CATEGORY 100
PRELIMINARY

SECTION 101 – CLEARING AND GRUBBING

101.01 DESCRIPTION. This work shall consist of clearing and grubbing within the limits specified in the Contract Documents.

101.01.01 Definitions.

(a) Clearing is the removal and disposal of trees, fallen timber and rotten wood, brush, shrubs, vegetation, rubbish, fences, and structures not specified in the Contract Documents for removal and disposal. Unless otherwise specified, clearing outside the LOD includes the removal of rubbish only.

(b) Grubbing is an earth-disturbing activity, which includes the removing from the ground and disposing of all stumps, roots and stubs, brush, and debris.

(c) Limit of Disturbance (LOD) is the maximum allowable limit of earth disturbance as delineated in the Contract Documents. When not delineated in the Contract Documents, the LOD will be the top of cut, toe of slope, or limit of ditch excavation. Do not perform earth-disturbing activities beyond the LOD without authorization.

(d) Limits. Clearing and grubbing is confined to the LOD and authorized modifications to the LOD. When indicated in the Contract Documents, the limit of clearing may include the area between the LOD and the right-of-way or easement lines.

(e) Grading Unit is the area of erodible material exposed at one time, not to exceed 20 acres.

(f) Disturbed Area is an area where erodible material is exposed by construction activities.

(g) Stabilization Measures are activities that provide vegetation or otherwise prevent erosion. These activities include the placement of temporary or permanent seeding or mulching, soil stabilization matting, riprap, stone aggregate, and asphalt or concrete paving. The placement of one or more of these temporary or permanent stabilization measures to the satisfaction of the Engineer will meet the requirements for proceeding to the next grading unit or operation.

101.02 MATERIALS. Not applicable.

101.03 CONSTRUCTION.

101.03.01 Erosion and Sediment Control. Unless otherwise specified in the Contract Documents or as directed by the Engineer, the clearing and grubbing area shall be limited to

one 20-acre grading unit per grading operation. Once this first unit is 50 percent graded, the Contractor will be allowed to proceed with the second 20-acre grading unit. With the permission of the Engineer, the Contractor may be allowed to exceed the one grading unit requirement to balance earthwork or when grading interchanges. Erosion and sediment control shall conform to the Contract Documents and Section 308.

The grading operation will be limited to the Contractor's ability to provide adequate resources to perform the grading in a timely manner and to provide and maintain the proper erosion and sediment control measures. The Engineer is the final authority in this determination. A grading unit need not be 20 contiguous acres. When wet soil conditions are encountered, the clearing, grubbing, and grading of another unit will be allowed, once stabilization of the initial unit is approved. No more than two grading units may be active at any time.

101.03.02 Vegetation. The Engineer will designate and mark trees, shrubbery, and plants that are to remain in place. Protect them from any damage, as specified in Section GP-7.11. Cut and properly trim the branches of trees overhanging the roadway to maintain a vertical clearance of 16 ft. Employ a tree expert licensed by the State of Maryland to supervise all trimming operations. Perform all trimming and repair of cuts and scars as specified in Section 712.

101.03.03 RESERVED – See Section 110

101.03.04 RESERVED – See Section 110

101.03.05 Grubbing.

(a) Excavation Areas. Remove all embedded stumps and roots to a depth of at least 3 ft below the subgrade or slope surface. Refill all depressions made below the subgrade or slope surfaces with materials suitable for embankment and compact as specified in Section 204.

(b) Low Embankments. Grub areas where the total depth of the embankment is less than 3 ft.

(c) High Embankments. In areas where the embankment is 3 ft or more in depth, cut off trees and stumps as close to the ground as practical but not greater than 1 ft above the ground surface. Near the toe of embankment slopes, remove trees and stumps that are within 1 ft of the slope surface.

101.03.06 Stream and Channel Changes. When an LOD is not specified, clear and grub 5 ft beyond the top of the cut slopes or as directed.

101.03.07 Disposal.

(a) Burning. If perishable material is burned, it shall be burned under the constant care of a watchperson. Burning shall conform to the applicable laws and ordinances of

Baltimore County and shall have the written approval of the Engineer and the owner of the property.

(b) Disposal Locations. Remove from the right-of-way and dispose of all unburned material and debris. Make all necessary arrangements to obtain suitable disposal locations. Furnish the Engineer with a copy of resulting agreements.

(c) Wood Disposal. No disposal of wood to the general public shall be accomplished off the job site without prior written approval of both the Engineer and the property owner. Any plan for such disposal shall be submitted to and approved by the Engineer prior to beginning the clearing and grubbing operation.

101.03.08 Damage to Trees and Other Protected Resources. Ensure that the LOD and all protected resources are demarcated as specified in Section 107.

Perform damage repair and damage compensation as specified in Section 712 for damage beyond the LOD due to work operations.

101.04 MEASUREMENT AND PAYMENT. ***Clearing and Grubbing*** will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for selective tree trimming and scar repair, repair or replacement of damaged trees, restoration measures for damaged or destroyed protected resources, repair to other damaged properties, removal and disposal of existing buildings when not covered as a specific pay item in the Contract Documents, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 102 – REMOVAL AND DISPOSAL OF EXISTING BUILDINGS

102.01 DESCRIPTION. This work shall consist of the removal and disposal of existing buildings, including foundations, footings or any part thereof, and backfilling, as specified in the Contract Documents. The work also includes protection of the buildings until the removal and disposal are accomplished as directed by the Engineer. Locations of buildings included in the work will be designated in the Contract Documents by the circled numbers ①,②,③, etc.

102.02 MATERIALS. Not applicable.

102.03 CONSTRUCTION. Schedule the removal, razing, or occupation of buildings and appurtenances as one of the first items of work. Post and protect the buildings from vandalism and theft.

Remove and dispose of buildings scheduled for temporary use immediately when vacated.

Buildings and appurtenances may be disposed of by burning if they are not located close to habitable dwellings and if not prohibited by local or State laws, regulations, ordinances, or by the fire marshal. Removal by burning shall be scheduled with the Engineer and shall have the prior written approval of the Engineer, the County Fire Marshall and the owner of the property. Removal by burning shall not be done on days when windy weather or dry conditions could endanger adjacent properties, as determined by the Engineer or the County Fire Department.

Salvaged materials not claimed by the County as described by Contract Documents shall become the property of the Contractor. Selling of merchantable material and removal by the purchaser shall be done only during daylight working hours and accompanied by a Contractor's representative.

102.04 MEASUREMENT AND PAYMENT. ***Removal and Disposal of Existing Buildings*** will not be measured for payment but will be paid for at the Contract lump sum price. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work. All buildings not designated for removal and disposal in the Contract Documents will not be measured but will be incidental to Section 101 "Clearing and Grubbing".

The County reserves the right to eliminate from this item any or all buildings or structures. For each building eliminated from this item, the item will be credited to the extent of the cost eliminated, which will be determined from a breakdown to be submitted by the Contractor showing the tabulation of individual unit costs used in arriving at the Contract price for this item. A breakdown of the Contract lump sum price for ***Removal and Disposal of Existing Buildings*** shall be submitted to the Engineer prior to beginning work.

SECTION 103 – ENGINEERS OFFICE

103.01 DESCRIPTION. Furnish, clean, and maintain in good condition an Engineers office at an approved location within the immediate vicinity of the project. The office shall be separate from any offices used by the Contractor, and it and all items therein shall be for the exclusive use of the County's Engineers and Inspectors. Rented properties that conform to the type of office specified in the Contract Documents will be acceptable.

103.02 MATERIALS. Not applicable.

103.03 CONSTRUCTION. Set up, equip, and make the office ready for use at least five days prior to commencement of other work on the project. Leave the office and appurtenances in place until all field records are complete. Upon removal of the office, restore the location to a condition acceptable to the Engineer.

Unless otherwise specified, the office and all furnished equipment and accessories shall become the property of the Contractor at the completion of the project.

103.03.01 Reserved.

103.03.02 Handicap Accessibility. When handicap accessibility is necessary, comply with Title II (28 CFR Part 35) and Title III (28 CFR Part 36) of the Americans with Disabilities Act (ADA) and the 2010 ADA Standards for Accessible Design.

103.03.03 Mobile Office Trailers. Anchor in accordance with the manufacturer's recommendations. Office trailers, as defined under the Industrial Building and Mobile Act of Maryland, shall be approved by the Maryland Department of Housing and Community Development and bear the Maryland Certification Insignia in the interior of the office.

Office Trailers shall not be placed within designated floodplain areas.

103.03.04 Reserved.

103.03.05 Requirements for all Offices.

(a) Entirely enclosed, waterproofed, and completely insulated to at least an R11 rating.

(b) Double thick floor with building paper placed in between the floor layers.

(c) Finished inside and outside as approved.

(d) A ceiling height of at least 7 ft, a pitched roof, and a ventilating louver in each gable.

(e) A 4 x 1 ft sign with the message:

FIELD OFFICE
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
BALTIMORE COUNTY

attached to or mounted in front of the office. The sign shall have a black background and have white lettering at least 3 in. high.

(f) A 5 x 7 in. "No smoking" sign posted on the outside of each entrance to the office.

(g) Interior and exterior doors equipped with different key locks. Interior doors keyed alike. Exterior doors keyed alike. An additional dead bolt lock for each exterior door. Four keys for each interior and exterior lock.

(h) Windows capable of being opened and closed. Equip with latches, screens, and venetian blinds or shades.

(i) Electrified in accordance with national and State electrical codes with satisfactory artificial lighting and lighting services. Ensure an illumination level of at least 75 ft-c.

(j) Equipment capable of heating the office to at least 70 F and cooling to at least 78 F.

(k) All offices shall be provided with neat, sanitary toilet and hand-washing accommodations for the exclusive use of the County employees; and such facilities shall meet the requirements of the State Department of Health and Mental Hygiene or other authorities having jurisdiction.

(l) The field office is to be maintained in a clean and sanitary manner. Trash shall be removed and the office broom-cleaned daily. The floors shall be damp-mopped weekly. Interior and exterior windows shall be cleaned weekly.

(m) Protect the County and County employees from any loss or damage to their property stored in the Engineers Office. Provide protection in the amount of twenty thousand dollars ($20 000), nondeductible, per each occurrence, for any loss or damage due to fire, theft, vandalism, storms, or floods. Complete the reimbursement, replacement, or repair within 30 days from the date the Engineer reports the loss.

(n) A parking area for the exclusive use of County employees. Provide the specified number of spaces. Post signs to designate the assigned parking areas. Stabilize the parking area as directed.

(o) Fire extinguishers of a dry chemical or multi-purpose ABC type (at least 10 lb), equipped with a visual air pressure gauge, and maintained in accordance with OSHA standards.

(p) A 24 unit first aid kit furnished and maintained as described in the Code of Federal Regulations, Title 29 Subpart D, Section 1926.50(d)2.

(q) A 4 x 8 ft waterproof bulletin board. Place in an easily accessible area within the project limits and conspicuously displayed to all employees. Post and maintain all pertinent and required notices for the duration of the project.

(r) Touch-tone telephones equipped with an answering device capable of answering, recording, storing, and playing back incoming messages at least 30 minutes in length and recording outgoing messages up to 15 seconds in length. The device shall be voice activated, beeperless, record as long as the speaker speaks, and play back recorded messages without dial tone or pauses.

Replace stolen equipment and equipment that becomes defective or for any other reason does not function as intended. Provide an equal or better unit within eight hours after notification. Replacement shall be at no additional cost to the County. Post emergency telephone numbers at a conspicuous location.

(s) One sanitary electric water cooler, including bottled water and disposable cups.

103.03.06 Microcomputer System for all Offices - as specified in the Contract Documents.

103.03.07 Facsimile (FAX) Transceiver for all Offices.

Provide a FAX/copier machine that:

(a) Is connected to a dedicated phone jack with a separate independent telephone line and phone number.

(b) Is in accordance and compatible with CCITT Group Transmission Standards (see specific line items for compatibility requirements).

(c) Uses public switched telephone networks and standard two wire leased line through RJ11C jacks or similar devices.

(d) Transmits at least 9600 BPS with automatic stepdown to compensate for phone line conditions.

(e) Is capable of transmitting a standard 8-1/2 x 11 in. page within 20 seconds through a clear phone line, based on CCITT #1 test chart.

(f) Is capable of two levels of resolution with contrast control:

(1) Standard 200/96 lines

(2) Fine 200/196 lines

(g) Is capable of self-test and providing activity reports with page headers, time, and date.

(h) Uses standard copy paper for receiving transmissions.

(i) Has an automatic document feeder tray (see specific requirements for each transceiver class).

(j) Has handsets.

(k) Has automatic answer, receive, and disconnect features.

(l) Provide the FCC registration number, ringer equivalence, and connection circuitry for each transceiver.

