling swivel jack shall be provided.
5. Surge brakes with lockable parking in conformance with Federal weight regulations.
6. The sign shall be capable of being locked in a stowed position while being towed.
7. A hydraulic lift mechanism shall be provided to elevate the sign to its operating position.
8. It shall be possible to lock the sign panel in several off-angle positions with respect to the trailer axis for enhanced visibility.

## CONSTRUCTION METHODS

### 850.61 Safety Controls for Construction Operations.

All warning devices shall be subject to removal, replacement and/or repositioning as often as necessary.

Cones or non-reflectorized warning devices shall not be left in operating position or on the highway when the day's operations have ceased. If it becomes necessary for the Department to remove any construction warning devices or their appurtenances from the project due to negligence by the Contractor, all costs for this work will be charged to the Contractor.

All automotive equipment not protected by cones or drums that is working on a project which is open to traffic shall have one amber flashing light mounted on the cab roof or on the highest practical point of the machinery. The light shall be in operation whenever the equipment is working on the highway and/or traveling in the work area at a speed of 40 kilometers per hour or less.

Amber flashers must be visible to both oncoming and overtaking vehicular traffic and shall have a minimum of 32 candela and a flashing frequency of 50 to 60 times per minute.

All vehicles except passenger cars which are assigned to the project and which operate at speeds of 40 kilometers per hour or less shall have an official SLOW MOVING VEHICLE emblem displayed.

All personnel who are working on the traveled way or breakdown lanes, unless protected by positive barriers such as precast concrete, shall wear Department approved safety vests.

The Contractor shall furnish such vests and maintain a sufficient supply of such at the work site for the Contractor's and Department personnel assigned to the project as well as those visiting the work site.

All vests shall remain the property of the Contractor.

#### **850.62 Safety Signing for Construction Operations.**

Signs which are damaged or are missing from their locations shall be replaced by the Contractor without additional compensation.

All signs shall be maintained in a satisfactory manner including the removal of dirt or road fill that cause a reduction in sign reflective efficiency.

All erected signs not consistent with the use of the roadway shall be removed, completely covered, or turned away from traffic each day.

#### **850.63 Portable Barricade Type III.**

Portable barricades shall be constructed in accordance with the Department's "Construction Standards" with the following revisions:

The alternating 150 millimeters wide reflectorized diagonal stripe shall be orange and white and shall slope downward at 45° toward the end by which the traffic is to pass. Barricades that block the passage of traffic or designate the end of the traveled way shall have alternating vertical orange and white stripes on the rails. Portable barricades shall be maintained in good and serviceable condition throughout the project.

Barricades shall be moved from place to place as required during construction and as directed by the Engineer.

#### **850.64 Temporary Pavement Markings.**

The Contractor shall provide all necessary temporary pavement markings, temporary raised pavement markers, or both following the completion of each day's operations and prior to opening the roadway to traffic. Temporary raised pavement markers shall be supplemented with tape or painted markings to assure lane delineation. The Contractor will be expected to make all necessary arrangements for this work so that it may be properly coordinated with construction operations.

#### **850.65 Hazard Identification Beacon (Flashing Warning Beacon).**

The Contractor shall supply the necessary power and shall be responsible for the maintenance of all devices and appurtenances with no additional compensation other than as provided under the contract unit price.

The beacon shall be mounted separately in a stable position on a suitable support and at an approved height.

When the Engineer determines that its use is no longer required at the given location, the Contractor shall remove the beacon and its appurtenances including power service, and restore the area to an acceptable condition.

#### **850.66 Special Lighting Unit (Arrow Display).**

The special lighting unit shall be available for immediate use throughout the duration of the project and be positioned at the direction of the Engineer. The unit shall be properly maintained throughout its use on the project.

