

# **SECTION 600**

## **MISCELLANEOUS** **CONSTRUCTION**

# CONSTRUCTION MANUAL

MAINE DEPARTMENT of TRANSPORTATION

Bureau of Project Development

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Section 601 Gabions and Mattresses -- 1 Page

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## GABIONS AND MATTRESSES

### 601-1 GENERAL

#### Reference

(1) Standard Specifications: Section 601, Section 711.02 thru 711.08

(2) Plans and Supplemental Specifications

This work shall consist of furnishing, assembling, filling with stones and lacing hexagonal mesh wire baskets, hereafter called gabions or mattresses, constructed in accordance with these specifications and placed in conformity with the lines, grades and dimensions shown on the plans or established in the field.

### 601-2 LAYOUT

Layout will be done by the Contractor but should be checked by the Inspector for location and grade.

### 601-3 CONSTRUCTION

The Inspector should review the reference material and the manufacturers recommendations for installation of the type being used, being aware of any underdrain, geotextiles or special backfill to be used. Assure that the gabions or mattresses will fit as per the plan. Any changes should be approved by the Resident.

Assure that the baskets are laced correctly to the adjoining one, and stretched as per the Standard Specifications. Assure that the contractor is placing the rocks as per the Standard Specifications.

### 601-4 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Entries should be made in the Inspectors Daily Report or the Diary as the work progresses regarding adherence to manufactures installation procedures and materials specification.

Measurement for payment will be to the neat line dimensions shown on the plans. Entry for final payment should be entered in the Final Quantity Book, Inspector's Daily Report or other bound field book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 602 Flowable Fill -- 2 Pages

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## **FLOWABLE FILL**

### 602-1 GENERAL

#### References:

(1) Special Provisions and Supplemental Specifications

(2) Construction Manual

Section 206 - Structural Excavation

(3) Standard Specifications

Sections 701.01, 701.02, 701.03, and 703.01

Flowable Fill is used to fill excavations or voids where it is difficult or impractical to place and compact earth or granular material. This fill might be used in culvert cross trenches, under concrete slabs or granite curbing for foundation, in front of granite curb, or in old drainage to be abandoned. Public utility companies and public works districts often use this fill to achieve a trench backfill which will not settle in the future.

### 602-2 LAYOUT AND CONTROL

Layout will done be by the Contractor or Subcontractor. Care must be taken in providing for maintaining containment while the fill is being placed, as it can flow like water.

### 602-3 TESTING REQUIREMENTS

Testing requirements will vary, depending on proposed use of Flowable Fill and requirements of Special Provision Section 602 and Project Minimum Testing Requirements. Tests may include Pressure Air Meter, Strength Cylinders, Modified Slump Test, and Temperature.

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#### 602-4 CONSTRUCTION

Measures must be taken to prevent the culvert from floating in pipe trenches. This may be done by driving re-bar each side of the pipe and using wire ties over the pipe. Mixes with 60 kg/M<sup>3</sup> [100 lbs/yd<sup>3</sup>] to 71 kg/M<sup>3</sup> [120 lb/yd<sup>3</sup>] of cement are recommended, as they are easily re-excavated in the future. Mixes with 89 kg/M<sup>3</sup> [150 lb/yd<sup>3</sup>] to 119 kg/M<sup>3</sup> [200 lb/yd<sup>3</sup>] of cement are not easily excavated with ordinary equipment. An air-entraining admixture in the mix makes it flowable. An accelerant admixture may be added when a quicker set is desired. The mix should be placed directly from the truck into the location, with as low a drop as possible. Earth berms, forms or shoring are used to contain the fill until it sets up.

#### 602-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Measures taken for containment and displacement should be inspected for security. Placement of the mix should clear the sides of the hole to prevent erosion and contamination. The Inspector should make a diary entry of the work. Measurements of the void filled may be necessary, depending of the method of measurement. Payment might be by Lump Sum, delivery slip quantity or measured in place, but usually delivery slip quantities are used unless pay limits are designated.

Measurements should be placed in a Construction or Final Quantity Book. Lump Sum payment or delivery slip quantities could be put directly into the Final Quantity Book with reference to the work in the Project Diary. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 603 Culverts and Storm Drains -- 5 Pages

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## **CULVERTS AND STORM DRAINS**

### 603-1 GENERAL

#### References:

(1) Construction Manual

Section 206 - Structural Excavation  
Section 604 - Manholes and Catch Basins  
Section 605 - Underdrains  
Division 800 - Utilities

(2) Standard Specifications

Section 206 - Structural Excavation  
Section 502 - Structural Concrete  
Section 509 - Structural Plate Pipes, Pipe Arches and Arches  
Section 603 - Pipe Culverts and Storm Drains  
Section 705 - Joint Materials  
Section 706 - Non-Metallic Pipe  
Section 707 - Metal Pipe

(3) Supplemental Specifications and Supplemental Standard Details for Construction

(4) Standard Details, Highways and Bridges

(5) Special Provisions

(6) OSHA Construction Standard for Excavations

The General Notes should be closely reviewed for data applicable to Culverts and Storm Drains.

Most full construction Project Plans incorporate a Drainage Sheet. This should be carefully reviewed and double-checked against the plans and cross-sections for locations, types of installations and special details or requirements. Differences should be resolved, so that the Resident can inform the Contractor in a timely manner of any changes, before the drainage has been ordered.

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It is the responsibility of the Resident to ascertain that the Drainage Inspector has become familiarized with the construction procedure and fully understands the Special Provisions, Specifications, and Plans.

The safety and convenience of public traffic are of primary importance. The Resident and Inspector should be sure flaggers are available when construction operations interfere with traffic, even if the interference is only for a relatively short period of time.

The Contractor should also be advised that two-way traffic must be maintained after working hours. It may be necessary to require the Contractor to work late to install enough culvert to allow two-way traffic, or a portion of excavated trench may need to be temporarily backfilled to achieve the same result. If backfill is placed for a pipe not carrying water, be sure the upstream end of the pipe is blocked off to keep dirt out of the pipe. The Special Provisions may require that water flow be maintained by pumping, in certain pipes. Check the Special Provisions, Section 105 in the Bid book for specific environmental requirements. Traffic control devices and signs, as indicated in the Standard Details and the MUTCD, should be utilized.

#### 603-2 LAYOUT AND CONTROL

Line and grade for culverts and storm drains will be set by the Contractor prior to start of construction. If a change of location is considered necessary, it can be made before beginning installation. The Resident should recommend changing the design and location of culverts if it will be in the best interests of the Department. Additional easements may be necessary.

For most locations, the Contractor's foreman will compute the midpoint grade and sometimes the quarter point grade, depending upon the length of culvert or the width roadway that can be opened up at one time. Some foremen will compute grades for each length of pipe. If this is done, the Inspector should be sure that the grades figured are correct for the lengths of pipe used. If an Inspector does not know how to figure these intermediate grades, the Resident should instruct them. The Inspector should also check any control set by the Contractor's personnel.

Many Contractors are using laser beams for line and grade control of culvert and pipe installations. Inspectors should check pipes placed with laser control as closely as installations made by other conventional methods. Laser equipment must be used in accordance with manufacturer's directions. They can be set up wrong and are often easily upset by temperature changes and other atmospheric conditions.

#### 603-3 TESTING REQUIREMENTS

Certification is required for all culverts, underdrain and gaskets, per Standard Specifications, Section 700

Residents or Inspectors will make a visual inspection prior to installation to detect any damage which may have occurred during shipment, or on the Project.

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#### 603-4 CONSTRUCTION

The Resident should ascertain the status of property where it is necessary to provide unplanned ditches or ditching out of existing drainage ways when they are outside of the normal R/W limits. If culverts are relocated for any reason, the Resident should make sure there are no R/W problems, particularly concerning drainage easements at proposed new locations, or new underground utility problems which have not been considered, such as locations of sewer, water, or gas lines.

Refer to Division 800 of this Manual for information regarding Utility Section policy regarding location of utility lines.

The Resident and Inspector should be aware of possible water pollution and siltation problems that may exist, or be caused by installation of drainage pipes, or by ditching operations. The Contractor's SEWPCP plan will address these issues, usually calling for riprap and other erosion control items shortly after installation completion.

Deviation from the plan design in alignment or grade may affect environmental permits and drainage easements. The Office of Environmental Services and/or Right-of-Way Division may need to be advised of substantial proposed changes.

Trench excavation for drainage pipes is normally done with a backhoe. The Contract will require excavations to be done as per OSHA's "Construction Standard for Excavations"; deeper trenches will require sloping, trench boxes or shoring to protect workers. The Contractor is required to designate a "Competent Person" to identify hazards and take measures to protect workers. Construction personnel should be familiar with this OSHA manual and advise of any worker safety concerns without actually telling the Contractor what measures to take. It is the Contractor's responsibility to notify nearby inhabitants prior to blasting. The proper signs should be in position from the time explosives are brought onto the site until after the charges are detonated.

Poor soil conditions or rock may necessitate undercutting to provide for a solid bed of material under the pipe. The undercut area may be backfilled with suitable excavation, or granular material if necessary, and compacted. The Inspector should decide whether or not undercutting is necessary and what material to use for bedding. Granular material may be required with wet conditions.

In general, material excavated should be used as backfill to have uniformity with the surrounding roadbed, minimizing differential frost heaving. Objectionable material should be separated from usable material and used in slopes or wasted. Care should be taken to compact under the haunches of the pipe and to place backfill in maximum 200mm [8 in] layers. A 900 mm [3 ft] cover must be maintained over the culvert to protect it from traffic loads. This may be a fill of common material or Aggregate Subbase Gravel above subgrade. Longitudinal drainage (parallel to centerline) would not usually require cover as it can usually be barricaded off except at crossovers or side roads.