103.03.08 Specific Field Office Requirements.

Engineers Office No. 1 – Standard office trailer with at least 200 ft^2 of floor area under one roof.

Engineers Office No. 2 – Standard office trailer with at least 400 ft^2 of floor area under one roof.

Engineers Office No. 3 – Standard office trailer with at least 700 ft^2 of floor area under one roof.

Engineers Office No. 4 – One-story structure containing at least 1300 ft^2 of floor area under one roof. Modular construction is acceptable. Office trailers are not acceptable.

ENGINEERS OFFICE				ITEM
1	**2**	**3**	**4**	
–	1	2	–	Inner Offices–100 ft^2 each
–	1	1	–	General office area
–	–	–	4	Inner Offices–120 ft^2 each
–	–	–	1	Conference room–240 ft^2
–	–	–	1	Storeroom with shelves–120 ft^2
–	1	1	1	Inner office ingress and egress to the other rooms
3	4	4	5	32 x 60 in. Executive type desks with center drawers
3	4	4	5	Swivel chairs, padded with arm rests
1	1	1	1	30 x 72 in. slant top drafting table and stool, approximately 40 in. high at the front edge
1	2	3	6	30 x 72 in. folding utility table, 30 in. high
–	–	–	1	12-person conference table with padded chairs
2	6	10	12	Additional padded chairs
1	2	2	3	Plan racks
1	1	1	2	Coat racks
1	1	1	1	3 x 6 ft blackboard or whiteboard
1	2	3	3	Electronic desk calculators with memory and tape readout (including manuals, and tapes as needed)
1	1	2	6	Legal size steel filing cabinets, 4 drawer fire resistant (D label) with locks
–	2	2	2	Standard size steel filing cabinets, 4 drawer with locks
1	1	1	5	Bookcases having four shelves 36 x 12 in.
1	2	2	2	Closets, full height, measuring at least 24 x 30 in., equipped with locks, and at least two shelves in each
1	1	1	–	Utility cabinet with 3 adjustable shelves
1	1	1	–	Overhead cabinet at least 8 ft long, 15 in. deep, and 18 in. high
1	1	1	2	Fire extinguisher as specified in Section 103.03.05
1	2	2	4	Telephones with separate lines, as specified in Section 103.03.05
2	2	2	2	Battery-operated smoke detectors
4	8	10	15	Designated parking spaces

103.03.09 Recyclable Materials (Paper, Bottles, Cans, Etc.). Recycling of suitable material is encouraged at all Engineers Offices and Contractor's facilities. However, when the project includes an Engineer's Office No. 4, recycling will be required at both the Engineers Office and the Contractor's facilities for the project. Provide the necessary containers and arrange for the removal of the recycled material from the site.

103.04 MEASUREMENT AND PAYMENT. ***Engineer's Office*** will not be measured but will be paid for at the Contract lump sum price for the pertinent Engineers Office specified.

The payment will be full compensation for site preparation, utility costs, all specified furnishings, to provide, equip, clean, maintain, insure, remove and dispose of the office, restore the site, recycling, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

All costs for the telephones and answering machines required for each specific office including furnishing, installation, maintenance, replacement, tapes for answering machine and monthly service charges (local and long distance) will not be measured but the cost will be incidental to the Contract lump sum price for the specific type of Engineers Office.

The only exception to the all-inclusive Contract lump sum price is the stabilization of the parking area, which will be measured and paid for using the pertinent items as directed.

SECTION 104 – MAINTENANCE OF TRAFFIC

104.00 GENERAL. This work shall consist of maintaining traffic, vehicular and pedestrian, on or along any transportation facility as specified in the Contract Documents. This Section sets forth the traffic control requirements necessary for the safe and continuous maintenance of traffic throughout the area affected by the work, and is intended to minimize inconveniences to the traveling public, while providing for the safety of motorists, pedestrians and workers.

Work shall be as specified in the Contract Documents or as directed by the Engineer. These documents shall include the latest Maryland Manual on Uniform Traffic Control Devices (Md MUTCD), Standard Specifications and Interim Specification Addenda (ISA), the State Highway Administration's Book of Standards for Highway and Incidental Structures, Traffic Control Plans (TCP), Plans, the Solicitation for Bids (SFB), and Special Provisions.

When speed of traffic is noted, this means the posted speed or prevailing travel speed, whichever is higher unless otherwise specified.

Items used for temporary maintenance of traffic shall be removed from the project site when no longer needed and shall become the property of the Contractor, unless otherwise specified in the Contract Documents.

Ninety percent of all reflective barrier markers, warning lights, and raised pavement markers shall be operational at any given time unless more are specified by the Engineer. Any deficiencies shall be corrected within 24 hours.

Upon initial installation reflectorized traffic control signs shall have a minimum of 70 percent reflectivity specified in Section 950.03 over 90 percent of their reflectorized surface, and channelizing devices shall have a minimum of 80 percent reflectivity specified in Section 950.03 over 90 percent of their reflectorized surface.

The Engineer may direct that traffic control devices, such as yield or stop signs that become damaged be replaced within four hours of notification to the Contractor. The Contractor shall take the necessary corrective action as approved by the Engineer to adequately warn and protect the public until the signs are replaced.

The Contract Documents specify one or more of the items listed in the following sections. When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.01 TRAFFIC CONTROL PLAN (TCP).

104.01.01 DESCRIPTION. This work shall consist of the development and implementation of a TCP. The TCP will include the design and placement of such items as signing, pavement markings, delineation, channelization, barriers, crash cushions and other items as required.

TCPs may be implemented within a single project or jointly between two or more projects. In situations where TCPs are jointly implemented, care shall be exercised to present correct and non-conflicting guidance to the traveling public.

The Contractor shall implement the County's TCP or he may develop his own TCP. The Contractor's TCP shall be submitted in writing to the Engineer at least 20 days prior to starting any work. Changes to the approved TCP shall be submitted in writing at least five days prior to implementing the change. For an emergency, the approval process will be completed within four hours. The Contractor shall have written approval of any TCP changes from the Engineer prior to their implementation. No work shall begin until the required traffic control patterns and devices are in place.

Unless otherwise specified in the Contract Documents, all travel lanes shall be restored at the end of the work day and no travel lane shall be reduced to less than 10 ft. Prior to opening the closed lane or shoulder, the Contractor shall clear the lane or shoulder of all material, equipment, and debris.

104.01.02 MATERIALS. Not applicable.

104.01.03 CONSTRUCTION. Not applicable.

104.01.04 MEASUREMENT AND PAYMENT. Any traffic control plan developed by the Contractor will not be measured but the cost will be paid for as part of the lump sum price paid for Maintenance of Traffic.

104.02 MAINTENANCE OF TRAFFIC (MOT).

104.02.01 DESCRIPTION. This work shall consist of maintaining traffic safely and efficiently through and/or around the area affected by the work.

104.02.02 MATERIALS.

Traffic Materials	950

104.02.03 CONSTRUCTION.

(a) Traffic Manager (TM). The Contractor shall assign to the project an employee or employees to serve in the capacity of TM. When a TM item is included in the Contract Documents the TM shall serve in the capacity full time. The TM may assume additional duties when a TM item is not included specifically in the Contract Documents and payment is made as part of a payment item for Maintenance of Traffic. The TM shall be experienced and trained in traffic control.

The Contractor shall submit the TM's name to the Engineer for approval at least 10 days prior to commencing any work on the project. The TM shall provide proof of completing a State Highway Administration-approved Temporary Traffic Control (TTC) training course within the last four years. Change in the appointment of any TM throughout the duration of the Contract will require a written submission to and approval by the Engineer.

The TM shall implement the TCP, maintain an up to date TCP and provide an acceptable copy to the Engineer following any changes.

The TM shall closely coordinate his operations with the Engineer and shall supervise the maintenance of traffic on the project, including those involving subcontractors. The TM shall be required to make on-site inspections of the area affected by the work on a regular basis including Saturdays, Sundays, and holidays and shall be available for consultation at all times. When the TCP is in place, the TM shall be responsible for making daily inspections during hours of operations. A minimum of one night inspection per week will be required. More inspections may be required as directed by the Engineer. The monitoring of the maintenance of traffic by the TM shall include surveillance of any area affected by the work of the Contract during holiday periods. The TM shall maintain a daily log for the inspections and shall include the date, time, condition of maintenance of traffic and any corrective action taken.

The TM shall be responsible for coordination between adjacent work zone operations to assure that inappropriate or conflicting traffic control sign messages or devices are not displayed to traffic.

The TM shall immediately notify the Engineer of any accident or incident within the area affected by the Contract.

The TM shall make inspections during and immediately after adverse weather conditions to ensure that the traffic control devices are clean, undamaged, and in their proper position. The superintendent and/or the traffic manager for the project shall meet all requirements of a Traffic Manager for this section.

(b) Maintenance of Existing Roadway. The Contractor shall be responsible for maintaining the existing roadway surface and shoulders, including crossroads, ramps, approaches, crossovers, medians, detour roads, entrances, and pavement markings within the limits of the project, throughout the duration of the Contract.

Any hazardous condition that exists or develops throughout the duration of the Contract, such as potholes and shoulder defects shall be repaired or patched by the Contractor as directed by the Engineer.

(c) Existing Regulatory, Warning, and Guide Signs. Existing signs that are no longer applicable, due to temporary traffic conditions, shall be relocated when necessary, turned, completely covered or removed with the approval of the Engineer. They shall be properly redisplayed to traffic as soon as conditions warrant. The Contractor shall replace at no cost to the County any existing signs misplaced, lost or damaged by the Contractor's operations.

Prior to commencement of construction and in the company of the Engineer, the Contractor shall inventory and note the location, type, size and color of all existing pavement markings, legends, symbols and signs. Submit the results on a mark- up set of the Contract Plans or on Contractor-prepared sketches or drawings.

(d) Storage and Movement of Equipment, Materials, and Vehicles. No equipment or material shall be stored or permitted to stand in unprotected areas or open areas within 10 ft from where traffic is being maintained unless protected by traffic barriers. Storage of equipment and materials may be permitted closer than 10 ft, subject to the following restrictions:

(1) Temporary traffic barriers, approved by the Engineer, shall be in place prior to storage of any equipment or materials.

(2) No equipment or materials shall be permitted to stand within 4 ft behind the face of the traffic barrier.

Areas used for storage of equipment and materials shall be restored to their original condition immediately upon completion of their use. No additional compensation will be provided for this work.

Vehicles and equipment shall enter and leave the work area in the direction of the traffic flow.

Paving work conducted on, or adjacent to the traveled way, shall be performed in the direction of traffic flow unless written approval is obtained from the Engineer prior to beginning such work.

The Contractor's vehicles and equipment shall enter on and exit from the roadway at interchanges or legally allowed public use crossovers. Making U-turns across any medians or crossovers signed FOR USE OF AUTHORIZED VEHICLES ONLY by the Contractor's vehicles or equipment are prohibited unless written approval is granted by all regulating entities.

(e) Warning Lights and Devices. Warning lights and flags shall be used on warning signs as specified in the TCP, the Contract Documents, or as directed by the Engineer. During hours of darkness, any channelizing device used to warn of a spot hazard shall have one Type A low intensity flashing warning light attached to the side adjacent to traffic. Two Type A low intensity flashing warning lights shall be attached to the top of each Type III barricade.

(f) Temporary Pavement Markings.

(1) Temporary pavement markings (TPMs) are those markings placed upon the roadway to serve an area of work activity or a work phase for a period of time after which they are to be removed.

When approved by the Engineer, a less than full complement of pavement markings and reduced dimension markings for dashed center lines and lane lines may be permitted. Where less than a full complement of pavement markings or reduced dimension markings are used, the time of use shall not exceed two weeks.

(2) TPMs may be either full dimension or reduced dimension as specified in the Contract Documents or as directed by the Engineer.

(3) Full dimension TPMs shall conform to the Md MUTCD, Part III and the Pavement Marking Dimension Table.

(4) Reduced dimension TPMs shall conform to the Md MUTCD, Part III and the Pavement Marking Dimension Table except that the dashed center lines and lane lines may consist of 4 ft segments and 36 ft gaps. All other dimension elements shall be as specified in the Md MUTCD and the Pavement Marking Dimension Table.

PAVEMENT MARKING DIMENSION TABLE

LINE TYPE	MATERIAL	REQUIRED MINIMUM EFFECTIVE WIDTH	
		EXPRESSWAYS AND FREEWAYS	OTHER ROADS
Lane Lines	Paint	6 in.	4 in.
	Preformed Tape	4 in.	4 in.
Lane Shifts	Paint	8 in.	4 in.
Lane Divides and Severe Alignment Changes	Preformed Tape	6 in.	4 in.
Center Lines (See Note 1)	Paint	6 in. (if operated two ways)	4 in.
	Preformed Tape	4 in. (if operated two ways)	4 in.
Edge Lines	Paint	Same as adjacent lane or shift line	Same as adjacent lane or shift line
	Preformed Tape		
Ramp Edge Lines	Paint	6 in.	6 in.
	Preformed Tape	4 in.	4 in.
Gore Marking	Paint	8 in.	—
	Preformed Tape	8 in.	
Auxiliary	Paint	Same as particular line being extended	Same as particular line being extended
	Preformed Tape		

NOTE 1: Discernible space between double lines shall be 4 to 5 in.