#### **850.69 Pavement Marking Removal.**

Pavement Markings shall be removed to the fullest extent possible by an approved method. Any damage to the pavement or surfacing caused by pavement marking removal shall be repaired by the Contractor at his/her expense by methods acceptable to the Engineer. Approved methods include but are not limited to:

1. Sand blasting using air or water.
2. High pressure water.
3. Steam or superheated water.
4. Mechanical devices such as grinders, sanders, scrapers, scarifiers and wire brushes.

Painting over a pavement marking line by use of asphaltic liquids or paints will not be permitted.

Inappropriate pavement markings shall be removed before any change is made in the traffic pattern.

Material deposited on the pavement as a result of removing markings shall be removed as the work progresses.

Accumulations of sand or other material which might interfere with drainage or could constitute a hazard to traffic will not be permitted.

Where blast cleaning is used for the removal of pavement markings and such removal operation is being performed within 3 meters of a lane occupied by traffic, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation, or by other methods approved by the Engineer.

#### **850.70 Temporary Precast Concrete Median Barrier.**

The Temporary Precast Concrete Median Barrier shall be installed as shown on the details indicated on the plans, in accordance with these provisions and/or as directed by the Engineer.

Each run, or bay, of temporary precast concrete barrier units shall be fastened together to form a continuous chain.

Delineators shall be installed in conformance with manufacturer's recommendations on the barriers at their termini; at 6 meter intervals on tangent sections; and 3 meter intervals on curved sections depending on radius as determined by the Engineer.

Delineators mounted on top of barriers separating opposing traffic shall have two sided amber reflectors delineating the left edge. Side mounted delineators shall have amber delineating the left edge, white delineating the right edge and have red as the back color.

Delineators shall be mounted at approximate angles which provided maximum reflectorization.

Approved temporary impact attenuators with delineation shall be installed at ends of barriers within 10 meters of approaching traffic.

The Contractor shall not leave a barrier leading end unprotected.

#### **850.71 Temporary Precast Concrete Median Barrier Removed and Reset.**

Temporary Precast Concrete Median Barriers shall be removed from existing locations and reset in accordance with above requirements, as directed.

#### **850.72 Portable Breakaway Barricades Type III.**

The Contractor shall furnish, set up, move and remove Portable Breakaway Barricades Type III as required or directed by the Engineer.

Portable Breakaway Barricades Type III shall be maintained in a good and serviceable condition throughout the project and shall be moved from place to place as required during construction and as directed by the Engineer.

#### **850.73 Temporary Anti-Glare Screen (Paddle Type).**

The Temporary Anti-Glare Screen (Paddle Type) shall be attached to the barrier in accordance with the manufacturer's recommendations and the following:

1. The paddles shall be installed on top of the barrier at an appropriate angle to eliminate all direct and peripheral glare while eliminating most of the intermittent glare.
2. The top of the paddle for most construction zone applications should be a minimum of 1.2 meters above the roadway. Unusual deviation from work zone practices involving excess radius and elevations may warrant the increase or decrease in overall height or spacing.
3. The method of attachment will be such that the anti-glare screen units can be easily removed and reinstalled on the barriers.

**850.74 Temporary Anti-Glare Screen (Paddle Type) Removed and Reset.**

This work consists of removing temporary anti-glare screen furnished above from the barriers and re-installing it on barriers at new locations. Any glare screen damaged during this work shall be replaced at no additional cost to the Department.

**850.75 Temporary Anti-Glare Screen (Paddle Type) Removed and Stacked.**

This work consists of removing and stacking temporary anti-glare screen furnished above, deemed no longer necessary, from the project to locations as directed.

**850.76 Pavement Marking Masking (Removable Tape).**

Pavement markings will be masked by covering with pavement marking masking tape. The width of the tape shall be sufficient to overlap the existing markings by 25 millimeters on each side (e.g., 100 millimeter wide markings will be masked by 150 millimeter wide tape).

Prior to the application of the pavement masking tape the roadway shall be clean and dry. Surface temperature shall be 10 °C and rising.

No diversion of traffic patterns by the use of temporary pavement markings shall be made before the pavement marking masking is in place.