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#### 603-5 INSPECTION

Upon delivery to the project, all pipes should be given an occasional check for general conformity to specification requirements and for damage. Pipe can be damaged in transit or by poor handling practices. Drying stress cracks in RCP culvert do not necessarily indicate unacceptable pipe. Rust spots or exposed metal is not necessarily exposed reinforcement. This usually indicates the ends of wire spacer supports that hold the reinforcement in position in the form. If any pipe has apparent manufacturing defects, the Resident should check with Technical Services, for AASHTO specification requirements.

The Inspector should ascertain that the layout stakes are properly located as to line and grade. If the grade doesn't look right for efficient drainage, check for errors and, if necessary, bring the situation to the immediate attention of the Resident.

For inspection, measurement, and documentation of excavation, see Section 206 of this Manual. The trench should be wide enough to allow installation of the pipe and compaction of the backfill. The culvert should be inspected for proper grade and alignment before it is backfilled.

Metal pipe connecting bands shall be drawn up tight and all bolts thoroughly tightened. RCP "O" rings shall be lubricated, and sections drawn together with joints open no more than 20mm [ $\frac{3}{4}$  in].

Polyethylene and PVC pipe sections should be firmly seated. Lifting holes in RCP pipe should be plugged.

Special care shall be taken to obtain proper compaction under the haunches of the pipe to obtain firm support; caution should be used to avoid over tamping to the extent that the pipe is lifted out of position.

Many failures of culvert pipe in the past could have been avoided by proper backfilling. Concrete or corrugated metal pipe cannot withstand heavy embankment loads unless the backfilling is performed in strict accordance with the Standard Specifications. During pipe laying and backfilling operations, the Inspector should occasionally observe the trench sides to see if shear cracks are developing.

Larger diameters of corrugated metal pipe (1200mm [48 in] and larger) come with steel rod struts placed horizontally on the interior. These struts deform the pipe making a shorter horizontal axis to compensate for vertical loads imposed by backfill material. Just prior to final acceptance these struts must be cut. Both the workers and the Inspector should be very careful when the cuts are made, as the struts are usually under considerable tension and often jump around unpredictably when cut through. Cutting should not be done too close to the pipe as it will damage the pipe coating.

Special fittings for pipes may be incidental to the work, or will be paid for as a special bid item. In those cases where they are not a bid item or not indicated on the plans, it will be necessary to follow the usual procedure for extra work; i.e., get a Lump Sum price from the Contractor if possible, or do the work "Force Account".



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Specifications prohibit placing pipe between December 15<sup>th</sup> and April 1<sup>st</sup> without written permission.

The Resident or Inspector will make visual inspections of all culvert pipes placed, to ascertain if the pipe has become damaged by construction hauling equipment or construction activities subsequent to its installation. Near completion of the Project, open systems should be checked for debris accumulation; necessary cleaning is usually done by flushing with water under high pressure.

The Inspector will document quantities for payment as follows:

- a. Open System Culverts - Record the plan dimension plus any additional lengths due to authorized field changes for each location.
- b. Closed System Culverts - Actual quantity may vary from plan dimensions due to field changes in locations of catch basins or outlets. Quantities documented will be determined from the computed lengths as verified by installation notes or from field measured lengths.

All measurements and other pertinent inspection notes will be recorded in a Diary.

#### 603-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Drainage Book, Construction Book: The Resident or Inspector will keep drainage installation notes in the Drainage Book if the drainage is extensive or in a Construction Book if the drainage is a minor contract item. Section 901-3 describes Drainage Books in more detail.

Final Quantity Book: Final quantity for payment will be entered in the Final Quantity Book under each appropriate item. Entries will be signed, dated, and referenced to the source documentation in the Drainage Book or in the Construction Book.

Excavation to install drainage is incidental to the item except for rock and excavation “below grade”, as defined in the Standard Specifications. If a boulder or a concrete obstruction measuring 2 m<sup>3</sup> [2 yd<sup>3</sup>] or more is encountered in the excavation, that portion within the limits of the trench is paid as structural rock and the portion outside the limits is paid as common rock excavation. Portions within and outside the trench limits can be estimated in fraction, example “½ boulder outside trench.” In a “full construction” area, if a portion of the boulder or concrete is above subgrade, that quantity will be paid as rock excavation and deducted from common excavation. Undercutting of earth, up to 300mm [1 ft] is incidental to the pipe. Below 300mm [1 ft] is paid as structural earth excavation. Refer to 206-7 for a further description of structural excavation for drainage. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## MANHOLES AND CATCH BASINS

### 604-1 GENERAL

#### References

(1) Construction Manual

Section 603 - Culverts and Storm Drains

Section 605 - Underdrains

Division 800 - Utilities

(2) Standard Specifications

Section 206 - Structural Excavation

Section 502 - Structural Concrete

Section 704 - Brick and block

(3) Standard Details, Highways and Bridges, for types, construction details, grates, steps and special details.

(4) Supplemental Specifications and Special Provisions.

(5) OSHA Construction Standard for Excavations

### 603-2 LAYOUT AND CONTROL

Catch basins and manholes will be laid out by the Contractor.

### 604-3 TESTING REQUIREMENTS

Certification Letter, as per Standard Specification Section 700

### 604-4 CONSTRUCTION

Equipment used for this work will be substantially the same as described in Section 603 of this Manual. The units are almost always constructed of pre-cast components, i.e. tub, barrel and cone sections. Sometimes it is

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necessary to construct the units utilizing concrete blocks and clay bricks due to conflicts with utilities, or to fit existing conditions. Concrete bricks should not be used as they deteriorate rapidly. Conflicts may be avoided with the use of offset cones or no-sump basins. Sometimes it is necessary to use units over the normal 1200mm [4 ft] diameter because of the size and/or number of culverts connecting with the unit.

Block alignment should be neat, but not necessarily absolutely perfect. As long as it is structurally sound and will adequately serve its intended function, it will normally be acceptable. Cutting or leaving holes to insert the pipes later necessitates a patch job in the masonry. If such cutting or patching is necessary, care must be taken to insure that all voids are filled. Some catch basins have rubber gaskets in the culvert openings, eliminating the need of patching around the culverts.

It should be determined exactly how deep the finished structure will be before the bottom is set. The top of the cone should be about 300mm [12 in] below finished grate grade to allow for the frame, mortar and bricks. The construction of any masonry structure in freezing weather should be discouraged.

Soil conditions under catch basins and manholes are important because of the weight of the structures. It is often necessary to undercut and replace the soil with compacted granular material. These excavations often end up being quite wide in relation to the size of the structure. For this reason the material should be placed far enough back to prevent a cave-in of the adjacent banking. A trench box or shoring is often necessary to protect workers.

As a general rule, a Utility will not be asked to move or relocate its installation if it can be avoided. The final decision will be made by the Resident.

Backfilling is done to subgrade using the material excavated, except for undercut material, and then Aggregate Subbase Gravel is used.

The frames and covers of manholes should be left temporarily below grade until paving surface. This can be done by temporarily setting the top course of masonry without mortar and setting the frames to their approximate final grades (usually a little bit low). Another common method is to leave the frame and cover off entirely. In this case, the top of the masonry or concrete structure is covered with a heavy wooden or steel cap until the work is complete, except for the surface course. In either of the above methods, the material placed around and/or over the cap or frame and cover is removed by cutting out the pavement and base as necessary. The frame is then set to final grade, depressed as shown on Standard Detail 604(08), using the bituminous binder course as a guide and installing bituminous concrete around the frame and cover from the gravel grade to the surface. It should be noted that the gravel and pavement around the frame should be graded to provide a "trough" at the gutterline, as shown on Standard detail 609(05).

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When altering catch basins, assure all loose bricks and mortar are removed before setting the new assembly. When rebuilding units, the existing structure should be removed to solid concrete or brick, and replaced. With new, altered, adjusted, or rebuilt units, cleaning of the sump is incidental.

#### 604-5 INSPECTION

The materials and components for manholes and catch basins should be inspected when delivered to the project. The Inspector should ascertain the basins conform to the plans; i.e. culvert hole location and grade and total height of the unit. Grates and frames should be carefully inspected for large "blowholes", fractures, thin sections and open casting joints.

The grate grade of installed units may be checked using string or a straight edge from the next to last pavement course. Grates should be aligned properly with the flow.

#### 604-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Excavation to install drainage is incidental to the item except for rock and excavation "below grade", as defined in the Standard Specifications. If a boulder or a concrete obstruction measuring two cubic meters or more is encountered in the excavation, that portion within the limits of the trench is paid as structural rock and the portion outside the limits is paid as common rock excavation. Portions within and outside the trench limits can be estimated in fraction, example "½ boulder outside trench"

In a "full construction" area, if a portion of the boulder or concrete is above subgrade, that quantity will be paid as rock excavation and deducted from common excavation

After acceptance of the installations, the height from floor to top of grate should be measured and recorded for final payment. Units up 2.5 meters [8 ft] will be 1 each. One fifth of a unit [one eighth of a unit] will be added for each additional 0.5 meters [1 ft] over 2.5 meters [8 ft] measured to the nearest 0.5 meters [1 ft]. Rebuild, alter and adjust items are measured as 1 each.

Drainage Book, Construction Book: The Resident or Inspector will keep drainage installation notes in the Drainage Book if the drainage is extensive or in the Construction Book if the drainage is a minor item in the contract.