NOTE 2: The 8 in. tape width can be achieved by placing two-4 in. wide segments of preformed tape adjacent to each other as approved by the Engineer.

NOTE 3: This table shall apply only to roads maintained by Baltimore County. For MdSHA-maintained Roads, refer to the applicable MdSHA permit.

(5) TPMs generally use short-lived marking materials that are easily removed. Material requirements are described elsewhere in these Specifications.

(6) Specific TPM requirements:

(a) As a minimum at the close of each day, the roadway shall have all center and lane lines in place.

(b) During the work day while work activity is underway, center and lane lines shall be in place or the lines shall be represented by channelizing devices, signs, or other traffic control devices to clearly define and mark all vehicle paths.

(c) Along two-lane, two-way roadways, the center line shall consist of a continuous double solid yellow center line, a single dashed yellow center line at full dimension, or a single dashed yellow center line at reduced dimension as directed by the Engineer.

(d) All no-passing zones shall be marked and signed as specified in the Contract Documents or as directed by the Engineer. All no-passing zones may be identified by signing for a period not to exceed seven days.

(e) Along multi-lane, undivided roadways the center line shall be identified using a continuous double solid yellow line.

(1) If a two-way left turn is present, see **(f)** below.

(2) If the roadway is three lanes, the center line may be either a continuous double solid yellow center line or a continuous single solid yellow and single dashed yellow combination center line permitting vehicles in the single lane direction to pass. For the placement of no-passing zones, see (f)(6)(d) above.

(f) Along multi-lane undivided roadways having a two-way left turn lane, the two-way left turn lane need not be marked provided that channelizing devices are used continuously throughout the length of the left turn lane at a maximum spacing of 200 ft to delineate the left turn lane, separate the opposing flows of traffic and provide areas within which left turning vehicles may queue while awaiting opportunities to turn.

(g) Along multi-lane roadways having reversible lanes, the lanes shall be marked with the full complement of pavement markings as described in the Md MUTCD Part III.

(h) Where edge lines are not in place, appropriate channelizing devices or other delineation shall be used to delineate the edge of the roadway.

(i) Specific pavement marking and complementary signing details are shown on the Temporary Traffic Control (TTC) Standard Drawings.

(j) For the latest approved TPM materials contact the State Highway Administration Office of Materials and Research.

(g) Channelizing Devices. Install traffic channelizing in accordance with the Md MUTCD, the Contract Documents and the following:

(1) Spacing in feet for channelizing devices in a taper shall be no more than the posted speed limit in mph**.**

(2) Spacing in feet for channelizing devices in a tangent shall be no more than twice the posted speed limit in mph.

(3) To define interchange gore areas or other unusual alignments, space channelizing devices at 25 foot intervals, unless the Engineer directs a closer spacing.

(4) Where possible, space channelizing devices at approximately 6 foot intervals at driveways and intersections, so that sight distance at these locations is not restricted.

(5) The Contractor's name or identification mark may be placed in an inconspicuous location on the channelizing device, facing away from traffic. No advertising is permitted.

104.02.04 MEASUREMENT AND PAYMENT. Unless otherwise specified, the Contract lump sum price for ***Maintenance of Traffic*** will be full compensation for all work necessary to maintain traffic, including relocating, turning, completely covering or removing, maintaining in like new condition and cleaning all existing and temporary traffic signs, and any other traffic control devices not included elsewhere in these Specifications but are necessary for the fulfillment of the Contract requirements and implementation of the approved Traffic Control Plan, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Payment of 50 percent of the Contract lump sum price will be payable on the first monthly estimate. The remaining 50 percent will be prorated and paid in equal amounts on each subsequent monthly estimate. The number of months used for prorating will be the number estimated to complete the work.

(a) When additional Contract pay items for Maintenance of Traffic are specified in the Contract Documents, measurement and payment will conform to the pertinent pay items included in the Contract Documents.

(b) Maintenance of Existing Roadway. Measurement and payment for this work will conform to the pertinent pay items included in the Contract Documents.

(c) Items for cones, reflective collars, anchoring devices, STOP/SLOW paddles, sign flags, and warning lights will not be measured but the cost will be incidental to the Contract lump sum price for ***Maintenance of Traffic*** unless otherwise specified in the Contract Documents.

(d) The Contractor shall immediately replace temporary traffic control devices when so directed by the Engineer. The cost to replace traffic control devices, including all material, labor, equipment and tools, will not be measured but will be incidental to the Contract lump sum price for ***Maintenance of Traffic*** except when specifically set up in the Contract Documents as a separate Contract pay item.

(e) Materials, equipment, and labor necessary for the construction and removal of temporary or detour roads will be measured and paid for at the Contract unit price for the pertinent items used.

(f) The ***Traffic Manager*** will be measured and paid for at the Contract price per unit day unless otherwise specified in the Contract Documents. The payment will be full compensation for all materials, fees, equipment, tools, and incidentals necessary to complete the work. A unit day shall consist of any 24 hour calendar day period.

When an item for a ***Traffic Manager*** is not specified, the cost for the Traffic Manager will not be measured but will be incidental to the Contract lump sum price for ***Maintenance of Traffic***.

104.03 TEMPORARY RAISED PAVEMENT MARKERS (RPMs).

104.03.01 DESCRIPTION. This work shall consist of furnishing, installing and removing temporary RPMs as specified in the Contract Documents or as directed by the Engineer.

104.03.02 MATERIALS. Temporary RPMs shall conform to the approved list maintained by the SHA's (and recognized by Baltimore County for this item) Office of Traffic and Safety.

104.03.03 CONSTRUCTION. All material, labor, equipment, tools and incidentals necessary for the complete installation / removal of temporary RPMs, as specified in the Contract Documents, shall conform to the manufacturer's recommendations.

104.03.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

(a) ***Temporary Raised Pavement Markers*** will be measured and paid for at the Contract unit price per each, installed in a manner acceptable to the Engineer.

(b) ***Removal of Temporary Raised Pavement Markers*** will be measured and paid for at the Contract unit price per each, removed in a manner acceptable to the Engineer.

(c) The County will reimburse the Contractor at the Contract unit price per each marker damaged by snowplow operations.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.04 TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER (TCB) FOR MAINTENANCE OF TRAFFIC.

104.04.01 DESCRIPTION. This work shall consist of furnishing, placing, resetting, painting, and removing TCBs for use at locations specified in the Contract Documents or as directed by the Engineer.

104.04.02 MATERIALS.

Vertical Panels, Reflective Barrier Markers and Warning Lights	As approved by the MdSHA QPL
Precast Concrete Traffic Barrier	950.01

104.04.03 CONSTRUCTION. The Contractor shall be responsible for maintaining TCBs in alignment and in a like new condition acceptable to the Engineer.

Resetting TCBs shall consist of removing and relocating TCBs as directed by the Engineer.

Items such as reflective barrier markers, vertical panels (object markers), and warning lights, shall be installed on the TCB as specified in the Contract Documents. Both faces and the top of the TCB shall be painted or repainted as directed by the Engineer.

104.04.04 MEASUREMENT AND PAYMENT.

(a) ***Temporary Precast Concrete Traffic Barrier*** and ***Reset Temporary Precast Concrete Traffic Barrier*** will be measured and paid for at the Contract unit price per linear foot measured along the center line of the top of the barrier. The payment will be full compensation for furnishing, placing, painting, maintaining and removal from the project site as directed by the Engineer, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

(b) Reflective barrier markers, vertical panels, and warning lights will be measured and paid for at the Contract unit price per each. The payment will be full compensation for furnishing, placing, maintaining and removal from the project site as directed by the Engineer and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

(c) The payment for ***Reset Temporary Precast Concrete Traffic Barrier*** will be full compensation for removal from its original placement, transporting and resetting it in its new temporary location, applicable portions of Section 104.04.04(a), and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.05 TRAFFIC BARRIER W BEAM (TBWB) FOR MAINTENANCE OF TRAFFIC.

104.05.01 DESCRIPTION. This work shall consist of furnishing, erecting, maintaining, resetting, and removing temporary TBWB at locations specified in the TCP or as directed by the Engineer.

104.05.02 MATERIALS.

Traffic Barrier W Beam	918.01
Traffic Barrier Posts	918.02
Hardware for Traffic Barriers	918.03
Wood Offset Blocks	M168
Recycled Composite Offset Blocks	612

104.05.03 CONSTRUCTION.

TBWB. Construction methods shall conform to the applicable portions of Section 612, Metal Traffic Barriers.

TBWB-Replacement. Any portion of the TBWB that is damaged shall be replaced immediately. This work shall be accomplished utilizing the Contract item TBWB for Maintenance of Traffic Replacement. The TBWB shall be installed to the correct horizontal and vertical alignments.

TBWB-Reset. When work is sufficiently completed through a traffic control area, and TBWB is no longer required, the TBWB and all components shall be removed and reset in a new work area as specified in the Contract Documents or as directed by the Engineer. The area shall be restored to its original condition.

104.05.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for furnishing and installing all cables, posts, brackets, Traffic Barrier W Beam, hardware, galvanizing, excavation, back-filling, concrete connections to rigid structures, removal, restoration of the area, and for all material, labor, equipment, tools, and incidentals necessary to complete the work as directed by the Engineer.

(a) ***Traffic Barrier W Beam for Maintenance of Traffic*** will be measured and paid for at the Contract unit price per linear foot measured from end to end, including all types of end sections.

(b) ***Traffic Barrier W Beam Replacement for Maintenance of Traffic*** will be measured and paid for as described in the preceding paragraph, with the exception that the limits of linear measurement will be at the ends of the newly installed Traffic Barrier W Beam, including end sections.

(c) ***Reset Traffic Barrier W Beam for Maintenance of Traffic*** will be measured and paid for as described in paragraph (a) above.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.06 TUBULAR MARKERS.

104.06.01 DESCRIPTION. This work shall consist of furnishing, installing and removing tubular markers for maintenance of traffic. Tubular markers shall be used to provide reflective delineation for channelizing traffic through work areas and detours as specified in the Contract Documents or as directed by the Engineer.

104.06.02 MATERIALS.

Tubular Markers	As approved by MdSHA QPL
Reflectorization	950.03

104.06.03 CONSTRUCTION. Tubular markers shall be installed on paved surfaces only, as recommended by the manufacturer and as approved by the Engineer.

104.06.04 MEASUREMENT AND PAYMENT. ***Tubular Markers*** will be measured and paid for at the Contract unit price per each. The payment will be full compensation for the removal of and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Tubular markers that are damaged as a result of traffic operations shall be replaced and will be measured and paid for at the Contract unit price per each for ***Replacement of Tubular Marker Mast***. If the base detaches from the pavement, the entire tubular marker assembly shall be replaced by and at the Contractor's expense.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.07 ARROW PANEL (AP).

104.07.01 DESCRIPTION. Furnish and place APs for temporary use. Arrow panels are required for use at lane closures on multi-lane roads.

Furnish APs that are self-contained, vehicle mounted or portable, and approved by the Engineer. Use self-contained trailer units unless otherwise specified.

APs shall have both manual and automatic dimmer devices capable of reducing the light intensity by 50 percent. Periodically clean the photocells in order to prevent malfunctioning of the brightness control. Dimmer devices are mandatory during night operation. The devices shall include a fail safe system ensuring that maximum brightness is displayed during sunlight and 50 percent brightness is displayed during darkness, regardless of which dimmer device is operational.

104.07.02 MATERIALS.

Arrow Panel	As approved by MdSHA QPL

104.07.03 CONSTRUCTION. Furnish and test the APs as directed 24 hours in advance of actual use. The AP unit shall conform to the Arrow Panel table and be arranged with double pointed arrow configuration capable of displaying a left arrow, right arrow, double arrow, and a four corner caution mode. A sequential chevron shall not be displayed.

ARROW PANEL				
AP UNIT	Md MUTCD TYPE	LAMP OPTIONS*		
		No. 4412 A-Par 46	No. 4415A	**1295 GE**
Portable	A, D	—	X	X
Vehicle Mounted	B	X	—	—
Self-Contained Trailer	C	X	—	—

*Or as approved.

Use an AP to close any lane of a multilane highway. Place APs as specified. Maintain APs in good operating order.

(a) The AP shall conform to the applicable requirements of the Md MUTCD and only be used to supplement other required traffic control devices. Use the "Arrow" mode when closing a through travel lane on a multilane roadway. Place only one AP in the "Arrow" mode for each stationary lane closure. Moving work operations may utilize one or more APs for a single lane closure. Ensure that placement does not cause driver confusion near ramps, median crossovers, and side road intersections.