**850.77 Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset.**

Excavation for temporary attenuator foundations and anchorage shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with gravel borrow.

The temporary impact attenuator shall be installed in accordance with the specifications and recommendations of the manufacturer. Copies of these specifications and recommendations shall be provided to the Engineer.

**850.78 Portable Changeable Message Sign.**

All warning devices shall be subject to removal, replacement and/or repositioning as often as necessary. The changeable message unit shall be available for immediate use throughout the duration of the project and be positioned at the direction of the Engineer. The Contractor shall be responsible for the maintenance of such device and appurtenances, throughout its use on the project, with no additional compensation thereof, other than as provided under the contract unit price. Should the unit be found defective in any way it shall be replaced immediately at the Contractor's expense.

**COMPENSATION**

**850.80 Method of Measurement.**

Safety signing for construction operations will be measured by the square meter and the quantity shall be only that which is actually used on the project. Regardless of the number of times that a sign may be reused on the project, it will not be measured for payment more than once.

2.5 meter sections of Portable Barricade Type III and 1.25 meter sections of Portable Breakaway Barricade Type III shall be considered as one unit each.

Temporary Pavement Markings shall be measured by the procedure outlined in Subsection 860.80.

Temporary Raised Pavement Markers will be measured by the unit.

Pavement Marking Removal shall be measured by the square meter of pavement marking actually removed.

Temporary Precast Concrete Median Barrier and Temporary Precast Concrete Median Barrier Removed and Reset will be measured by the meter.

Temporary Anti-Glare Screen (Paddle Type), Temporary Anti-Glare Screen Removed and Reset and Temporary Anti-Glare Screen Removed and Stacked will be measured by the meter along the top of the barriers receiving the installation, from outsides of the end paddles for each continuous run.

Pavement Marking Masking Tape (Removable Tape) will be measured by the square meter installed.

Temporary Impact Attenuators will be measured as a single unit. Relocation of an attenuator required by the plans or directed by the Engineer will be paid for as attenuator removed and reset, each.

Portable Changeable Message Signs will be measured by the Unit-Day.

#### **850.81 Basis of Payment.**

The contract prices under these items shall constitute full payment for all material, labor and equipment required or incidental to the satisfactory completion of the work as described above. Any devices provided under this section which are lost, stolen, destroyed or deemed unacceptable while their use is required on the project shall be replaced without additional compensation.

Lump sum payments will be made in equal amounts on each estimate based on the number of months estimated to complete the work.

Payment for Temporary Pavement Markings and Raised Pavement Markers will include full compensation for furnishing, installing, maintaining and removing as specified the markings and markers, except that removal of painted temporary pavement markings will be paid for under Item 854.1, Pavement Marking Removal-Paint.

The contract unit price for Hazard Identification Beacons will include full compensation for excavation, backfilling, foundations, conduit, wiring, supports, power service costs, removal and restoration of the area.

Reflectorized Drums, with or without lights, will be paid for at the contract bid price per Drum-Day and Special Lighting Units at the contract bid price per Unit-Day. Payment will be made at the unit bid price for any portion of a day during which these devices were actually used on the project.

Temporary Precast Concrete Median Barrier and Temporary Precast Median Barrier Removed and Reset will be paid for by the meter for furnishing, installing, re-aligning, maintaining and removing the temporary median barrier including delineation, as specified above. The Contractor will not be compensated for any work necessary to maintain or re-align units or replace damaged units.

The contract unit price for Temporary Impact Attenuators and Temporary Impact Attenuators Removed and Reset includes full compensation for furnishing, installing, maintaining and removing the attenuators.

Portable Breakaway Barricades Type III will be paid for by the unit price each which shall constitute full payment for all material, labor and equipment necessary to furnish, install, maintain, move and remove the barricades.

Temporary Anti-Glare Screen (Paddle Type), Temporary Anti-Glare Screen Removed and Reset, and Temporary Anti-Glare Screen Removed and Stacked will be paid for by the meter, which price will include full compensation for all labor, materials and equipment to complete installations and removal. The anti-glare screen shall remain the property of the Department upon completion of project.