Final Quantity Book: Final quantity for payment will be entered in the Final Quantity Book under each appropriate item. Entries will be signed, dated, and referenced to the source documentation in the Drainage Book or in the Construction Book. **All calculation and data entries must be signed, dated, and checked; the checker must sign a date his/her entries.**

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## UNDERDRAINS

### 605-1 GENERAL

#### References:

(1) Construction Manual

Section 206 - Structural Excavation  
Section 603 - Culverts and Storm Drains  
Section 703 - Aggregates  
Section 706 - Non-Metallic Pipe  
Section 707 - Metal Pipe

(2) Standard Specifications

Section 206 - Structural Excavation  
Section 603 - Pipe Culverts and Storm Drains  
Section 703 - Aggregates  
Section 706 - Non -Metallic Pipe  
Section 707 - Metal Pipe

(3) Standard Details, Highways and Bridges

(4) OSHA Construction Standard for Excavations

(6) Supplemental Specifications and Special Provisions

(7) List of Minimum Testing Requirements

### 605-2 LAYOUT AND CONTROL

Layout for underdrain will be done by the Contractor.

### 605-3 TESTING REQUIREMENTS

Pipe: Certification Letter, per Standard Specifications, Section 700

Gradations: Underdrain sand and stone; see List of Minimum Testing Requirements

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#### 605-4 CONSTRUCTION

Underdrain systems are invariably located well within the R/W limits. However, if outlets are relocated, they should not create drainage ways without easements or flood areas inside or outside the existing right-of-way. Many underdrains flow continuously, creating such a problem. Outlets should go into catch basins, manholes, or culverts or be directed to existing drainage ways if possible. The Right-of-Way team member should be contacted to ensure there will not be drainage easement problems. The Resident should check that provisions are made for the pipe if a system outlets through a bridge structure.

The Contractor shall make a choice of pipe material for use in Type B and Type C Underdrain. Underdrain pipe should not be used to take the place of culvert pipe. The upstream end of pipes should be capped, or sealed with a stone and mortar or bricks and mortar.

The direct connection of existing or new drains from abutting property to underdrain pipe is prohibited by State law. Contamination from these drains could cause the effluent of the system to need treatment. Current policy does allow these drains to outlet into the granular material of underdrain trenches, but this policy may change in the near future.

The Resident will often have to make decisions on new locations for underdrain, depending on soil conditions in the field.

Methods of construction and type of equipment used for installation of underdrain are substantially the same as discussed in Section 603 of this Manual, except special backfill of stone and/or sand are required for all types of underdrain. Backfill around Type "C" up to the perforations should be with a relatively impervious material except when in rock as explained below. Granular backfill for Types "B" and "C" shall be placed in 200mm [8 in] layers to subgrade elevation. Care should be taken to keep the surrounding earth or other dirt from contaminating this special backfill material.

In rock cuts, the blasting and excavating usually removes rocks well below the required depth. It is permissible to backfill with broken ledge rock or with material meeting the requirements for underwater granular borrow. Type "B" will then be backfilled in accordance with Specifications. Type "C" should be filled with granular borrow to the perforations and then backfilled in accordance with specifications.

When underdrain is installed in fill areas, the policy is to place the fill to subgrade elevation and then excavate the fill for the underdrain.

Material excavated should not be wasted unless there is no possible use for it on the Project. The Contractor should plan on its use and leave enough space to place this material.

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When a substantial amount of water is flowing into the excavation, care should be taken to prevent water flowing directly into the pipe already installed as clay or silt may be washed into the pipe reducing its effectiveness. This can often be accomplished by using a sump or pocket on the inlet end of each pipe section; if necessary for the Contractor to flush the system it would be at no cost to the State.

Outlets should run into a catch basin, manhole or a culvert wherever possible, assuring the outlet should not freeze or clog up readily. When outletting into a culvert, the flow line of the underdrain should enter the culvert above the one-third point or slightly above the spring line. Pipes outletting out of slopes should have the end 150mm [6 in] above the adjacent grade of the ground to prevent the pipe from being buried in the future.

The impervious material used as fill for Type "C" underdrain should be at or near its optimum moisture content. Soil that is too wet can cause "floating" of the pipe when it is compacted under the haunches of the pipe. Compacting is done most efficiently with pneumatic hammer type equipment. Holes in Type "C" underdrain, plugged with impervious fill, must be completely cleared before backfill is placed. This may be accomplished with an air hose or with hand tools.

Crushed stone placed over Type "C" should be placed in one 150mm [6 in] layer over the top of the pipe. Initial lifts of sand should be 300 mm [12 in] in depth to protect the pipe from compaction equipment on both types of underdrain.

#### 605-5 INSPECTION

The Resident will brief the Inspector on the expected duties, making sure they have the proper equipment and access to all pertinent data regarding underdrain installation.

Locations of underground utilities should be noted on the plans; if not, have the utilities dig test holes to locate them for possible interference with underdrain locations. If circumstances prevent the utility from digging these test holes, it may be necessary to hire the Contractor to dig the holes.

All underdrain pipes should be given a visual inspection on delivery for manufacturing defects and damage. Pipe that apparently does not meet our specification requirements must not be used until a final decision has been made as to its acceptability.

The inspection of Structural Excavation work is an essential part of the underdrain installation. Reference is made to Section 206 of this Manual, Structural Excavation.

Some contractors will set stakes and place a grade line at a given height above the flow line. A marked pole or survey rod is used in conjunction with a hand level to grade the trench bottom and set the pipe accurately. Where possible a laser is frequently used for grade and line control, greatly simplifying the work.

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Special connections such as wyes, tees, elbows or crosses should be tied into the project centerline so they can be plotted on as-built plans, permitting them to be located in the future in case of plugging or failure of the system. Special connections are usually paid as 1 m [3 ft] of the largest size in the connection, and runs are measured through the connection.

#### 605-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Quantities for payment will be documented by either of the following methods:

- a. Measurement of each run during or after installation. This method may be used to arrive at a final quantity or a progress quantity.
- b. Field count of the number of sections installed. This method may be used in itself for progress payment and to verify length figured between two known stations for final payment or for progress payment.
- c. Lengths of special connectors, i.e., elbow, wye or tee, will be included in the overall measured or computed length of the run of underdrain.

Drainage Book, Construction Book: The Resident or Inspector will keep drainage installation notes in the Drainage Book, if the drainage is extensive or in the Construction Book if the drainage is a minor item in the contract. Section 901.3 – Field Books in Division 900, describes in more detail the content of these fieldbooks.

Excavation to install drainage is incidental to the item except for rock and excavation “below grade”, defined in the Standard Specifications. If a boulder or a concrete obstruction measuring two cubic meters or more is encountered in the excavation, that portion within the limits of the trench is paid as structural rock and the portion outside the limits is paid as common rock excavation. Portions within and outside the trench limits can be estimated in fractions, example “½ boulder outside trench”.

In a “full construction” area, if a portion of the boulder or concrete is above subgrade, that quantity will be paid as rock excavation and deducted from common excavation.

Final Quantity Book: Final quantities for payment will be entered in the Final Quantity Book under each appropriate item. Entries will be signed, dated and referenced to the source documentation in the Drainage Book or in the Construction Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries**



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## GUARDRAIL

### 606-1 GENERAL

#### References:

(1) Standard Specifications

Section 708 - Coating Materials

710 - Rails and Posts

(2) Standard Details

Design locations for guardrail are listed in the Construction Notes, Plan View, and Cross Sections.

### 606-2 LAYOUT AND CONTROL

The Contractor shall lay out ends of guardrail locations with stakes. The Inspector should review the location of the stakes and ensure that the placement is appropriate for actual jobsite conditions. Check to see that the end locations are extended enough to shield the hazard that the guardrail is intended to protect. Remember that end treatments do not count as protection when looking at length of need. Check to see if the guardrail run can be extended to eliminate an end treatment. If there is an appropriate place within 50 to 75 meters [up to 250 ft] for a radius, the radius end should be used. This is because it is typically cheaper, especially factoring in maintenance cost, to extend the run than place an end treatment with a widening. Any changes must be approved by the Resident, and a revised list of guardrail locations should be presented to the Contractor. Final end locations shall be staked prior to constructing shoulders or shoulder widening areas.

Actual line and grade for the guardrail run is set by the Contractor. The centerline paving joint is usually used for horizontal control, and the finished shoulder grade for vertical control. The Contractor may set up a string line to use as horizontal and vertical alignment for installing the posts. A common error is to crowd the line string with one post, thereby upsetting the alignment of all the others in that run of rail. Keep in mind that precise line and grade is not necessary. However, minor location adjustments can and should be made for visual appearance. It is important that the finished installation look correct to the eye because this is the way it will look to the motorist. Particular care should be taken on horizontal curves that several intermediate points are set to provide a smooth continuous curve. The offset from the roadway centerline should also be checked. Guardrail should not be placed closer than 1.2 m [4 ft] from the edge of travel lane or 5 m [16 ft] from the

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centerline of the roadway. The greater distance will control. (The 5 m [16 ft] minimum is critical to accommodate snowplow widths).

When the Contractor lays out guardrail and end treatments (MELTs, 350s, etc.) particular care should be taken to determine the exact locations of electrical conduit, underdrain, culverts and other underground installations. According to Dig Safe regulations, these utilities should be located and well marked. If underground conflicts exist with proposed guardrail locations, bring it to the immediate attention of the Resident. The Contractor is responsible for repair of damaged underground installations.

#### 606-3 TESTING REQUIREMENTS

##### Beam Type Rail-Steel Posts-Offset Brackets and Fittings:

Certification - Refer to Division 700, as per the List of Minimum Testing Requirements.

##### Pressure Treated Posts, Wood and Polymer Blockouts:

Certification - Refer to Division 700. as per the List of Minimum Testing Requirements.