(b) Aim the AP at approaching traffic in conformance with the minimum legibility distance specified in the Md MUTCD. Ensure that the display is level.

(c) For stationary lane closures, place the AP on the shoulder at the beginning of the taper (nearest to oncoming traffic). Where there are narrow or no existing shoulders in the closed lane behind the channelizing devices, place the AP as near to the beginning of the taper as possible.

(d) For a lane closure on a two-lane, two-way roadway, or for a shoulder closure on any roadway, use the “Caution” mode. In "Caution" mode, one light is displayed in each corner.

104.07.04 When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

Each ***Arrow Panel*** will be measured and paid for at the Contract price per unit day. A unit day shall consist of any approved usage within a 24 hour calendar day period. Each ***Arrow Panel*** will be paid for only once per unit day, regardless of how many times it is relocated. When an arrow panel is used for part of a day, it will be measured and paid for as a unit day.

The payment will be full compensation for all material, labor, equipment, tools and incidentals required to set up and operate at the site as required by the Traffic Control Plan or as directed.

104.08 TEMPORARY TRAFFIC SIGNS (TTS).

104.08.01 DESCRIPTION. This work shall consist of furnishing and installing TTS on or along any transportation facility as specified in the Contract Documents.

The Contractor shall maintain sign faces free of tape, tape residue, or any other foreign matter, and shall remove any advertisements from signs and supports. Supplemental signs shall not cover any part of the face of the primary sign.

104.08.02 MATERIALS.

Wood Sign Supports	921.05 and 921.06
Reflectorization	950.03
Signs	950.08
Portable Sign Supports	As approved by MdSHA QPL

104.08.03 CONSTRUCTION. TTS shall be as specified in the Contract Documents or as directed by the Engineer.

The signing shall conform to Section 6B of the Md MUTCD or the State Highway Administration's Standard Highway Sign Book (SHSB). All work area warning signs shall be 48 x 48 in. unless otherwise specified. The SHSB may be obtained from the State Highway Administration Office of Traffic and Safety, Traffic Engineering Design Division, Telephone No. (410) 787-4022. Designs of signs not included in the SHSB may be prepared by the Contractor in sketch form, to scale, and approved by the Engineer (Baltimore County) or such sign designs may be obtained upon seven day request from the Office of Traffic and Safety. Requests shall be directed to the Engineer (Baltimore County) in writing.

Signs that will be in place for more than three working days shall be mounted on two 4 x 4 in. posts, unless otherwise specified at a minimum height of 5 ft from the near edge of the roadway pavement to the bottom of the sign in rural areas and 7 ft in urban areas. Additional bracing of signs is prohibited. The tops of the wood posts shall not protrude more than 3 in. beyond the nearest edge of the sign. Wood posts shall be placed a minimum of 4 ft into the ground for 4 x 4 in. wood posts and a minimum of 5 ft into the ground for 4 x 6 in. wood posts.

Signs mounted on portable supports for temporary conditions shall be mounted so the bottom of the sign shall not be less than 1 ft above the roadway pavement elevation. Higher mountings are desirable. Portable sign supports shall be self-erecting, able to withstand a wind velocity of 70 mph and shall be able to maintain themselves within five degrees rotation around their vertical axis.

Fabricated wood signs or flexible roll up signs shall be used only as directed by the Engineer. Fabricated aluminum signs including material thickness shall conform to the Maryland State Highway Administration's Standard Highway Sign Book. Diamond shaped warning signs 48 x 48 in. or larger shall be 0.100 in. minimum thickness.

TTS shall not be installed until inspected and approved by the Engineer. The signs shall not be displayed to traffic until directed by the Engineer. TTS shall be properly maintained, remain in place only as needed, and be immediately removed thereafter. Where operations are performed in phases or stages, only those signs that apply to the present conditions shall be displayed to traffic.

When a sign is not indicative of actual conditions such as during periods of partial shutdown or extended periods of no work being performed (including lunch times and overnight periods), the Contractor shall remove the sign, turn it away from all traffic, or completely cover it with an opaque material that is approved by the Engineer. The entire work zone setup does not have to be removed for non-work periods of time up to one hour. Special care shall be exercised to properly space signs along the highway to insure that traffic is provided adequate sight distance to both work zone signs and existing signs.

Signs shall not be obscured by weeds, shrubs, trees, construction equipment, materials or waste materials, personal vehicles, or any other obstruction and shall conform to the sight distance requirements as specified by the County.

TTS for both daytime and nighttime use shall be reflectorized.

Sign Replacement. Signs shall be new or in like new condition. Signs that become faded, illegible, or damaged shall be replaced as directed by the Engineer. Signs that are not new will be permitted to be used only if their reflective intensity at a divergence angle of 0.2 degrees and incidence angle of minus four degrees conforms to at least 70 percent of the values specified in Section 950.03.01. At other times throughout the duration of the Contract the sign's reflective intensity shall be a minimum of 60 percent. The acceptability of the signs shall be measured by means of 60 percent and 70 percent calibrated 1 ft square test plates at the appropriate times. The test plates shall conform to these requirements.

104.08.04 MEASUREMENT AND PAYMENT.

(a) ***Temporary Traffic Signs*** will be measured and paid for at the Contract unit price per square foot in accordance with Section 109 of these Standard Specifications. The payment will be full compensation for furnishing, erection, relocation, maintenance, cleaning, replacement due to damage or normal wear, removal, and for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

(b) Signs damaged by traffic will be measured and paid for at the Contract unit price per square foot for ***Temporary Traffic Signs***. The payment will be full compensation for the furnishing and erection of any replacement signs. The replacement of the sign supports will not be measured but the cost will be incidental to the Contract unit price per square foot for ***Temporary Traffic Signs***.

Temporary traffic signs and all associated hardware, fittings, posts, brackets, and incidentals shall be removed from the project site when no longer needed and shall become the property of the Contractor.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.09 TEMPORARY TRAFFIC BARRIER END TREATMENTS.

104.09.01 DESCRIPTION. Furnish, install, maintain, reset, and remove temporary traffic barrier end treatments in conformance with the manufacturer's recommendations or as directed.

104.09.02 MATERIALS.

Temporary Traffic Barrier End Treatments	Refer to the Contract Documents
Temporary Crash Cushion Sand Filled Plastic Barrels (SFPB)	104.10.02

104.09.03 CONSTRUCTION.

Temporary End Treatments.

(a) Install Temporary Type E and J Traffic Barrier End Treatments in conformance with the manufacturer's recommendations and as approved.

The nose section shall be reflectorized as approved by the MdSHA Office of Traffic & Safety.

(b) Install Sand Filled Plastic Barrels (SFPB) as specified in Section 104.10.03.

Inspection of End Treatments.

(a) Perform a daily visual inspection of the devices to ensure that no damage has occurred, and that the end treatment is capable of functioning as intended.

(b) Following an impact, an approved reflectorized drum will suffice temporarily as reflectorization for the end treatment. Repair or replace the damaged end treatment within four hours after notification.

104.09.04 MEASUREMENT AND PAYMENT. ***Temporary Traffic Barrier End Treatments***, ***Remove and Reset Temporary Traffic Barrier End Treatments***, and Repairing Temporary Traffic Barrier End Treatments will be measured and paid for at the Contract unit price for one or more of the items listed below unless otherwise specified.

(a) ***Temporary Traffic Barrier End Treatments*** will be measured and paid for at the Contract unit price per each for the type specified. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to provide a complete temporary traffic barrier end treatment.

(b) Temporary crash cushion sand filled plastic barrels will be measured and paid for as specified in Section 104.10.04.

(c) ***Remove and Reset Temporary Traffic Barrier End Treatments*** will be measured and paid for at the Contract unit price per each for the type specified. The conditions specified for the initial installation and removal of the end treatment shall be applicable to removing and resetting the end treatment.

(d) ***Temporary Traffic Barrier End Treatment Spare Parts Package*** furnished and installed will be measured and paid for at the Contract unit price per each for the type specified. The payment will be full compensation for the complete clearing and removal of debris and damaged unsalvageable parts, and for all material, labor, equipment, tools, and incidentals necessary to construct the temporary end treatment to the configuration specified.

Payment will not be made for spare parts packages used for end treatments damaged due to the Contractor's operations.

(e) Removal of the temporary traffic barrier end treatments will not be measured but the cost will be incidental to the initial Contract unit price per each. Removal shall include patching of any holes made to anchor or stabilize the end treatment, and cleaning and clearing the area of all debris.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.10 TEMPORARY CRASH CUSHION SAND FILLED PLASTIC BARRELS (SFPB).

104.10.01 DESCRIPTION. This work shall consist of furnishing and installing SFPB. SFPB shall be arranged as specified in the TCP or as directed by the Engineer.

104.10.02 MATERIALS.

Plastic Barrels	As approved by MdSHA QPL
Sand	901 — Table 901A

104.10.03 CONSTRUCTION. The ground shall be leveled with material comparable to the existing ground to support the system prior to installing the SFPB.

The components, assembly, placing configuration, and filling of the individual standard yellow plastic barrels with varying weights of sand shall conform to the manufacturer's recommendations or as specified in the Contract Documents. Each SFPB shall be separated from all other SFPB by a distance of 3 in. The distance between the last row of SFPB and the object being shielded shall be 12 in. SFPB may be permitted to stand on pallets 4 in. or less in height.

The first barrel of the SFPB configuration shall be reflectorized as specified in the Contract Documents. Following an impact, an approved reflectorized drum, conforming to Section 104.12, will suffice temporarily as reflectorization of the SFPB until the damaged SFPB can be replaced. The damaged barrels shall be replaced no later than four hours after the Contractor is notified.

All sand to be placed in the barrels shall be dry and loose. Bags of sand are prohibited. The Contractor shall have available sufficient replacement items including sand. The barrels shall be watertight. An antifreeze agent shall be added to the sand in conformance with the manufacturer's recommendations.

Immediately after the SFPB have served their intended purpose, the Contractor shall remove the installation and restore the site as directed by the Engineer.

104.10.04 MEASUREMENT AND PAYMENT. ***Temporary Crash Cushion Sand Filled Plastic Barrels*** will be measured and paid for at the Contract unit price per barrel for one or more of the items listed below and specified in the Contract Documents.

(a) ***Temporary Crash Cushion Sand Filled Plastic Barrels - Maintenance of Traffic***.

(b) ***Replace Temporary Crash Cushion Sand Filled Plastic Barrels - Maintenance of Traffic***.

(c) ***Remove and Reset Temporary Crash Cushion Sand Filled Plastic Barrels - Maintenance of Traffic***.

The payment will be full compensation for all furnishing, cleaning, placing, replacement, remove and reset, and removing from the project the individual weighted barrels, excavation, sand, regrading, antifreeze agent, machinery, labor, equipment, tools, and incidentals necessary to install, maintain, replace, remove and reset, and remove from the project the Sand Filled Plastic Barrels in a manner acceptable to the Engineer.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.11 TEMPORARY PAVEMENT MARKINGS.

104.11.01 DESCRIPTION. Furnish, install, and remove temporary pavement markings. These markings include lines (striping), legends (letters and numbers) and symbols. The requirements found in Section 549 of the MdSHA Standard Specifications for Construction and Materials shall apply to this specification.

104.11.02 MATERIALS.

Pavement Marking Paint	Refer to Contract Documents
Removable Pavement Marking Tape	Refer to Contract Documents
Black Out Tape	As approved by MdSHA QPL

104.11.03 CONSTRUCTION.

104.11.03.01 Quality Control/Quality Assurance. Perform Quality Control testing in conformance with MSMT 729. Technicians will be certified by the County. The Engineer will complete the Quality Assurance checks by performing the Nighttime Visibility Evaluations.

Retroreflectance. The initial retroreflectance readings for temporary pavement markings shall be at least 250 millicandelas per lux per square meter for white and 150 for yellow. The Engineer will monitor the pavement markings in conformance with MSMT 729 during the service life of the material.

104.11.03.02 Service Life. Maintain the pavement markings for the applicable service life of the materials. The service life shall be at least 180 days for tape and 60 days for paint. Replace the materials if the retroreflectance falls below 150 millicandelas per lux per square meter for white and 100 for yellow.

Replace or repair the pavement markings as necessary within this period and within four hours or as directed at no additional cost to the County. Refer to Section GP-5.11.

104.11.03.03 Application. Apply pavement markings in accordance with the manufacturer's recommendations and the Contract Documents. Apply markings prior to allowing traffic on the pavement and in the same direction as the flow of traffic.

Surface Condition. The pavement surface shall be clean, dry, and free of all contaminants, including curing compound, dirt, and loose particles. Remove all residual, loose, and poorly constructed pavement markings.