Payment for Pavement Marking Masking Tape will include the furnishing, installing, maintaining, and removing as specified or directed by the Engineer.

Temporary Impact Attenuators will be paid for at the contract unit price, which includes full compensation for furnishing and installing the attenuator, as well as all labor, equipment, materials, foundation and anchorage, and all incidental work necessary to complete the work as specified, and to maintain the attenuator in proper working condition.

Temporary Impact Attenuator Removed and Reset will be paid for at the contract unit price for each relocation and installation which will include full compensation for installing the attenuator, all labor, equipment, materials, foundation and anchorage, and all incidental work necessary to complete the work as specified.

Gravel Borrow required for any foundation and anchorage work to the Temporary Impact Attenuators will be paid for at the contract unit price under Item 151, Gravel Borrow.

Portable Changeable Message Signs will be paid for at the contract bid price per Unit-Day. Payment will be made at the unit bid price for any portion of a day during which these devices were actually used on the project.

**850.82 Payment Items.**

851.	Safety Controls for Construction Operations	Lump Sum
852.	Safety Signing for Construction Operations	Square Meter
853.	Portable Barricade Type III	Each
853.1	Portable Breakaway Barricade Type III	Each
853.2	Temporary Precast Concrete Median Barrier	Meter
853.21	Temporary Precast Concrete Median Barrier, Removed and Reset	Meter
853.41	Temporary Impact Attenuator for Shoulder, Incapable of Redirection	Each
853.411	Temporary Impact Attenuator for Shoulder, Incapable of Redirection, Remove and Reset	Each
853.42	Temporary Impact Attenuator for Shoulder, Capable of Redirection	Each
853.421	Temporary Impact Attenuator for Shoulder, Capable of Redirection, Removed and Reset	Each
853.43	Temporary Impact Attenuator for Median, Incapable of Redirection	Each
853.431	Temporary Impact Attenuator for Median, Incapable of Redirection, Removed and Reset	Each
853.44	Temporary Impact Attenuator for Median, Capable of Redirection	Each
853.441	Temporary Impact Attenuator for Median, Capable of Redirection, Removed and Reset	Each
853.5	Temporary Anti-Glare Screen (Paddle Type)	Meter
853.6	Temporary Anti-Glare Screen, Removed and Reset	Meter
853.7	Temporary Anti-Glare Screen, Removed and Stacked	Meter
854.	Temporary Raised Pavement Markers	Each
854.014	Temporary Pavement Markings - 100 mm (Painted)	Meter
854.016	Temporary Pavement Markings - 150 mm (Painted)	Meter
854.024	Temporary Pavement Markings - 100 mm (Non-Removable Tape)	Meter
854.026	Temporary Pavement Markings - 150 mm (Non-Removable Tape)	Meter
854.034	Temporary Pavement Markings - 100 mm (Removable Tape)	Meter
854.036	Temporary Pavement Markings - 150 mm (Removable Tape)	Meter
854.1	Pavement Marking Removal - Paint	Square Meter
854.2	Pavement Marking Removal - Thermoplastic	Square Meter
854.3	Pavement Marking Removal - Tape	Square Meter
854.4	Pavement Marking Masking (Removable Tape)	Square Meter
855.1	Hazard Identification Beacon Type B	Each
855.2	Hazard Identification Beacon Type D	Each
856.	Special Lighting Unit (Flashing Arrow)	Unit-Day
856.12	Portable Changeable Message Sign	Unit-Day
859.	Reflectorized Drum	Drum-Day
859.1	Reflectorized Drum with Flasher (Type A)	Drum-Day
859.2	Reflectorized Drum with Light (Type C)	Drum-Day
151.	Gravel Borrow	Cubic Meter

**SECTION 860**

**REFLECTORIZED PAVEMENT MARKINGS**

**DESCRIPTION**