#### 606-4 CONSTRUCTION

Contractors may either drive guardrail posts or hand-dig the holes. However, if the holes are dug deeper than required the fill under and around the posts must be backfilled in layers not exceeding 100 mm [4 in], and it must be thoroughly compacted. The Contractor must trim neat straight edge lines, and then fill the entire hole created by driving the post. If the guardrail is on a paved shoulder, ensure that bituminous patching is completed around the posts. The intent of this is to prevent erosion from occurring around the posts. Ensure that any posts that become damaged (bent, distorted, etc.) be removed and replaced. Also, check to see that the posts are set reasonably plumb and are at the correct height (730 mm [28 in] from finish ground level to top of post). If the guardrail height is outside of this range it needs to be adjusted to the proper height.

Placing posts on or in solid rock can be done in several ways. The preferred method is to blast the rock and set full-length posts in accordance with Plans and Specifications. In areas where blasting is not allowed, the rock can be removed with a jack-hammer. In situations where blasting is unwise or impractical, other methods may be used, but the method must be approved by the Resident. Sometimes posts can be shortened and set in concrete on top of the rock. Another solution may be to eliminate a post in an area of conflict and double up the W-beam in that section. When guardrail is to be installed in a fill section, rock shall not be placed in the embankment under the location of the guardrail to an elevation 1.2 m [4 ft] below the finished grade of the shoulder.

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Single posts for mailboxes should be placed at a location acceptable to the property owner and in accordance with Standard Detail 606(01). In case of conflict, postal requirements should be given the greater consideration. Ensure that multiple mailbox assemblies are constructed in accordance with Standard Detail 606(02). If they are supported by a plank, they are considered dead fixed objects and should be replaced with a breakaway device. When existing mailbox facilities are removed due to construction, the boxes and posts, if necessary, shall be removed and placed beyond the lines of improvement. Further disposition or arrangements for mail delivery is up to the individual property owner.

#### 606-5 INSPECTION

The Inspector should have a pop level, folding rule or tape, and a set of plans showing locations and details of the guardrail on the project. The Inspector must also be familiar with the Standard Details and specifications involving the types of guardrail to be constructed. Any new runs of guardrail on the NHS shall pass NCHRP 350 standards and be approved by FHWA. For Non-Proprietary guardrail devices (such as NCHRP 350 terminal ends), Contractors must submit a set of installation drawings and manufacturer's specifications to the Resident for approval of the device prior to installation.

When pressure-treated wood posts with pre-bored holes and precut tops are used, the location of the holes is critical to the function of the guardrail. When wood posts are delivered they should be checked for dimension, spacing and location of holes, and that they do not have any serious structural defects as specified in the Standard Specifications, Section 710.07. Component parts should be checked for Plan and Specification compliance. Small pieces in particular, such as nuts, bolts, washers, spacers, clips, and similar items are all required to be hot dip galvanized and should be checked.

If previously erected guardrail is damaged during any non-suspended period that the Contract is in force, the Contractor is responsible for the repair of the damage incurred. (Refer to Section 104.2.7 of the Standard Specifications.) If damage occurs during a suspended period, it is the general policy of the Department to pay for the damage. Damage to guard rail that has apparently been done during the winter should be brought to the attention of the Construction Support Manager before a final decision is made on who is responsible for payment. (It may be possible that a State Maintenance crew will do the work.)

When installing new guardrail runs, the length of the run needs to be taken into consideration. The lane of traffic next to a guardrail run cannot be opened with an exposed end. A temporary end treatment must be installed nightly on uncompleted runs exposed to traffic.

Final acceptance should not be given until the installation is properly aligned and has a uniform appearance. Adjustment of new guardrail runs is included in the new guardrail price. Adjustment of existing runs where beams have been replaced is paid through the new beam areas. After erection, a check should be made to be sure that all bolts are in place and tightened. Also, check the w-beam rail to ensure that it was installed

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correctly. It must be lapped over in the direction of traffic flow so that the beam doesn't penetrate the vehicle in the event of a collision. Ensure that delineator posts are installed on the ends of the guardrail runs as well.

When connecting guardrail to a bridge, ensure that the first guardrail panel before the end post is a double layer modified guardrail panel and the additional guardrail posts are spaced as shown on the Standard Details, 606(25) and 606(26). The "Michigan Shoe" attachment must be lapped with the exposed end away from approaching traffic. Also ensure that the materials used for installing anchor bolts are on the current MDOT pre-qualified product list for anchoring materials. This list is available from the MDOT Internet site (<http://www.maine.gov/mdot/planning/products/product.htm>) or from the Bureau of Planning. When completing a splice due to a bridge connection, the length of panel must be at least two panels long, each 3.81 m [12.5 ft], or a total of 7.62 m [25 ft] from the end post prior to making the splice. When the existing run is 61 m [200 ft] or less, however, the entire run should be removed and reset and posts driven at the proper spacing.

The Inspector must check the galvanized surfaces of guardrail components. Any components that have been abraded or cut (such that the base metal is exposed) must be cleaned and painted with two coats of zinc galvanized rust-resistant paint.

#### 606-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary/Daily Report: the Resident or Inspector will document the Contractor's progress on guard rail items. If guardrail work on the project is extensive and if several items are involved, for example: remove, modify, and reset, or adjust, or remove and reset, the Resident should set up a "guardrail book". Each run guardrail to be worked on will be entered in this book primarily by location, i.e. station to station, left or right, and further identified by type of work to be done, whether remove, modify, and reset, or adjust, etc. As a run is complete and accepted, it will be so noted by the Inspector and dated.

Final Quantity Book: Final quantity for payment will be entered in the Final Quantity Book, signed, dated, and referenced to source documentation or noted as original entries.

Final quantities will be field measured or figured from station to station. **All calculation and data entries must be signed, dated, and checked; the checker must sign a date his/her entries.**

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## FENCING

### 607-1 GENERAL

#### References:

(1) Construction Manual

Section 1001

(2) Standard Specifications

Section 710 - Metal Components

502 - Structural Concrete

(3) ASTM A-153

(4) Standard Details

Locations for types of fencing required are listed on the plan sheets, and are usually drawn on the Plans if a definite location has been established.

Concrete for posts or anchors should not require the services of a specially trained concrete plant inspector. This concrete is not for structural strength as such, but is more of a special fill. Depth of holes in ledge, size of forms for concrete and type of concrete are specified on the Standard Detail Sheets, Section 607.

On controlled access R/W, the State is responsible for the maintenance of permanent fencing. On R/W with no access control, the property owner maintains permanent fencing.

Fences erected under contract on highway projects will be located as follows:

Chain Link or Cattle Fence on Controlled Access R/W projects shall be erected with the fencing on the side of the posts away from the highway and so located that the fencing and posts are entirely within the Right of Way. It is suggested that the center of the posts be set on a line 150mm [6 in] inside the Right of Way Line.

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On all other projects, the fencing shall be installed entirely outside the Right of Way limits with the fencing on the side of the posts away from the highway. It is suggested that the center of the posts be set on a line 150mm [6 in] outside the Right of Way Line.

#### 607-2 LAYOUT AND CONTROL

All layout necessary for fencing will be the responsibility of the Contractor. Depending upon the location it may be necessary to use a Survey Crew. When fencing is along R/W lines, it will be necessary for these lines to be precisely located. The Contractor will locate the fencing from the above control as required by the plans. Verification of location is suggested.

The amount of fencing required on a job often varies from the Plans. It is not uncommon to have a given quantity of fence at an "undetermined" location. The Contractor should be given a complete list of types and locations of fences required, far enough in advance to permit the ordering of materials.

Shop drawings are not normally necessary as detail sheets found in the Standard Details give sufficient data for most cases. However, special cases can always occur, for extra wide entrances or other situations requiring special details or equipment. In such cases, shop drawings will be requested, usually as a part of the Specifications. Approved copies must be on file before materials are ordered or work is started on the phase covered by the shop drawings.

#### 607-3 TESTING REQUIREMENTS

Gates, Wires, Fabric, Posts & Braces: Certification - Refer to Division 700. It is recommended that a call be made to the Supervisor of Independent Assurance in Bangor, (207) 941-4531.

#### 607-4 CONSTRUCTION

Where fencing is shown to be located within the R/W, the fencing Contractor must take extreme care that he does not encroach on abutting property unless the expressed permission of the Owner is obtained in writing. Where fencing is shown on the plans to be located off the R/W, the Right to Work Permit is obtained by the R/W Division. Spacing of posts is shown in 607(8) of the Standard Details.

Methods of accomplishing the work and the equipment necessary are fairly standard. Postholes are usually dug by machine if the location is in earth and is accessible. Otherwise, they are dug with hand operated gasoline powered augers or by hand labor.

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Single holes drilled in rock for metal posts should be at least 25mm [1 in] larger in diameter than the largest dimension of the post to be used. A sand-cement grout should be used to set posts in the drilled holes. Posts should be carefully plumbed when mortar is placed, making sure that the bracing used cannot be readily disturbed.

Fencing is not usually erected after frost penetrates more than a few inches, unless posts have been previously set. Fabric or wire can, of course, be placed any time as long as deep snow does not interfere.

Near the end of a run (approximately 12 to 18 meters [40 to 60 ft]), the bays should be balanced out to eliminate one or two obviously unbalanced bays at the end of the run. Round section bracing will usually be acceptable if the cross-sectional area is equal to the square bracing specified.

#### 607-5 INSPECTION

Any layout the Contractor does should be checked by the Inspector assigned to cover the fencing items. It is easy to make the mistake of locating a fence 150mm [6 in] inside the R/W line when it is supposed to be 150mm [6 in] outside.