104.11.03.04 Pavement Marking Removal. Completely remove all removable pavement markings prior to application of the permanent markings. On stage construction or final surfaces of Portland cement concrete pavements, remove any objectionable adhesive residue by water blasting or other approved methods. Do not use open flame to remove adhesive residue, or any pavement markings. Completely remove or obscure pavement markings within the travel way or adjacent to the travel way that are not applicable.

Ensure that neither the existing nor the final surface is damaged by the operations.

Refer to the Contract Documents for the removal of existing permanent paving markings.

Completely remove or obscure all nonapplicable pavement markings within the travel way or adjacent to the travel way with removable pavement marking tape, as specified in Section 104.11.02.

104.11.04 MEASUREMENT AND PAYMENT. ***Pavement Marking Paint*** and ***Removable Pavement Marking Tape*** will be measured and paid for using one or more of the items listed below and as specified.

The payment will be full compensation for furnishing, installing, and removal of lines, letters, numbers, arrows, symbols, and the removal of all residue. In addition, payment will cover maintenance and replacement during the service life, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

(a) Replacement of Pavement Markings required beyond the service life per linear foot for the specified pavement marking item.

(b) Replacement of Removable Markings made necessary during the service life as a result of plowing (as determined by the Engineer) per linear foot for the specified removable marking item.

(c) ***Pavement Marking Paint Lines*** - in width specified - per linear foot.

(d) ***Pavement Marking Paint Letters*** / ***Numbers*** / ***Symbols*** per square foot. The square foot quantity for Legends (letters and numbers) and Symbols will be as specified in the Traffic Control Standard Detail Plates.

(e) ***Removal of Removable Pavement Marking Tape Lines*** - in width specified - per linear foot.

(f) ***Removal of Removable Pavement Marking Tape Letters*** / ***Numbers*** / ***Symbols*** per square foot. The square foot quantity for letters, numbers and symbols will be as specified in the Traffic Control Standard Detail Plates.

(g) ***Placement of Removable Pavement Marking Tape Lines*** – any type, any width – per linear foot.

(h) ***Placement of Removable Pavement Marking Tape Letters / Numbers / Symbols*** per square foot. The square foot quantity for letters, numbers and symbols will be as specified in the Traffic Control Standard Detail Plates.

(i) ***Black Out Tape Lines*** – any type, any width – per linear foot.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.12 DRUMS FOR MAINTENANCE OF TRAFFIC.

104.12.01 DESCRIPTION. This work shall consist of furnishing and placing drums and maintaining in like new condition, as warning or channelizing devices to control and maintain traffic.

Drums shall be manufactured of low density polyethylene (PE) to withstand impact without damage to themselves or vehicles. The drum shall be 36 in. in height and a minimum of 18 in. in diameter. The reflective stripes shall be horizontal, circumferential, orange and white, 6 in. wide, two each of white and orange alternating with the top stripe being orange. Drums may have one or more flat sides as long as the minimum 18 in. diameter is satisfied.

104.12.02 MATERIALS.

Plastic Drums	As approved by MdSHA QPL
Reflectorization	950.03

Use high performance wide angle white and fluorescent orange sheeting on all drums.

104.12.03 CONSTRUCTION. Drums shall be adequately weighted with bags of sand to keep them from moving. These bags, with no other attachments, shall rest on the base of the drum. The drums shall be maintained in like new condition. Rubber or plastic bases or recycled tires weighing between 20 and 40 lbs. may be used as a substitute for sand bags. Drums shall be spaced per Section 104.02.03(g)(3) or as specified in Contract Documents or as directed by the Engineer.

The Contractor will be permitted to neatly stencil his name or identification mark at the bottom of the non-reflective portion of the drum in maximum 2 in. high letters. No other markings or writings will be permitted on the vertical side of the drum.

Drums damaged by traffic shall be replaced no later than four hours after the Contractor is notified.

104.12.04 MEASUREMENT AND PAYMENT. ***Drums for Maintenance of Traffic*** will be measured and paid for once at the Contract unit price per each. The payment will include reflectorization, setting, resetting, removing, bags of sand, maintenance, cleaning of drums to like new condition, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Where drums have been set and are subsequently damaged by traffic, and in the opinion of the Engineer, are not repairable they shall be replaced and will be measured and paid for at the Contract unit price per each.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.13 BARRICADES FOR MAINTENANCE OF TRAFFIC.

104.13.01 DESCRIPTION. Furnish, set, reset, maintain, and remove barricades for maintenance of traffic.

104.13.02 MATERIALS.

Reflectorization	950.03
Barricades	As Approved by MdSHA QPL

104.13.03 CONSTRUCTION. Use barricade rails conforming to the Md MUTCD, with a minimum rail length of 5 ft. Use approved reflective sheeting and installation procedures.

Replace barricades damaged by traffic within four hours after notification.

Mount signs so that no more than half of the top two rails or one third of the barricade is covered. Mount signs on the barricade so that the bottom of the sign is at least 12 in. above the ground or surface. The bottom of rectangular signs shall not be mounted higher than the bottom of the top rail. Do not use aluminum signs.

104.13.04 MEASUREMENT AND PAYMENT. ***Barricades for Maintenance of Traffic*** will be measured and paid for once at the Contract unit price per each for the pertinent barricade item specified in the Contract Documents. The payment will be full compensation for warning lights (when required), the maintenance and removal of any required warning lights, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Where barricades have been set and damaged by traffic, and the Engineer determines that they are not repairable, replacement will be measured and paid for at the Contract unit price.

When work is specified to be accomplished under the item ***Maintenance of Traffic***, the work will be incidental to the lump sum price for ***Maintenance of Traffic***. When work is required other than the above and no pay item is specified in the Contract Documents, refer to Section GP-4.06 (Changes) for basis of payment.

104.14 CONES FOR MAINTENANCE OF TRAFFIC.

104.14.01 DESCRIPTION. Furnish, set, reset, maintain, and remove cones for maintenance of traffic.

104.14.02 MATERIALS.

Reflectorization	950.03
Cones	As Approved by MdSHA QPL

Cones shall be new or like new condition. Cones shall be at least 28 in. high, at least 10 in. diameter at the inside of the base, reflectorized, and equipped with approved anchor collars as needed to maintain an upright position.

104.14.03 CONSTRUCTION. The Contractor's name or identification mark may be neatly stenciled at the bottom of the cone in maximum 2 in. high letters. Place no other markings or writings on the vertical area of the cone. Turn the cone so that Contractor's name or identification mark faces away from traffic. Cones shall be spaced per Sections 104.02.03(g)(1) through (4).

Replace cones damaged by traffic within four hours or as directed after being notified.

104.14.04 MEASUREMENT AND PAYMENT. Cones for maintenance of traffic and cones that have to be replaced will not be measured but the cost will be incidental to the Contract price for ***Maintenance of Traffic***.

104.15 FLAGGER.

104.15.01 DESCRIPTION. This work shall consist of furnishing flaggers when specified in the Contract Documents or as directed by the Engineer. Flagging shall conform to Section 6F of the Md MUTCD. All outfits and equipment will be approved by the Engineer. Flaggers shall have completed a State Highway Administration-approved Temporary Traffic Control (TTC) training course within the last three years. The failure of any flagger to perform the required duties shall be grounds for the Engineer to require a replacement.

Flaggers shall use STOP/SLOW paddles unless the Engineer allows other devices; paddles shall be 24 x 24 in. with minimum 8 in. high letters. Reflective sheeting on the STOP/SLOW paddle shall be encapsulated sheeting conforming to Section 950.03. Standard paddle sign designs shall be as specified in the Contract Documents.

Two-way radios or pilot vehicles shall be used whenever flaggers are not within sight distance of each other, or when directed by the Engineer.

104.15.02 MATERIALS. Not applicable.

104.15.03 CONSTRUCTION. Not applicable.

104.15.04 MEASUREMENT AND PAYMENT. ***Flaggers*** will be measured and paid for at the Contract unit price per hour when specified in the Contract Documents. The payment will be full compensation for clothing, STOP/SLOW paddles, pilot cars or other vehicles, air horns or bull horns, field telephones, walkie talkies, site illumination, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

When an item for ***Flagger*** is not specified, the cost for the Flagger will not be measured but will be incidental to the contract lump sum for ***Maintenance of Traffic***.

104.16 MODIFICATION OF EXISTING SIGNS.

104.16.01 DESCRIPTION. This work shall consist of relocating, removing, covering, modifying, re-erecting, or changing existing highway signs relating to the construction activity. This work is in addition to the temporary traffic signs specified in Section 104.08.

104.16.02 MATERIAL.

Sign Panel Supports and Hardware	909.07, 921.05, 921.06, 950.04 A 123, A 153 and A 709
Reflective and Non-reflective Sheeting	950.03
Sign Materials	950.08

Use an approved opaque sign covering material.

104.16.03 CONSTRUCTION. Modification of existing signs shall be as specified in the Contract Documents or as directed by the Engineer.

104.16.04 MEASUREMENT AND PAYMENT. Modification of existing signs will be measured and paid for using one or more of the items listed below and specified in the Contract Documents.

The payment will be full compensation for all excavation, backfill, hardware, relocation, removal, covering, modifying, re-erecting changes to existing highway signs, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

(a) ***Relocate Wood Sign Supports*** per each.

(b) ***Sign Modifications to Overhead Sign Structures*** per linear foot.

(c) ***Relocate Sign*** per square foot.

(d) ***Remove Sign*** per square foot.

(e) ***Modify Copy*** per character.

(f) ***Shield*** per each.

(g) ***Cover Sign*** per square foot.

(h) ***Relocate Sign Luminaire*** per each.

104.17 TEMPORARY MOVABLE TYPE CONCRETE TRAFFIC BARRIER (MCTB).

104.17.01 DESCRIPTION. Furnish, place, assemble, maintain, move, and remove and dispose of movable interlocking type concrete traffic barrier. Movable barrier systems shall consist of individual units that remain connected for the total length when being moved in one continuous operation.

104.17.02 MATERIAL.

Precast Movable Concrete Barrier & Transfer Device	As Approved by MdSHA QPL
Reflective Barrier Markers	As Approved by MdSHA QPL

104.17.03 CONSTRUCTION. Perform all transfer shifts using the transfer device. The transfer device shall be capable of moving and transferring the barrier as required, and of operating on the curve and grades specified. Ensure that the device does not extend into traffic.

The Engineer will inspect the movable barrier upon delivery and throughout the life of the project. Replace any damaged or defective units as directed. Install reflective barrier markers as specified. Maintain the barrier and reflective barrier markers in a like new condition.

Perform all maintenance operations for the transfer device. Have sufficient spare parts and personnel available to ensure that the required lane configurations are in place at the required times. Failure to move the MCTB at the proper time will be cause for penalty under Section GP-5.12.

104.17.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

(a) The initial installation of the ***Temporary Movable Type Concrete Traffic Barrier*** will be measured and paid for at the Contract unit price per linear foot measured in place from end to end.

(b) Transfer shifts of the barrier will be measured and paid for at the Contract unit price per linear foot for the ***Transfer Shift of Movable Type Concrete Barrier*** item. The

measurement will be end to end of the barrier actually shifted. The Contract unit price will apply to each shift.

(c) Replacing sections of the barrier that have been damaged by vehicular traffic while in place will be measured and paid for at the Contract unit price per each for the ***Replacement Sections for Movable Type Concrete Barrier*** item. Replacement of sections damaged by the Contractor's operations shall be at no additional cost to the County.

(d) Resetting the barrier will be measured and paid for at the Contract unit price per linear foot for the ***Reset Movable Type Concrete Barrier*** item. The payment will also include removal from its original placement and transporting and resetting it in its new temporary location.

(e) Reflective barrier markers will be measured and paid for as specified in Section 104.04.04(b).

(f) End treatments will be measured and paid for under the pertinent item specified in the Contract Documents.

104.18 RESERVED

104.19 PORTABLE VARIABLE MESSAGE SIGNS (PVMS)

104.19.01 DESCRIPTION. Furnish, install and relocate portable, self-contained, trailer mounted variable message signs.

104.19.02 MATERIALS.

PVMS	As Approved by MdSHA QPL

All materials shall be like new, corrosion resistant, and unaffected by water spray, salt, oil, gasoline, and all other contaminants in the quantities normally found along the edge of the traveled roadway. Construction, materials, and operation shall meet NFPA, UL, and NEC. Ensure that sign messages are visible and legible for a distance of 900 ft from any point along the traveled approach roadway at all times. The PVMS shall be equipped with a sighting device to provide alignment for maximum visibility.

104.19.03 CONSTRUCTION.

104.19.03.01 Equipment.

Trailer. In accordance with Maryland Motor Vehicle Law.

Structural Support. The structural support framework shall allow the system to be assembled into a unit and be mounted on the trailer, and shall provide the support mechanism between the sign panel assembly, the power supply, and the controller.