The Inspector will record work as it progresses, in either the Project Diary or an Inspector's Diary; i. e. station-to-station limits, fence length and other pertinent documentation. The Final Quantity accepted for payment will be field measured. Measurements will be recorded directly in the Final Quantity Book.

#### 607-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary/Daily Report: the Resident or Inspector will note the Contractor's progress on this item. Location of work, crew and equipment will be recorded.

Quantities for payment will be determined from field measurements or from plan dimensions verified by field notes. Notes and measurements will be entered in the Final Quantity Book.

Final Quantity Book: Final quantity for payment will be signed, dated, and referenced to field measurements, if such measurements are not entered directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries.**

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## SIDEWALKS

### 608-1 GENERAL

#### References:

(1) Standard Specifications

Section 403 - Bituminous Concrete

502 - Structural Concrete

705 - Joint Fillers

709 - Reinforcing Steel

(2) Standard Details Book (December 2002)

The general policy regarding existing walks is that they will be replaced at no cost to the Municipality, additional sidewalks are often paid for partly by the Municipality as per a Municipal/State Agreement. The only items involved in this cost are the gravel base and the pavement. Typically, items to be paid for by the Municipality have a different category number on the Progress Estimate Form.

Cross-sections usually give more accurate information as to exact location in relation to construction or survey base lines, and also exact width, transitions and other data necessary.

### 608-2 LAYOUT AND CONTROL

Locations, widths and types of walks are indicated on the Plans and Cross-sections. In most instances, sidewalks are constructed directly behind curbing. In those locations where they are directly behind the curbing, an offset line from centerline will provide an adequate basis for location by the Contractor.

### 608-3 TESTING REQUIREMENTS

None specifically required - Refer to Sections 304, 401, and 502 for tests required on items involved.



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#### 608-4 CONSTRUCTION

Excavation to subgrade for walks will usually be done when the roadway is excavated. Sometimes this part of the work is left until last and the work done by an all-purpose excavator, or even by hand. In fills, material is placed and compacted as a part of the roadway embankment. Grading of subgrade and placement of gravel base is usually done after curbing is completed. Fine grading is by hand, just prior to placing of portland cement concrete or bituminous concrete pavements.

Finishing of the surface on Portland Cement Concrete walks can vary from the "shell" finish specified. The Special Conditions and Supplementary Specifications should be carefully checked. The finish requirement could also be varied if the walk abuts an existing sidewalk with a finish different from that specified. Joints finished with a grooving tool are becoming less and less common. This is done more often with joint cutting saws, in sidewalks as well as roadways.

#### 608-5 INSPECTION

The usual equipment for field inspection is necessary. In addition, a string level or a carpenter's level is quite handy for accurate checking of the relatively small slopes of sidewalks.

#### 608-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary: The Resident or Inspector will note the Contractor's progress or work on this item, compactive effort, depth of gravel, thickness of pavement; proper cross-slope will be recorded.

Field Measurements will be entered directly in the Final Quantity Book for sidewalk measured by the square meter [square yard]. For sidewalks measured "by the item", delivered slips will be taken for hot bituminous pavements, gravel will be figured separately, either in-place or by the delivery slip if the work consists only of shimming the existing sidewalks, gravel may be included in the overall plan quantity for roadway gravel and therefore paid as part of the roadway gravel.

Final Quantity Book: For sidewalk paid by the unit, measurements will be entered directly in the Final Quantity Book. For sidewalk paid by the item, quantities for payment will be entered under the appropriate pay item elsewhere in the Final Quantity Book. **All calculations and data entries must be signed, dated and checked; the checker must sign and date his/her work.**

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## CURBING

### 609-1 GENERAL

#### References:

(1) Construction Manual

Section 612 - Bituminous Hand Sealing

(2) Standard Specifications

Section 609 - Curbing

(3) Standard Details

The type of curbing for a particular project will be as indicated on the list of bid items for that project. Normally, this will be one of the types designated in Section 609.01 of the Standard Specifications. The only variation will be in the case of special Cast-in-Place Portland Cement Concrete Curb. If such is specified, detailed Supplementary Specifications and appropriate drawings will be provided.

Vertical curb is generally used to keep water within the roadway, as a safety barrier between the traveled way and sidewalks, to keep sidewalks high enough to allow drainage to go into the gutter, and to define entrances to abutting property. Mountable-sloped curb is used around the perimeter of traffic islands and median strip for channelization purposes where emergency traffic can strike it or ride over it without going out of control.

### 609-2 LAYOUT AND CONTROL

In general, granite and concrete curb layout is shown on a separate plan sheet showing offsets to radii, PC's, and PT's based on computer data. If such a plan is not with the regular set of plans, it can be obtained from the Design Division. Layout will normally be done by the Contractor.

a. Granite or Concrete Curb The Contractor is responsible for grades required. In many cases, grades can be best obtained from the adjacent paved roadway by an offset line of nails placed in the base or binder course.

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b. Granite Edging Layout for edging is most commonly done by placing an offset line of nails on the base or binder course. Elevations are then taken on these nails and they are used as line and grade control to the top arris line. Lines for islands and short radii may be set by swinging a tape from the radius point as shown on the plans.

c. Bituminous Curb Layout for bituminous curb on roadways is usually done from centerline control points by locating an offset line on the pavement already placed. This line can be at actual curb line or be placed one foot inside the curb line and the Contractor will establish actual curb line just prior to placing the curbing. In general, grade is predetermined by the pavement grade. The exception is at catch basins and curb inlets. These areas should be shimmed so that the top of the curbing will be a true grade with no obvious sags and humps.

#### 609-3 TESTING REQUIREMENTS

a. Granite - none required.

b. Precast Concrete - Letter of Compliance from Materials & Research.

#### 609-4 CONSTRUCTION

Sectional type curb or edging should be handled with care when delivered to the project. A canvas sling or a set of steel tongs is usually used to prevent spalling and breakage.

Rough excavation is usually done just prior to setting final batter boards or pins for string grades. The rough grade should be thoroughly compacted at or near the correct moisture content, and left about one inch higher than the minimum final grade required. Proper compaction is very essential in order to help prevent undue future settlement of the curbing. Best practice dictates that aggregates over 25mm [1 in] be raked out of the top 50 to 75mm [2 to 3 in] of base directly beneath the curbing to facilitate fine grading and proper bedding of the curb stones. A final check for correct line and grade should be made just before placing surface course and adjustments made, if necessary.

A new method of installing granite curb has been tried with great success. A trench is dug in the gravel base to approximately 100mm [4 in] below the bottom of the curb and is thoroughly compacted. The curb is placed on small wooden wedges, set at each end of the curb. By gently tapping the wedges, the curb can be easily brought to line and grade. The curb is covered with a strip of plastic sheeting and fill concrete is placed, in the trench, under and around the curb up to the level of the Binder. This method of installation would be directed in the Special Provisions. An Extra Work Order is necessary to add this installation method after the Bid opening.

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a. Granite or Concrete Curbing Stones adjacent to previously set curb inlet stones must be set first and doweled using epoxy grout specified [Refer to Standard Detail 609(03)]. The remainder of the curb should be set working away from inlet stones.

Vertical type curb should preferably be installed prior to the binder course of bituminous concrete being placed, but can be installed prior to placing surface.

After bedding the stones, they are to be backfilled to subbase in thin 100 to 150 mm [4 to 6 in] layers of gravel base. Layers should be carefully and thoroughly tamped with a thin heavy tamping tool. Fill should be brought up equally on both sides of the stones as much as possible. Backfill material should be wet as necessary to obtain maximum compaction.

Contractors often leave the base course back 150 to 300 mm [6 to 9 in], set the curbing, and fill on one or both sides with binder or surface mix. Base course mix can be used but only to depth of base course. This fill material is placed by hand, but is paid for as machine-placed binder. (Refer to the Construction Manual, Section 401-5.) Layers should not be over 100 mm [4 in] thick and must be well compacted.

Actual and final locations of drive openings are best determined by eye in the field to be sure that they are located correctly in relation to the driveways as used. Widths should be according to plan. Plans usually call for a specified curb opening at driveways regardless of existing width of the driveways. There should be no objects in the curb line that would break a run of curbing. Present policy dictates that any object cannot be closer than one foot behind the face of the curb.

b. Granite Edging Edging should be placed before the wearing course of bituminous paving is placed. It should be placed so that the bottom arris line (at the gutter) will be at or below the finished pavement grade.

c. Bituminous Concrete Curb Bituminous curb should be placed to the exact line marked out. At catch basins where the grade is shimmed, it is very important that the shimming is correctly and carefully done with a fine sand mix or level mix. Otherwise, the end points will be rough and a sag with an adjacent hump accentuating it will result. A check should be made to be sure there is no bond-breaking paper in back of the face of the curb line where the shim material is placed.

#### 609-5 INSPECTION

Curbing for a specific project is sometimes inspected at the manufacturer's plant. If this is done, it is at the Contractor's request in order that they may be paid for curbing that has been set aside for the project but has not been delivered to the job site. (Refer to Sections 108.2.1 and 108.4 of the Standard Specifications.) This does not mean that individual pieces cannot be rejected when they are delivered to the site. Standard Specifications, Section 712.04 shows the allowable tolerances for all types of granite curb and granite edging.

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Checks should be made for the minimum length required for circular granite curb [Standard Detail 609(01)], and for anchor bolt holes and end finish [Standard Specification 712.04 (e)] for bridge curbing.

Width of joints between individual stones can be controlled with a piece of wood of about 10 mm [ $\frac{3}{8}$  in] in thickness. It is a good practice where bituminous concrete walks about the back of granite or concrete curb to use bituminous mix behind joints to prevent filtering of sand or loam through the joint.

Stones that get stained from fuel oil can often be cleaned with a strong detergent solution or Fuller's Earth or a combination of both. On bridge curbs, it is permissible to allow the linseed oil used on concrete to be used on the granite curb if the entire curb is covered with the oil.

Inspection of granite curb and edging should be made prior to placing the bituminous concrete wearing course. Checks should also be made during the paving operation to correct displaced stones before the mix cools and the stone is locked out of position. Portions of bituminous curb to be reflectorized should not be sealed.

#### 609-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project diary, Inspector's Diary/Daily Report, Construction Book: The Resident or Inspector will note the Contractor's progress on these items; approximate station to station limits of work, crew, and equipment will be recorded.

Field measurements should be made after curb has been installed. Measurements shall be as specified and as shown on the Standard Detail Sheets, taking into account terminal ends and circular granite curb. There is no difference in price for circular bituminous curbing. Measurements shall be recorded in the Final Quantity Book. If the curbing is extensive, the Resident should set up a "curb Book" or at least a part of the construction Book before the contractor begins work. The location of each item of curb, i.e., "new", "reset", or "circular", and others, should be identified by sketches, station to station limits, left or right.

Final Quantity Book: Final quantity for payment will be entered in the Final Quantity Book, signed, dated, and referenced to measurements.

No separate payment is made for excavation to install curb, whether new or reset. Excavation is incidental to the curb item or to roadway excavation. There is no payment to remove existing curb. Only curb that is reset is measured for payment. Removal of existing curb that is not used is incidental to other items in the contract. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries.**

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Section 610 Stone Fill, Riprap -- 2 Pages

## **STONE FILL, RIPRAP, STONE BLANKET, AND STONE DITCH PROTECTION**

### 610-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 610 - Stone Fill, Riprap, Stone Blanket and Stone Ditch Protection

Sections 703.25 thru 703.29 - Materials

##### (2) Standard Details

Section 610

##### (3) Best Management Practices for Erosion and Sediment Control

This work shall consist of excavating for and constructing a protective covering of stone, with or without grout.

### 610-2 LAYOUT AND CONTROL

Layout will be done by the Contractor, but should be checked for location and slope prior to work being started. This can be done with batter boards and a string line or a hand level and a wooden ruler.

### 610-3 CONSTRUCTION

As a rule of thumb, a cubic foot rock will average 68 to 77 kg [150 to 170 lb].

Larger stones should be used at the bottom of the slope. The bottom layer should be set in a toe trench to support the stone.

Stone Ditch should be angular so it can be keyed in to the other stones. It is typically placed 300mm [1 ft] deep and is placed on erosion control geotextile (See the Construction Manual, Section 620).

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Riprap must be angular and clean according to Specifications. Pit tailings are not allowed. Riprap is typically placed 450mm [1.5 ft] deep and is placed on erosion control geotextile (See the Construction Manual, Section 620). Blasted ledge from the project often can be used as Riprap, as long as the size and cleanness is acceptable to the Resident.

When grout is called for in the Plans or Special Provisions, the grout should have the consistency of heavy cream so it can flow and fill all voids.

#### 610-4 INSPECTION

Normally, excavation is incidental, the Inspector should check the Plans and notes for verification. The final acceptance of riprap areas may be contingent upon neatly cleaning up the surrounding slopes of all debris and choking up all voids with gravel or broken rock securely rammed into place. Riprap to be grouted should be left open enough for grout to run down through.

#### 610-5 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary, and Construction Book: The Resident or Inspector will make notes documenting progress of work on these items. He/she will record source of material, whether rock from within the excavation limits on the project, pit tailing, or rock quarry. Measurements, sketches, and computations will be recorded in the Construction Book or directly in the Final Quantity Book.

Final Quantity Book: Final quantity for payment will be entered in the Final Quantity Book, signed, dated, and referenced to measurements and calculations. Quantities will be determined from surface area measurements to limits authorized by the Resident and to depths shown on the plans.

If riprap or stone fill is placed under water or on rough, irregular ground as required by the Resident or called for on the plans, quantity for payment can be measured by delivery slip with no reduction in volume. References are made to Section 610.05 of the Standard Specifications.

If the source of material is rock excavation, there will be no deduction from borrow, even though rock excavation is designated for use in the embankment, i.e., even though the project is a "borrow" job. Standard Specifications, Division 100, Section 104.3.13 allows the use of ledge for items designated under this Section without deductions from borrow.

There will be no payment for excavation beyond the face of riprap, stone ditch protection and stone blanket; only the excavation from original ground to face of the finished slope is allowed, i.e. excavation is incidental to riprap where rock is actually placed. More detailed explanation is given in Section 610 of the Standard Specification. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## **BITUMINOUS SEALING**

### 612-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 612

Section 702.12

##### (2) Standard Details 609(03)

Emulsified sealing compound is occasionally applied on bituminous curb (when the mix does not have a “tight” appearance. A very rare situation with today’s curb mixes), paved gutters and paved islands (when directed on the Plans) to improve water-shedding properties and to improve appearance. The material is commercially marketed, usually delivered in five-gallon pails and has the capability of being diluted with additional water, if needed. Islands, medians and crosswalks may instead be included under Item 658.20 if an acrylic latex color is specified.

Sealing the shoulder area on a bridge is incidental to the bridge paving, and is discussed in the Standard Specifications, Subsection 403.03 (e) and (f).

### 612-2 LAYOUT AND CONTROL

Bituminous curb should be painted only on the top and front face. If the ends are to be reflectorized, sealing should not be done because it may bleed through the white paint. The vast majority of bituminous curbing will not need to be sealed with the finish today’s mixes give. This item is typically a throw in estimate and rarely used in the field.

Using the sketch shown on Standard Detail Sheet 609(03), the area to be reflectorized can be marked off on each run of curb, a top line designated, and the remaining area sealed with two applications of compound. Downspouts and islands, if not included item 658, will be completely covered with two coats.



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#### 612-3 TESTING REQUIREMENTS

None required - must conform to specification requirements Subsection 702.12

#### 612-4 CONSTRUCTION

Sealing compound is delivered either in diluted or in concentrated form. When diluted by the manufacturer, it should be used as it comes from the can. When undiluted, it should be diluted by adding not more than 50% water (i.e.-5 gallons of water to 10 gallons of undiluted emulsion). A stiff-bristled brush or broom works well on curb and downspouts, whereas a squeegee or sponge mop works better on island surfaces and will not leave brush marks. The areas treated with sealing compound must be protected with the use of traffic control devices when subject to vehicle, bicycle or pedestrian traffic for drying purposes.

Different name brands of sealer seem to act differently with the addition of water. Therefore, some experimentation by adding water slowly until a good workable mixture is produced is generally acceptable procedure.

#### 612-5 INSPECTION

Areas to be sealed should be checked for cleanliness. Normally, sweeping and blowing is sufficient. Two coats are required, and drying required between coats. Air temperatures and sunlight will influence drying time. Notes should be included in bound book for documentation of manufacturer of material used, mixing and application.

#### 612-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary: Appropriate notes will be made in the project records regarding weather conditions, temperature, and brand name.

Final Quantity Book: Final quantity for payment will be determined from field measurements or plan dimensions or a combination of both and will be properly referenced to the source documentation. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries.**

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## EROSION CONTROL BLANKETS

### 613-1 GENERAL

#### References:

Standard Specifications

Section 613 - Erosion Control Blankets

Section 615 - Loam

Section 618 - Seeding, Fertilizer, Lime

Section 619 - Hay Mulch

Section 717.061 - Erosion Control Blankets

Section 717.063 - Ground Anchors

Best Management Practices for Erosion and Sediment Control

Erosion Control Blanket, as specified in Special Provisions, will be used. The use of Erosion Control Blanket is not recommended where water velocity exceeds 1.5 m/s [5 ft/s].

### 613-2 LAYOUT AND CONTROL

Precise layout as such is not required. The Contractor will place the Blanket in such locations as designated on the plans and/or indicated by the Resident or Inspector. Blanket shall be used in locations such as shoulder berms, esplanade strips, curb sections, ditches, and drainage ways. **All excavated ditches should receive erosion control blanket or stone.**

### 613-3 TESTING REQUIREMENTS

Certification - Refer to Division 700, Materials & Tests.

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#### 613-4 CONSTRUCTION

Seed will be sown prior to installation of the Erosion Control Blanket. No loam will be required under the blanket. Seed and its application will not be paid separately, but will be considered incidental to the item.

The only practical method of placing is by hand. The Standard Specifications, Section 613.05 and the Standard Details should be followed for placing the material. Corners or relatively sharp turns should be neatly folded and well pinned with fold-over laps facing downstream. Blanket must be in close contact with the soil at all points. To accomplish this, the soil must be smooth and free from rocks, lumps and other irregularities. Great care must be taken not to stretch the blanket when laying it. It should lie loosely on the soil and should be stapled starting in the middle of the strip and working toward the side. If the blanket is stretched or raised to ride over irregularities it will bridge. Water will run under it and start scouring.

The spacing of wire staples and turning down of edges as shown on Standard Details is important and should be closely checked.

#### 613-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Quantity for payment will be field-measured, possibly with ditch measurements, and entered in a bound field book or directly into the Final Quantity Book. Measurements will be taken along the length and width of the installation. Overlapped or folded material is not included in the calculation; i.e. area covered, not area of material is the Pay Quantity. Blanket is commonly 1.2 meters [4 ft] wide.