The framework shall provide sufficient support to prevent damage to any unit component when the sign is in the down and locked position during normal highway travel.

The deployed structure shall supply adequate support to allow complete sign operation, including raising and lowering of the sign panel, during sustained wind speeds of 85 mph.

The display windows shall be made of impact-resistant clear Lexan or as approved.

Sign Panel. Not to exceed 144 in. length, 90 in. height, 12 in. depth.

Display.

(a) Capable of displaying three lines of text.

(b) Each line of text shall be constructed using either a discrete matrix or a full matrix display.

(c) Capable of displaying eight characters per line.

(d) The character height shall be at least 18 in.

(e) If discrete matrix display is used, each character shall be displayed using a 5 x 7 array with at least eight array modules per line.

A 4-1/4 to 7 in. space shall exist between each display line with no glare reflection.

(f) If full matrix display is used, the sign shall have at least 25 rows and 45 columns of disks. Each display line shall have at least 7 rows and 45 columns of disks and a 4-1/4 to 7 in. space between each display line with no glare reflection.

Flip Disk Mechanism.

(a) Be electromagnetically activated, with a service life of at least 200 million operations.

(b) Have a reflective surface that will maintain color intensity for at least three years.

(c) Be circular or rectangular, with a visible surface area between 3-3/4 and 4-1/4 in^2.

LED Illumination. LED illumination for each matrix element shall:

(a) Meet ITE specification for amber color.

(b) Utilize AlInGaP substrate.

(c) Each LED shall produce at least a 1candela output on center at 25 mA drive current.

(d) Each matrix element shall have at least two LED's located within the perimeter of the flipping disk.

(e) Provide full illumination within at least a 24 degree cone perpendicular to the sign face.

(f) Have an operating temperature range of -40 to 160 F.

PVMS UNIT.

Lift Mechanism.

(a) Electric or electrically assisted hydraulic mechanism capable of raising and lowering the sign panel.

(b) Capable of being raised or lowered manually.

(c) Furnished with a stainless steel safety bolt to prevent the sign panel from lowering once in the raised position. A self-locking mechanism shall be incorporated into the safety bolt to prevent it from being inadvertently dislodged.

(d) Designed to allow the raised sign panel to rotate 360 degrees about the vertical axis.

(1) Allow rotation clockwise and counter-clockwise.

(2) A mechanism shall be provided to lock the sign panel in place, at any position.

Electrical Connections and Gauges.

(a) All wiring from power sources to PVMS equipment shall use locking cable connectors.

(b) Volt and amp gauges shall be provided for both AC and DC.

(c) Standard negative ground system shall be tied to the sign chassis.

(d) Lightning protection shall be supplied to the load side of the sign system's distributed power lines to withstand multiple surges in excess of 600 volts.

Power Supply. Either a solar powered electrical system, or existing commercial electrical service.

Solar Powered Electrical System. Battery power system and solar array panels capable of displaying a two page message for 21 consecutive days without auxiliary charge.

Sign Controller.

(a) Capable of driving the matrix display panel operating over a -50 to 150 F range and in a 20 to 100 percent noncondensing humidity range.

(b) Accommodate 100 preprogrammed, user-defined messages.

(c) Capable of displaying three sequenced messages. On/Off time for each message in a sequence shall be user adjustable within a range of 0 to 5 seconds.

(d) Designed for fail-safe prevention of improper information display in the case of a system malfunction.

(e) Cause a user defined default message to be displayed in case of failure of the PVMS unit when flip disk mechanism is used.

(f) Have the capability of retrieving all messages stored in temporary memory.

(1) Temporary memory shall be nonvolatile.

(2) All messages and programs shall remain resident in the controller's memory in the event of a power failure.

(3) Have an RS-232 port to facilitate connection of an external communication device.

(g) Capable of automatic system recovery after power outages to the central controller without operator intervention, including the ability to maintain an up-to-date status on a remote unit if sign is operated from a remote location.

(h) Monitor and display the battery output voltage and solar array activities (charging/discharging), and blank the sign when the battery output voltage drops below the manufacturer's recommended output level.

(i) Capable of monitoring and displaying the status of the photocell and adjusting the sign illumination to match the ambient light conditions. The controller shall have at least nine levels of dimming from 10 to 100 percent brightness.

(j) Contained in a weatherproof cabinet located on the controller housing and insulated to protect against excessive vibration and temperature.

(1) Equipped with a lockable door latch and interior cabinet dome light.

(2) Provided with a keyboard storage location inside the cabinet.

Character Set Software.

(a) Have all of the standard ASCII characters and symbols.

(b) Provide left and right arrows.

(c) Have all alphanumeric entries performed with a keyboard or keypad that causes the same character to be displayed on the matrix. Arrow symbols shall be generated via a cursor pad on the keyboard or keypad.

(d) Have messages default to self-centering display with the ability to left or right justify a display when full matrix is used.

104.19.03.02 Set up and operate the PVMS on the project site 24 hours in advance of actual use. Ensure that each unit is functioning properly and approved. Locate the PVMS as specified.

Aim the PVMS at approaching traffic in accordance with the 900 ft minimum visibility and legibility requirement. Ensure that the PVMS is level and that the sign face is not obscured by highway alignment or glare from either sunlight or vehicle headlights.

104.19.04 MEASUREMENT AND PAYMENT. The ***Portable Variable Message Sign*** (PVMS) will be measured and paid for at the Contract price per unit day. A unit day shall consist of any approved usage within a 24 hour calendar day period. Each unit will be paid for only once per unit day, regardless of how many times it is relocated. When a unit is used for part of a day, it will be measured as a unit day. This unit price will be the same regardless of the type of unit used.

The payment will be full compensation for the electrical power and hook up, setup and maintenance of computer programs, changing messages, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

104.20 Through 104.28 – RESERVED

104.29 TRUCK-MOUNTED VARIABLE MESSAGE SIGN (TVMS).

104.29.01 DESCRIPTION. Furnish, install and relocate a portable, self-contained, truck mounted, variable message sign.

104.29.02 MATERIALS. Each unit shall contain the work vehicle structural support system, sign panel assembly, lift mechanism, power supplies, sign mounted controller, and ancillary equipment.

All materials for TVMS shall be like new, corrosion resistant, and unaffected by water spray, salt, oil, gasoline, and all other contaminants in the quantities normally found along the edge of the traveled roadway. The TVMS construction, materials, and operation shall meet NFPA, ULI, and NEC. Ensure that sign messages are visible and legible for a distance of 900 ft from any point along the traveled approach roadway at all times.

The TVMS shall not block the driver's rear view vision when either in the transport or the deployed position.

104.29.03 CONSTRUCTION.

104.29.03.01 Equipment.

Truck. The work vehicle size and the method of attachment shall be as specified in the manufacturer's specifications. All vehicles shall be in accordance with Maryland Motor Vehicle Law.

Structural Support. The structural support framework shall allow the system to be assembled into a unit and be mounted on the truck, and shall provide the support mechanism between the sign panel assembly, the power supply, and the controller.

The framework shall provide sufficient support to prevent damage to any TVMS components when the sign is in the down and locked position during normal highway travel.

The sign panel shall be mounted as a permanent fixture of the truck and provide a minimum height of 7 ft from the bottom of the sign to the surface of the roadway when in its operating position. Affixing a trailer-mounted unit to a truck is prohibited.

The deployed structure shall supply adequate support to allow complete sign operation including raising and lowering of the sign panel during sustained wind speeds of 85 mph.

The display windows shall be made of impact-resistant clear Lexan or as approved.

Sign Panel. Sign panel dimensions shall not exceed 92 in. wide by 54 in. high unless approved. The TVMS shall be capable of displaying three lines of text with the following requirements:

(a) Each line of text shall be constructed using a full matrix display.

(b) The sign shall be capable of displaying six characters per line.

(c) The character height shall be at least 12 in.

(d) The sign shall have a pixel arrangement of at least 20 rows by 40 columns, with at least 3 LEDs per pixel.

LED Illumination. LED illumination for each matrix element shall have the following characteristics:

(a) LED shall meet to the ITE specification for amber color.

(b) LED shall utilize A1InGap substrate.

(c) Each LED shall produce at least one candela output on center at 25 mA drive current.

(d) LED shall provide full illumination within at least a 24 degree cone perpendicular to the sign face.

(e) Operating temperature range of the LED shall be -30 to 125 F.

TVMS Unit. Submit a catalog cut and character set for any TVMS approval to the Bureau of Traffic Engineering and Transportation Planning. Furnish examples of standard messages to be used on the sign.

Lift Mechanism.

(a) The lift mechanism shall be capable of being raised and lowered manually.

(b) A self-locking mechanism shall be provided to prevent the sign panel from lowering once in the raised position.

Electrical Connections and Gauges.

(a) All wiring from power sources to TVMS equipment shall use locking cable connectors.

(b) Each sign shall be equipped with an automatic lamp intensity regulator that maintains a constant output with a varying battery voltage.

(c) Standard negative ground system shall be tied to the vehicle chassis.

Power Supply. The TVMS shall operate from a solar powered electrical system.

Sign Controller. The controller shall:

(a) Be capable of driving the matrix display panel operating over a -30 to 125 F range and in a 20 to 95 percent non-condensing humidity range.

(b) Accommodate 50 preprogrammed, user-defined messages.

(c) Be capable of displaying three sequenced messages. On/Off time for each message in a sequence shall be user adjustable at increments of one-tenth of a second within a range of 0 to 5 seconds.

(d) Be designed for fail-safe prevention of improper information display in the case of a system malfunction. In the event of a system malfunction, the sign shall display a blank message.

(e) Have the capability of retrieving all messages stored in temporary memory.

(1) Temporary memory shall be nonvolatile.

(2) All messages and programs shall remain resident in the controller's memory in the event of a power failure.

(3) Have an RS-232 port to facilitate connection of an external communication device.

(f) Monitor and display the battery output voltage and solar array activities (charging and discharging) and blank the sign when the battery output voltage drops below the manufacturer's recommended output level.

(g) Be capable of monitoring and displaying the status of the photocell, adjust the sign illumination to match the ambient light conditions, and have at least nine levels of dimming from 10 to 100 percent brightness.

(h) Be contained in a sheet metal or high density polyethylene (HDPE), weatherproof cabinet located on the controller housing, and insulated to protect against excessive vibration and temperature.

(1) The cabinet shall have a lockable door latch.

(2) The keyboard/input device storage location shall be provided inside the cabinet.

Character Set Software. The character set software shall:

(a) Have all the standard ASCII characters and symbols.

(b) Provide left and right arrows.

(c) Have all alphanumeric entries performed with a keyboard or keypad that causes the same character to be displayed on the matrix. Arrow symbols shall be generated via a cursor pad on the keyboard or keypad.

(d) Have messages default to self-centering display with the ability to left or right justify.

104.29.03.02 Operation. Set up and operate the TVMS 24 hours in advance of actual use to ensure that each unit is functioning properly and approved.

Variable Message Sign Mode. Use the TVMS in variable message sign mode on roadways where the posted speed limit is less than or equal to 40 mph. The TVMS is intended for mobile operations. If used for stationary construction or maintenance operations, do not leave the TVMS in place for more than eight consecutive hours.

Arrow Panel Mode. The TVMS may be used in lieu of a Type C arrow panel on any roadway as long as the TVMS is capable of displaying a left arrow, right arrow, double arrow, and a four-corner caution mode.

Use the TVMS only as a supplement to other required traffic control devices. When closing a through travel lane on a multilane roadway, use the "Arrow" mode only. Only one TVMS in the "Arrow" mode shall be used for each stationary lane closure. Moving work operations may utilize one or more TVMS for a single lane closure.

(a) Ensure that the placement does not cause driver confusion near ramps, median crossovers, and side road intersections.

(b) For stationary lane closures, place the TVMS on the shoulder at the beginning of the taper (nearest to oncoming traffic). Where there are narrow or no existing shoulders in the closed lane behind the channelizing devices, place the TVMS as near to the beginning of the taper as possible.

(c) For moving maintenance type activities along multilane highways where a lane is closed, place the TVMS at the rear of the activity in the closed lane on a vehicle separate from the maintenance vehicle itself. For paint striping activities, additional vehicles with TVMS or arrow panels in the arrow mode may be required to supplement the work operation. TVMS shall always remain upstream of the maintenance vehicles where adequate recognition distance is available. The vehicle carrying the TVMS shall be equipped with signing and lighting as required by the standard TCPs.

(d) TVMS shall only display the "Caution" mode for a lane closure on a two-lane, two-way roadway, or for a shoulder closure on any roadway. The "Caution" mode on a TVMS shall show displays of circular appearance in each of the four corners of the TVMS. The circle diameters shall range from 9.5 to 11 in. and utilize approximately 30 pixels. The circles shall be offset from the left and right edge between 3 and 6 in. and from the top and bottom edge between 1.5 and 3 in. The vertical spacing between the centers of the circles shall range from 2.5 to 3 times the diameter of the circles. The horizontal spacing between the centers of the circles shall range from 1.75 to 2 times the vertical spacing.