#### Sample Quantity Book Entry

Item 613.319 Temporary Erosion Control Blanket				
Field Measured				
<u>Location</u>	<u>Length (M)</u>	<u>Width (M)</u>	<u>Area (M<sup>2</sup>)</u>	<u>Accum. Area (M<sup>2</sup>)</u>
RT/Sta. 1+350 to Sta 1+860	510	1.2	612.0	
LT/Sta. 2+015 to Sta 2+058	43	2.3	98.9	710.9
Entered By: <u>Sign &amp; Date</u>				
Checked By: <u>Sign &amp; Date</u>				

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## LOAM

### 615-1 GENERAL

#### References:

#### (1) Standard Specifications

Section 203

Section 615

#### (2) Best Management Practices for Erosion and Sediment Control

Sources of loam outside the lines of improvement must be approved by the Resident prior to its removal for use on the project. The loam specification was written to encourage the use of on-site soils. On-site soils can be amended with compost to provide loam; this is preferred to off-site sources. A condition of approval will be the acceptability of the arrangements for the final disposition of the proposed material sites. Unless the site is to be developed in a manner wherein remaining loam would be detrimental, an amount sufficient for site restoration must be reserved. (Refer to Pit Authorization Form)

If loam is taken from within the lines of improvement, its removal is paid for as earth excavation. Final placement of loam will be paid for at contract prices. It is the intent of the Department to salvage, and if necessary, to stockpile, all loam that can reasonably be salvaged.

Authorization for payment of loam used outside of designated grading limits should be made in writing (Diary notes and memo to Contractor) prior to the actual placing of the loam. Loam used to repair areas needlessly damaged by the Contractor's operations will not be measured for payment.

### 615-2 LAYOUT AND CONTROL

Any areas where loam is to be omitted but is shown on the plans to be loamed should be noted in a memo to the Contractor before the work is started. In some cases, stakes showing the location of a downspout, the limits of a ditch, the extension of a sodded area, or the extension of seeding may help clarify memo notations. Staking is the responsibility of the Contractor.

Before loaming operations are started, an inspection of the project should be made to determine if any areas would support a growth of grass without being loamed. This is usually determined as a material that meets the loam specifications.

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#### 615-3 TESTING REQUIREMENTS

Loam can be tested at the Resident's option. See Standard Specification 615.02.

#### 615-4 CONSTRUCTION

Best Management Practices dictates that loam be placed on slopes as soon as possible after grading is completed in an area.

Slopes should be near grade when loam is applied. Excessive depths of loam on steep slopes should not be allowed due to the tendency to slump when subjected to heavy rains. Contractors should not be allowed to "rough out" slopes during excavation operations with the intention of using loam to bring slopes to grade. This often produces areas prone to slumping and areas with insufficient loam to maintain a growth of grass.

Due to the increasing scarcity and concurrent increase in cost, the wasting of loam by unwarranted and excessive depths should be discouraged at all times. Whenever possible, construct fill slopes of waste and strippings. Such material will usually support grass without the addition of loam.

The Contractor should be notified of any major increases in loam on a project as soon as possible, to enable the Contractor to stockpile loam far enough ahead so that the sod and organics will break down and provide a more friable loam.

The Inspector should make sure that the loaming operation does not contaminate other portions of the work. Contamination is often caused by tracking wet loam onto graveled or paved areas and by spillage when being removed from hauling vehicles. Spilled loam subjected to traffic quickly becomes compact "lenses". These lenses are easily removed with hand shovels. The removal of spillage with grading equipment often incorporates the loam into granular materials and should not be allowed.

Hand raking of loam areas prior to placing of the loam is not generally necessary. Necessary finish can be obtained with ordinary construction equipment. Hand raking to remove equipment tracks or other marks is not normally necessary except where seeding Method No. 1 is to be used.

Standard Specifications, Subsection 615.04 requires loam to be spread uniformly to proper depth. Clods, roots, and stones over 50 mm [2 in] and all other foreign matter must be removed. In Seeding Method No.1 areas, the maximum stone diameter is 25 mm [1 in].

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#### 615-5 INSPECTION

Except as provided in Standard Specifications, Section 615, Specifications for loam are general in nature. The wide variety of loam available in different areas and difficulty of quickly field testing material makes approval a matter of judgment.

Loam shall be free from admixture of subsoil, refuse, large stones, clods, roots or other undesirable foreign material.

Loam is just another name for good topsoil. Very light, sandy loam and heavy clay loam should be avoided unless nothing better is available. All soils can be improved with the addition of compost. Suitable material will maintain a spherical shape when molded in the hand, yet crumble when disturbed. Loam is best judged when slightly moist. Soil from swamps and bogs does not make suitable loam and should not be used. If in doubt of suitability of the material, consult the Landscape Unit. Loam should be placed sufficiently to be 100 mm [4 in] deep after rolling in Method No. 1 seeding areas, and 50 mm [2 in] after rolling in other areas.

#### 615-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

The Resident or Inspector will keep notes describing the Contractor's loam, seed, and mulch operations. He/she will record location of areas worked, personnel equipment, and weather conditions. Depth of loam will be spot checked and recorded.

Final quantity for payment will be plan quantity or a quantity determined from measurements.

Plan Quantity. A review and check of the Engineer's estimate for reasonableness is an acceptable way to verify the quantity shown in the Schedule of Items. The plan quantity will be adjusted, upward or downward, if changes are made in the field.

Measurements. The accuracy and frequency of measurements will depend on the project. On a rural overlay job, station-to-station limits and typical widths scaled off the plans or field measurements are acceptable. On an urban job, areas will be divided into common shapes and field measured by length and width.

Loam and sod will be field measured. Field Measurements, scaled measurements, and load counts will be entered in a Construction Book, signed, and dated. Final Pay quantity will be entered in the Final Quantity Book and labeled as such, signed and dated, references will be made to the source documentation such as; measurements, load counts, and loading of the hydroseeder. **All calculation and data entries must be signed, dated and checked; the checker must sign and date his/her entries.**

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Section 616 Sodding -- 2 Pages

## SODDING

### 616-1 GENERAL

#### References:

(1) Standard Specifications Section 616

(2) Special Provision

Section 717.01(b) - Fertilizer

Section 717.02 - Agricultural Ground Limestone

Section 615 - Loam

(3) Best Management Practices for Erosion and Sediment Control

### 616-2 LAYOUT AND CONTROL

Sod for front lawns is normally laid out by painting an edge line on the ground. Other than this, layout as such is not usually required for sodding. When required, layout is done by the Contractor and approved by the Resident or assigned Inspector. Sod is usually placed to align with previously constructed items, such as curb, shoulders, slopes, ditches or other previously set or previously graded items.

### 616-3 TESTING REQUIREMENTS

None required.

The sod should consist of a reasonably clean growth of grass. Sod that is full of moss and weeds should not be accepted.

### 616-4 CONSTRUCTION

Sod is always placed by hand over the prepared loam bed of not less than 100 mm [4 in]. The areas should be fertilized and limed before sod is placed. Loam should be moist; loam can be saturated as long as the

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Contractor can maintain the grade while installing the sod. Sod needs to be watered the day of installation; on hot dry days this should be done as soon after installation as possible.

Particular care should be taken when placing sod strips. It is recommended that the top of the sod be recessed 12 to 25mm [ $\frac{1}{2}$  to 1 in] below the finished slope to be sure it does not block drainage. Lawn areas that are to be maintained by property owners should not be pegged even when the slopes are greater than 2:1. Pegs tend to work out of the ground and can become a hazard.

#### 616-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Areas to be sodded shall be cleared of large stones, roots, clods and other debris. Area shall be brought to proper grade as per plan, or Resident direction, allowing for the depth of sod so that the sod is at proper finish grade. If an area consists of hard packed soil it shall be scarified, or otherwise loosened to a depth of 50 mm [2 in] before placing loam. Refer to Standard Specifications, Section 616.04.

Sod shall be moist when laid and laid on a moist soil bed. Sod shall be at right angles to flow of water, beginning at the lowest point and working upward, placing the sod edge to edge to form a uniform surface. Vertical joints should be offset to reduce runoff. All joints should be plugged with suitable material to produce a tight surface. Areas subjected to scour shall have the leading edge turned down and buried to a depth of at least 75 mm [3 in]. Sod shall be tamped or rolled to a smooth surface. Sod shall be watered at intervals to assure that roots remain moist.

Sodding is measured by the square meter [square yard] in place. Quantity accepted for payment will be measured and recorded in a bound field book, preferably the Final Quantity Book. Soil preparation including excavation for the placement of sod, supplying and applying fertilizer and agricultural limestone will not be paid for separately, but will be considered incidental to the item.

#### Sample Quantity Book Entry

Item 616.08 Sodding				
	Field Measured			
<u>Location</u>	<u>Length (M)</u>	<u>Width (M)</u>	<u>Area (M<sup>2</sup>)</u>	<u>Accum. Area (M<sup>2</sup>)</u>
Sta. 1+350 to Sta 1+ 860	510	3.5	1785	
Sta. 2+015 to Sta. 2+058	43	2.0	86	1871
Entered By: <u>Sign &amp; Date</u>				
Checked By: <u>Sign &amp; Date</u>				



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## SEEDING

### 618-1 GENERAL

#### References:

- (1) Standard Specifications, Section 618
- (2) Standard Specifications, Section 717
- (3) Best Management Practices for Erosion and Sediment Control

Method Number One seed mixture is generally intended solely for lawn areas, or any area that is to have intensive, close mowing. Method One shall be installed with fiber mulch only; no hay is to be used. Method Number Two seed mixture should be used on infrequently mowed areas such as inslopes, ditches and rural lawns. Method Number Three seed mixture should be used on areas not expected to be mowed, such as backslopes and behind guardrails. It is particularly important to use hay mulch and binder with Methods Two and Three. Where unusual conditions prevail, the Landscape Unit should be consulted in regard to making arrangements for special seeding. Lime and fertilizer shall be applied in conjunction with the seeding as per Specifications. When seeding ditches or near water bodies, fertilizer can be eliminated; lime shall always be used. Method Three does not require fertilizer when seeding.