Install the TVMS as specified.

The TVMS shall be designed so that it supplies a minimum visibility and legibility distance of 900 ft. Ensure that the TVMS is level and that the sign face is not obscured by highway alignment or glare from either sunlight or vehicle headlights.

104.29.04 MEASUREMENT AND PAYMENT. The ***Truck Mounted Variable Message Sign*** (TVMS) will be measured and paid for at the Contract price per unit day. A unit day shall consist of any approved usage within a 24 hour calendar day period. Each ***Truck Mounted Variable Message Sign*** will be paid for only once per unit day, regardless of how many times it is relocated. When a unit is used for part of a day, it will be measured as a unit day.

The payment will be full compensation for the vehicle, setup and maintenance of computer programs, changing messages, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 105 – AGGREGATE FOR MAINTENANCE OF TRAFFIC

105.01 DESCRIPTION. Aggregate material placed for maintenance of traffic.

105.02 MATERIALS.

Crusher Run Aggregate CR-6	901.01
Graded Aggregate Base	901.01

105.03 CONSTRUCTION. Refer to Section 501.03.

105.04 MEASUREMENT AND PAYMENT. ***Crusher Run Aggregate CR6 – Maintenance of Traffic, Graded Aggregate Base for Stage 1 Maintenance of Traffic***, and ***Graded Aggregate Base for Maintenance of Traffic, Driveways, etc.*** will be measured and paid for at the Contract unit price per ton. The payment will be full compensation for all aggregate, hauling, placing, compacting, removal, rehandling, reworking, disposal, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

When aggregate is used as part of any base or pavement course in the construction and maintenance of temporary detours, approaches, crossings, and widenings, the item of work will be measured and paid for as specified in Section 501.

SECTION 106 – HOT MIX ASPHALT (HMA) FOR MAINTENANCE OF TRAFFIC

106.01 DESCRIPTION. Place HMA for maintenance of traffic.

106.02 MATERIALS.

Tack Coat (Rapid Setting)	904.03
HMA	904.04
Crack Filler	911.01& 911.01.01
Production Plant	915

106.03 CONSTRUCTION. Refer to Standard Detail Plate R-38 and to Section 504.03.

106.04 MEASUREMENT AND PAYMENT. ***Hot Mix Asphalt for Stage 1 Maintenance of Traffic;*** and ***Hot Mix Asphalt for Maintenance of Traffic, Driveways, etc.*** will be measured and paid for at the Contract unit price per ton. The payment will be full compensation for all tack coat, crack filler, hauling, placing, compacting, maintaining, removal, rehandling, reworking, disposal, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

When hot mix asphalt is part of any base or pavement course used for the construction and maintenance of temporary detours, approaches, crossings, and widenings, the item of work will be measured and paid for as specified in Section 504. For payment of temporary tie-ins, refer to Section 504.04.

SECTION 107 – CONSTRUCTION STAKEOUT

107.01 DESCRIPTION. This work shall consist of furnishing, placing and maintaining construction layout stakes as specified in the Contract Documents or as directed by the Engineer by either Method One or Method Two. Method 1 is for Baltimore County capital projects and Method 2 is for development projects.

107.01.01 METHOD ONE. The Contractor shall, as part of the construction stakeout operation, before any clearing operation commences, demarcate any wetlands and the limit of clearing throughout the entire project as shown in the Contract Documents and labeled as Limit of Clearing or Wetlands to the satisfaction of the Engineer.

Where limits of clearing are not shown in the Contract Documents, the limit of clearing will be the top of cut, toe of slope or limit of ditch excavation.

107.02 MATERIALS.

107.02.01 METHOD ONE. The material for flagging the clearing limits shall be a 3 in. international orange vinyl material. The flagging material shall have "CLEARING LIMIT" in minimum 2 in. high letters printed with an indelible black marker subject to the Engineer's approval. The material for flagging wetlands shall be 1-1/2 in. pink vinyl flagging with "WETLAND" printed on it with minimum 1 in. high blue letters using indelible marker.

107.02.02 METHOD TWO. Not applicable.

107.03 CONSTRUCTION.

107.03.01 METHOD ONE (Baltimore County capital projects):

107.03.01.01 Line and Grade. The surveyor will provide the Contractor with the following subject to the approval of the Engineer:

(a) Roadway and Utility Stakeout.

(1) A staked center line of the roadway or base line for the utility with the maximum spacing of stations (stakes, nails, crosses, etc.) of 100 ft.

(2) Establish appropriately spaced benchmarks and mark with a known elevation. Establish the necessary references including all points of curvature (P.C.), and points of tangency (P.T.) for the preservation and control of the centerline.

The Engineer shall furnish two sets of prints of the cross sections and the cross sections will be used as guides only. Dimensions or elevations scaled from the cross sections are not sufficiently precise for use in the construction.

(b) Structure Stakeout.

(1) A staked out centerline or working line, whichever applies, with stations not over 100 ft apart and extending at least 100 ft beyond ends of the structure.

(2) When the structure is on a curve, the surveyor will furnish a staked out center line or working line, whichever applies, consisting of stations not over 100 ft apart and including the P.C., P.T., and at least one point on the tangents beyond each end of the curve.

(3) The surveyor shall establish at least two benchmarks, one on each end of the structure.

107.03.01.02 Equipment and Personnel. The Contractor shall use competent personnel and industry standard equipment for all surveying work required to set and maintain the elevations and dimensions as specified in the Contract Documents.

107.03.01.03 Control Markers. The Contractor shall exercise care in the preservation of stakes and bench marks set by the surveyor and shall reestablish them upon the request of the Engineer and at no additional cost to the County when any are damaged or destroyed.

107.03.01.04 Control Stakes. For roadways as specified in Section 107.03.01.01, the Contractor shall furnish, set and preserve stakes at each station along each side of the project on the right-of-way or easement line, whichever is furthest from the center line of construction. Where only part of an ultimate dual highway is to be constructed, the stakes on the side of the future improvement shall be set 10 ft beyond the construction limits. On each of these stakes shall be marked its offset distance from the center line and its top elevation or the cut or fill to the profile grade line. The Contractor shall set additional stakes as needed for horizontal and vertical controls necessary for the correct layout of the work.

107.03.01.05 Layout. For structures as specified in Section 107.03.01.01**,** the Contractor shall proceed with his layout work. However, before any actual construction begins, the Contractor shall rerun the surveyor's approved lines and grades to check same and then establish all center line or working line intersections with the center line or center of bearing of all piers, bents and abutments. From these field layouts, the Contractor shall check the proposed span lengths by electronic distance measurement or by taping, using a steel measuring tape. When manual taping is used, the measurements shall be compensated for temperature, sag, and horizontal alignment of the steel measuring tape. The Contractor shall also check the location of the structure to affirm its correct location with relation to existing structures, roads and existing conditions that are to remain in their original positions. If any discrepancies are found, the Contractor shall notify the Engineer at once in writing, otherwise, it will be assumed that all planned dimensions, grades and field measurements are correct. All lines established on the ground shall be preserved or referenced, marked, and kept available at all times.

The Contractor shall establish the field elevations for all bridge seats and assume responsibility for finishing to proper grade. If any steel beams or girders are incorporated in the project, the Contractor shall run elevations over the tops of the beams or girders after they are in place, before any forms are attached to them, to determine the deflection of each member. This information shall then be applied to the deflection diagram to determine the corrected elevation of bottom slab forms and screed supports. The Engineer shall check the information assembled by the Contractor with the surveyor before final adjustments are made and before any quantity of concrete is placed in said forms.

107.03.01.06 Utilities. The Contractor shall furnish to the utility companies or agencies working within the limits of the project, promptly upon request, reference to control points, alignment and grade data, so that they may properly locate and coordinate their work and improvements in relation to this project.

Intersection Utility Stakeout. The Contractor shall notify the appropriate agencies listed below within a minimum of 72 hours (excluding weekends and holidays) prior to the Contractor's anticipated beginning of any underground work.

(a) Request a **MISS UTILITY** stakeout and possess a valid **MISS UTILITY** clearance ticket number for any underground work.

(b) Contact all utilities within the limits of the project that are not a member of **MISS UTILITY** and obtain a stakeout of their respective facilities.

(c) Request the Traffic Engineering Division to assist with locating and identifying County-maintained traffic signal facilities.

(d) Request the State Highway Administration's District Utility Engineer to stakeout their lighting facilities should the proposed work impact a State roadway. Within a State highway right-of-way, follow the requirements of the State permit.

The Contractor shall stakeout the proposed construction as indicated in the Contract Documents and allow the surveyor and Engineer to verify location of the proposed facilities.

107.03.01.07 Right-of-Way and Easement Lines. The Contractor shall define only right-of-way and easement lines of the project for adjacent property owners, promptly upon request.

107.03.01.08 Subgrade, Subbase and Base Controls. The Contractor shall furnish for subgrade, subbase and base courses, string line and grade with fixed controls having a maximum longitudinal and transverse spacing of 25 ft.

The Contractor shall place along each form line for cement concrete pavement line and grade with fixed controls not to exceed 25 ft.

107.03.01.09 Flagging. The flagging shall be placed continuously through wetland areas. In areas where trees are not to be disturbed, the Contractor shall individually flag those trees in a line along the clearing limits that are not to be moved or destroyed. If the wetland flagging has been destroyed and the Engineer determines that it is still required, the Contractor shall reflag the area.

If the Contractor does not replace the destroyed flagging within 48 hours after notification by the Engineer that replacement flagging is needed, the surveyor may proceed to have the area re-flagged. The cost of the re-flagging by the surveyor will be charged to the Contractor and deducted from any monies due under the Contract.

At the completion of construction, the Contractor shall remove all flagging.

107.03.02 METHOD TWO (Development projects):

(1) For all Developer Projects the term "Engineer" in paragraph (2) shall be the Developer's Engineer as the term applies to construction stakeout. For all Developer Projects the Engineer shall submit a copy of the stakeout grade sheets to the Division of Construction Contracts Administration. All developer stakeout work shall be done under the

supervision of a Professional Land Surveyor or a Property Line Surveyor (as applicable) registered in the State of Maryland.

(2) The Engineer shall have a surveyor furnish and set construction stakes establishing lines, grades, and measurements to be furnished for the contracted work under these Specifications for roadway (highway) and utility work. For all structure work, including bridges and buildings, the surveyor shall furnish the centerline stakeout and the benchmark for reference points to the Engineer, with the balance of the grades and measurements to be furnished to the Engineer by the Contractor. The Contractor shall provide and shall have available to the project an adequate surveying and engineering staff which is competent and qualified to set all lines and grades needed to construct bridges and buildings.

(3) Only those survey control marks shown on the drawings (or marks extended from those control marks) shall be used for construction. The Contractor shall furnish the assistance for their preservation after being set. The Contractor shall, however, be held responsible for their preservation. If, in the opinion of the Engineer or his surveyor, the marks are willfully or carelessly disturbed or destroyed by the Contractor or his employees, the entire cost of replacing them shall be charged against the Contractor and the cost shall be deducted from the Contractor's final payment.

(4) Where electronic alignment control devices are used, the Contractor shall verify the alignment by conventional methods at intervals of 100 ft for lines 200 ft long between structures, or at changes in alignment when the structure is on a curve, and at the midpoint of lines under 200 ft long as defined above.

(5) Intersection Utility Stakeout. The Contractor shall notify the appropriate agencies listed below within a minimum of 72 hours (excluding weekends and holidays) prior to the Contractor's anticipated beginning of any underground work.

(a) Request a **MISS UTILITY** stakeout and possess a valid **MISS UTILITY** clearance ticket number for any underground work.

(b) Contact all utilities within the limits of the project that are not a member of **MISS UTILITY** and obtain a stakeout of their respective facilities.

(c) Request the Traffic Engineering Division to assist with locating and identifying County maintained traffic signal facilities.

(d) Request the State Highway Administration's District Utility Engineer to stakeout their lighting facilities should the proposed work impact a State roadway. Within a State highway right-of-way, follow the requirements of the State permit.

The Contractor shall stakeout the proposed construction as indicated in the Contract Documents and allow the Engineer to verify location of the proposed facilities.

107.04 MEASUREMENT AND PAYMENT.

107.04.01 METHOD ONE. ***Construction Stakeout*** will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for furnishing, placing and maintaining construction layout stakes, flagging of clearing and wetlands, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Payment of the Contract lump sum price will be prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating will be the number estimated to complete the work.

107.04.02 METHOD TWO. All work related to Construction Stakeout will not be measured but the cost will be incidental to other items provided for in this contract.

SECTION 108 – MOBILIZATION

108.01 DESCRIPTION. This work shall consist of the construction preparatory operations, including the movement of personnel and equipment to the project site and for the establishment of the Contractor's offices, buildings, and other facilities necessary to begin work.

108.02 MATERIALS. Not applicable.

108.03 CONSTRUCTION. All work performed in providing the facilities and services shall be done in a safe and workmanlike manner.

108.04 MEASUREMENT AND PAYMENT. Mobilization will not be measured for payment but will be paid for at the Contract lump sum price.

The cost of all required insurance and bonds will be incidental to the Contract lump sum price for mobilization.

Payment of 50 percent of the Contract lump sum price will be made in the first monthly estimate after the Contractor has established the necessary facilities. The remaining 50 percent will be prorated and paid in equal amounts on each of the next five monthly estimates. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Payment of the Contract lump sum price will not be made more than once, regardless of the fact that the Contractor may have, for any reason, shut the work down on the project, moved his equipment away from the project and then back again.

If an item for mobilization is not provided, the cost of mobilization will be incidental to the other items specified in the Contract Documents.

SECTION 109 – FIXED PRICE CONTINGENT ITEMS

109.01 DESCRIPTION. To provide for certain contingencies during construction, some contracts include Fixed Price Items for use as the work proceeds. These items only apply when included in the proposal with prices established prior to bidding. Should any of these items not be included in the proposal as described above, they shall be addressed as described elsewhere in the Specifications and, if to be paid for, as bid by the Contractor.

Only those items listed below in Table 109.1 may be treated as Fixed Price Contingent Items, and then only if and as directed by the Engineer:

Effective December 13, 2017, fixed price contingent values are as follows:

Table 109.1 Fixed Price Contingent Items

Code	Description	Unit of Measure	Fixed Price
109005	TEMPORARY TRAFFIC SIGNS	SF	$22.00
109110	TEST PIT EXCAVATION / CONVENTIONAL EXCAVATION METHODS	CY	$360.00
	TEST PIT EXCAVATION BY VACUUM	CY	$650.00
109205	CLASS 3 EXCAVATION/SELECT BACKFILL – PROPER DISPOSAL OF UNSUITABLE MATERIAL	CY	$130.00
109305	BORROW FOR BACKFILLING TRENCHES - PROPER DISPOSAL OF UNSUITABLE MATERIAL	CY	$80.00
109405	MIX NO.1 CONCRETE	CY	$450.00

109.02 MATERIALS. Not applicable.

109.03 CONSTRUCTION.

1. Borrow for Backfilling Trenches - Proper Disposal of Unsuitable Material: Material found to be unsuitable by the Engineer shall be disposed at a location as directed by the Engineer. See Section 203.

2. Class 3 Excavation / Select Backfill - Proper Disposal of Unsuitable Material: Material found to be unsuitable by the Engineer shall be disposed at a location as directed by the Engineer. See Sections 301 and 302.
3. Test Pit Excavation / Conventional Excavation Methods: See Section 205.
4. Test Pit Excavation By Vacuum: See Section 205.
5. Mix No.1 Concrete: This item covers the furnishing and placing of air-entrained concrete work as directed by the Engineer, and furnishing all labor, tools, equipment and appliances necessary to complete the work as directed by the Engineer. See Sections 405, 414, and 902.
6. Temporary Traffic Signs: See Section 104.08.

109.04 MEASUREMENT AND PAYMENT.

1. ***Borrow for Backfilling Trenches - Proper Disposal of Unsuitable Material***: Payment for furnishing suitable backfill shall be in accordance with the stipulated price per cubic yard in place and compacted. Price is full compensation for excavating, hauling, depositing and compaction of material and disposal of unsuitable material on-site or offsite. Payment shall not be made for suitable backfill material placed outside of specified trench widths.
2. ***Class 3 Excavation / Select Backfill - Proper Disposal of Unsuitable Material***: Payment for furnishing select backfill shall be in accordance with the stipulated price per cubic yard in place and compacted. Price shall include disposal of unsuitable material on-site or offsite. Payment shall not be made for select backfill material placed outside of specified trench widths.
3. ***Test Pit Excavation / Conventional Excavation Methods***: Test Pit Excavation performed by conventional (non-vacuum) excavation equipment will be measured and paid for at the contract unit price per cubic yard for the material actually removed from within the limits specified. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work. Tamped backfill will not be measured but the cost will be incidental to the Contract unit price per cubic yard for ***Test Pit Excavation / Conventional Excavation Methods***. Any pavement to be replaced will be paid for as specified in Section 106.
4. ***Test Pit Excavation By Vacuum*** *(no depth constraint)*: Test Pit Excavation performed by vacuum excavation equipment will be measured and paid for at the contract unit price per cubic yard excavated by this method. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.
5. ***Mix No. 1 Concrete***:

   A. Price per Cubic Yard:

   Payment for furnishing and placing air-entrained concrete work in roads, paving, curbs, gutters, footways, etc., if and as directed, is made at the stipulated price per cubic yard. This price includes furnishing and placing air-entrained concrete work as required and furnishing all labor, tools, equipment and appliances necessary to complete the work as shown, specified and directed.

   B. Paving Beyond Limits:

   Payment is not made for replacing paving beyond limits shown in the Standard Detail Plates. Payment is never made for replacement of damaged paving when the damage is due, in any way, to the Contractor's fault or negligence.

6. ***Temporary Traffic Signs***: See Section 104.08.

Note: Referring to all test pit excavation fixed price contingent items, test pits shall be limited to: contract tie-in locations, utilities not shown on the Contract Drawings, locations identified by the Contract Documents, and locations as directed by the

Engineer. Test pits performed by the Contractor: to identify the location of sewer house connections, water services, water service reconnections, utilities (including buttresses), test stations, traffic signal appurtenances, pilings, or miscellaneous structures; or to identify pavement or subsurface composition; shall not be measured but shall be considered incidental to the Contract.

SECTION 110 – ADJUSTING AND REPLACING FENCES, SHRUBS, TREES, HEDGES, ETC.

110.01 DESCRIPTION. This item includes the removal and relocation adjacent to the work of fences, shrubs, trees, hedges, mail boxes etc., all as directed by the Engineer.

110.02 MATERIALS.

See Section 900, MATERIALS.

110.03 CONSTRUCTION METHODS.

Existing fences shall be carefully removed as directed by the Engineer and to the extent required to permit construction operations. The Contractor shall safely store all elements during the time that they are down and, when possible, re-erect them at the locations designated by the Engineer. If, through no fault of the Contractor, these elements cannot be re-erected, then they shall be replaced on a force account basis for the cost of the materials only.

Shrubs and trees shall be transplanted with sufficient earth to insure that no damage to their major root system occurs. General reference is made to Section 710.03 for acceptable planting methods. After transplanting has been accomplished, it shall be the Contractor's responsibility to water all plants until their growth is established. The relocation of trees will only be required when indicated on the Plans.

110.04 METHOD OF MEASUREMENT & BASIS OF PAYMENT.

This item will not be measured. Payment for this work will be at the lump sum price for "Adjusting and Replacing of Fences, Shrubs, Hedges, Trees, etc." which price shall be full compensation for all excavation materials, removing, transporting, planting, equipment, labor, tools, and any other work incidental to the satisfactory completion of this item. The replacement of materials as specified above will be paid for on a force account basis for the cost of the materials only.

SECTION 111 – TEMPORARY ORANGE CONSTRUCTION FENCE

111.01 DESCRIPTION. Furnish, install, and maintain new or like new temporary orange mesh construction fence. This fence is not to be used as a safety barrier.

111.02 MATERIALS.

Precast Concrete Blocks	903.05
Tie Wire, Tension Wires, Tension Wire Clips and Hardware	914.02
Orange Mesh Fencing	As approved

Fence posts shall be 4 ft high, 1.90 in. diameter round posts; or 5-1/2 ft high, 2 in. steel U channel posts, as specified herein.

Submit samples of the fence fabric, fence posts, movable precast concrete blocks, tie wire, tension wires, and other miscellaneous hardware for approval.

111.03 CONSTRUCTION. Temporary orange construction fence shall be at least 4 ft high and with a maximum post spacing of 8 ft. When installed on a paved surface, support the fence by inserting the round post into a precast concrete block having a round hole through the center of the block. When installed in unpaved areas, use steel U channel fence posts driven 1-1/2 ft into the ground. Installation of the fence in any other manner will require approval.

Secure the fabric to the posts by wrapping a tie wire around the horizontal fence strands and the posts. Install a top tension wire to prevent sagging. When installed on paved surfaces, the Engineer will determine if a bottom tension wire is required.

Remove the fence when the Engineer determines that the fence is no longer required. The removed fence is the property of the Contractor.

Damaged Construction Fence. Repair or replace damaged construction fence within four hours after notification.

111.04 MEASUREMENT AND PAYMENT. ***Temporary Orange Construction Fence*** will be measured and paid for at the Contract unit price per linear foot for the actual number of linear feet measured to the centers of end posts. ***Remove and Reset Temporary Orange Construction Fence*** will be measured and paid for at the Contract unit price per linear foot. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

SECTIONS 112 Through 119 – RESERVED

SECTION 120 – TREE PRESERVATION AREA

120.01 DESCRIPTION. Establish and maintain a Tree Preservation Area (TPA).

120.02 MATERIALS.

Temporary Orange Construction Fence	111.02
Fertilizer	920.03.01

120.02.01 Tree Preservation Program (TPP). The County will develop a TPP to establish the goals and specify the procedures for tree branch pruning, brush removal, tree felling, tree root pruning, tree fertilizing, and other tree preservation operations to protect trees and vegetation within the TPA.

120.03 CONSTRUCTION.

120.03.01 Maryland Licensed Tree Expert (LTE). A LTE shall perform or directly supervise the operations specified in the Contract Documents and the TPP in conformance with the Maryland Roadside Tree Law, the Forest Conservation Act, and accepted arboricultural practices.

120.03.02 Delineation. Delineate the perimeter of the TPA as specified in the Contract Documents.

120.03.03 Temporary Orange Construction Fence (TOCF). Ensure that the delineated TPA is approved prior to installing the TOCF. Perform installation and maintenance as specified in Section 111.03. Complete installation of the TOCF before:

(a) Beginning clearing and grubbing operations.

(b) Installing erosion and sediment controls.

(c) Conducting the Tree Preservation Meeting.

(d) Performing tree preservation operations.

120.03.04 Tree Preservation Meeting. Prior to beginning work, meet at the TPA with the Engineer, the County Arborist, and the LTE to review the TPP.

120.03.05 Tree Preservation Operations. Maintain the TPA as specified in the TPP and the Contract Documents. Perform the following operations, as specified in the TPP:

(a) Tree Branch Pruning. Section 712.

(b) Brush Removal. Section 713.

(c) Tree Felling. Section 714.

(d) Tree Root Pruning. Section 715.

(e) Tree Fertilizing. Section 716.

120.03.06 Prohibited Activities within the TPA.

	PROHIBITED ACTIVITIES
a	Felling, removing, or harming any tree or plant designated for preservation.
b	Removing wood, soil, stones, and other natural materials.
c	Any kind of foot or vehicular traffic.
d	Driving, storing, washing, or maintaining trucks or construction equipment.
e	Placing backfill, stacking or storing supplies.
f	Grading, trenching, draining, dewatering, and burning activities.
g	Dumping waste or storing toxic or hazardous materials.

120.03.07 Restricted Activities. The following activities are restricted in the area near the TPA unless authorized by the Engineer.

	RESTRICTED ACTIVITIES
a	Felling trees.
b	Grading that will disrupt drainage patterns.
c	Draining and dewatering activities.
d	Storing construction equipment.
e	Truck washing and maintenance activities.
f	Dumping waste and storing toxic or hazardous materials.
g	Burning and trenching activities.

120.03.08 Cleanup and Restoration. When construction activities are complete, remove the TOCF, construction materials, and debris without damaging trees in the TPA and adjacent areas. Grade the perimeter of the TPA to blend with nearby areas. Seed as specified in Section 705.

120.03.09 Damage Repair. Refer to Section 712.03.11.

120.03.10 Damage Compensation. Refer to Section 712.03.12

120.04 MEASUREMENT AND PAYMENT. Work performed as specified in the Tree Preservation Program or Contract Documents will be measured and paid for as part of one or more of the items listed below. Payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

120.04.01 ***Temporary Orange Construction Fence***. Refer to Section 111.04.

120.04.02 ***Tree Branch Pruning***. Refer to Section 712.04.

120.04.03 ***Brush Removal***. Refer to Section 713.04.

120.04.04 ***Tree Felling***. Refer to Section 714.04.

120.04.05 ***Tree Root Pruning***. Refer to Section 715.04.

120.04.06 ***Tree Fertilizing***. Refer to Section 716.04.

120.04.07 The licensed tree expert services will not be measured but the cost will be incidental to the Contract unit price for the Clearing and Grubbing item.

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