### 618-2 LAYOUT AND CONTROL

Regardless of how the seeding is to be done, the seeding areas must be laid out in unit areas equivalent to one load of the device used to accomplish the seeding. One unit is defined as 100 m<sup>2</sup> [1000 ft<sup>2</sup>]. The capacity of the hydraulic seeder should be taken into account when determining what seeding loads will be applied to various areas. For example, if the capacity of the hydraulic seeder is 50 units, then 50-unit areas should be determined and laid out, as practical.

Measurement is made longitudinal to the centerline with widths taken perpendicular to the centerline at frequent intervals and area computed by the average end method. Seed is generally required on all disturbed areas, including Erosion Control Blanket areas that have been seeded prior to installation.

### 618-3 TESTING REQUIREMENTS

<u>Fertilizer:</u>	Certification
<u>Ground Limestone:</u>	Gradation and Certification.
<u>Seed:</u>	Certification & Sample to Bangor Lab.

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#### 618-4 CONSTRUCTION

Preparation of areas to be seeded is well covered by the Standard Specifications. The seeding area should be sufficiently friable to a depth of at least 50 mm [2 in]. Stones up to 25 mm [1 in] will be allowed on Seeding Method No. 1 areas, and stones up to 50 mm [2 in] will be allowed on Seeding Method No. 2 areas. Method No. 1 shall be sown on 100 mm [4 in] of loam. In order to reduce weeds and provide a quality lawn, areas to be seeded to Method No. 1 should not be hay mulched; if mulch is required prior to seeding straw mulch shall be used. If there is sufficient hay or straw mulch already on the ground, seed may be applied over top of the mulch. If the ground is bare, seed will be applied before the mulch, or as directed by the Resident.

#### 618-5 INSPECTION

The Inspector must obtain Certificates of Compliance for the seed to be used prior to placement of the seed. Where seeding is done by a hydraulic seeder, the tank must have an agitator to keep all materials suspended in water to assure a uniform application.

Determination of what constitutes a "satisfactory" growth for final acceptance of a given area is a matter of judgment. Refer to Standard Specifications, Section 618.10 "...a reasonably thick uniform stand of permanent grass species with at least 90 percent coverage, free from sizeable thin or bare spots". Applicable notes should be made in the Project Diary when areas attain an acceptable growth.

#### 618-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT.

##### Field Documentation

Project Diary, Inspector's diary/Daily Report: The Resident or Inspector will keep notes describing the Contractor's loam, sod, seed, and mulch operations. He/she will record location of areas worked, personnel, equipment, and weather conditions. Depth of loam will be spot checked and recorded; loading of the hydroseeder with seed, lime, fertilizer, and mulch will also be documented.

Contract specifications require that, at the Resident's directive, a second seeding be applied within 60 calendar days of the Project completion at the Contractor's expense if there is no acceptable growth of grass at the first seeding. The Resident must notify the Contractor before the end of the 60 day period for the specification requirements to remain valid. Reference is made to seed specifications in the Contract Book for further clarification.

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#### Measurement and Payment

Final quantity for payment will be plan quantity, quantity determined from measurements, or load count.

Plan Quantity. Specifications state that final payment for seed and mulch will be based on the quantities shown in the Schedule of Items if estimated areas agree within 15 percent of actual areas. A review and check of the Engineer's Estimate for reasonableness is an acceptable way to verify the quantity shown in the Schedule of Items. The plan quantity will be adjusted, upward or downward, if changes are made in the field. An easy way to keep track of Plan Quantity is to agree with the Contractor on the amount to be seeded. This amount is then loaded into the hydroseeder and the load total can be entered into the Final Quantity Book.

Measurements. The accuracy and frequency of measurements will depend on the project. On a rural overlay job, station to station limits and typical widths scaled off the plans or field measured are acceptable. On an urban job, areas will be divided into common shapes and field measured by length and width.

Load Count. If the areas consist of numerous shapes and require time to field measure, the Resident can estimate the number of units to be loaded in the hydroseeder and advise the Contractor that load count will be the basis for final payment. (See Plan Quantity above)

Field measurements, scaled measurements, and load counts will be entered in the Construction Book, signed, and dated. Final pay quantity will be entered in the Final Quantity Book and labeled as such, signed and dated; references will be made to source documentation such as: measurements, load counts, and loading of the hydroseeder. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries.**

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## MULCH

### 619-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 619

Section 717.04 - Mulch

Section 717.05 - Mulch Binder

##### (2) Best Management Practices for Erosion and Sediment Control

### 619-2 LAYOUT AND CONTROL

Layout, as such, is not required for this item. Mulch will be applied on all disturbed areas or those areas so designated by the Resident or the Inspector.

### 619-3 TESTING REQUIREMENTS

As per Standard Specifications, Section 717.04.

### 619-4 CONSTRUCTION

The requirement regarding chopped hay is not intended to prohibit the use of mulching machines that tear the bales apart and blow it over the intended areas as directed.

Application should appear to be reasonably uniform. The mulch should not form a heavy or dense mat, as air and rain should be able to circulate reasonably well. The soil should show plainly upon close examination but not comprise more than 10% of the area. Its purpose is to shade the seed but not to smother it. The binder is a required part of the Hay Mulch Specifications and must be applied as specified.

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The mulch can also be bound by staking and tying down with string if desired by the Contractor and approved by the Resident. If this, or any other approved method of anchoring the mulch is used, then full payment for placing the mulch must be made. If it is not practical or desirable to apply hay mulch by machine, e.g., in heavily built up urban areas, or on narrow esplanades, it can be spread by hand.

#### 619-5 INSPECTION

Mulch will be measured by the unit, with one unit equaling 100 M<sup>2</sup> [1000 ft<sup>2</sup>]. Measurements may be those taken for loam and seed. Mulch can be stored on the project at any location suitable to the Contractor and Subcontractor.

#### 619-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Refer to subsection 615-6 of this Manual for documentation requirements.

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## GEOTEXTILES

### 620-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 620

Section 722.01 - Stabilization / Reinforcement Geotextile

Section 722.02 - Drainage Geotextile

Section 722.03 - Erosion Control Geotextile

Section 722.04 - Separation Geotextile

##### (2) Standard Details, Section 620

##### (2) Best Management Practices for Erosion and Sediment Control

### 620-2 LAYOUT AND CONTROL

Geotextile shall be placed as directed on the Plans, or those areas so designated by the Resident or the Inspector.

### 620-3 TESTING REQUIREMENTS

None required; however, the material used must be one of the products listed on the Maine Department of Transportation's Approved Product List.

### 620-4 CONSTRUCTION

Methods of proper installation are described in the Standard Specifications, Section 620.03.

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## 620-5 INSPECTION

Geotextile will be measured by the square meter [square foot] of area covered. No measurement will be made for overlaps, patches, or repairs of damaged geotextile, unless required and authorized by the Resident. Field Measurements will be recorded in a bound field book or the Final Quantity Book. The name of the product used will be recorded in the Final Quantity Book. The contractor will submit a Product Data Sheet from the Manufacturer, more commonly called a "spec sheet". The spec sheet will be compared to DOT specifications to verify compliance of the material.

## 620-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's Diary/Daily Report: The Resident or Inspector will keep notes regarding the location of work and preparation of the area prior to placement of the material.

Final Quantity Book: Measurement for payment will be entered in the Final Quantity Book or Construction Book. Overlaps, patches, or repairs will not be included for payment. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her entries**

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## LANDSCAPING

### 621-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 717.01(b) Fertilizer

Section 717.04(c) Mulch

Section 717.09 Peat Humus

##### (2) Construction Manual - Section 622 Transplanting

##### (3) American Standards for Nursery Stock

This work shall consist of furnishing and installing plant materials in accordance with the Specifications and in reasonably close conformity to the plans. The use of the term "Landscape Architect" denotes the Department's landscape staff or approved consultant engaged by the Department.

There shall be a pre-construction meeting with the contractor, the Resident, and the Landscape Architect to review the schedule of work, traffic control, utility locations, and changes in the quantities, Special Provisions, and material substitutions.

When plant material is to be installed the Resident will notify the Landscape Architect 48 hours in advance of any work. The Landscape representative will stake the final exact locations of the plants making adjustments as necessary for the design, to avoid utility locations and insure safety setbacks. The Contractor is always required to supply the stakes. All plant material shall meet the requirements of the Specifications and the "American Standard for Nursery Stock."

If the Contractor or their equipment will be in or near the travelway, the Contractor must use traffic control devices in accordance with the current edition of the "Manual on Uniform Traffic Control Devices" (MUTCD) and Standard Specification 652.

### 621-2 LAYOUT AND CONTROL

Locations for plant material are generally delineated in the field. At times, the locations may be changed because of unexpected site conditions. If there are questions or concerns, the Landscape Architect shall be contacted before the plants pits are dug, to certify locations and assist with the proper relocation of the plants.



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The Contractor should review the proposed locations of the plants as staked, and assure that the plants are properly located to conform to actual site conditions. On-site conditions to consider when laying out plant material include, but are not limited to, signage, overhead utilities, underground utilities, ledge, wet areas, sight distance setbacks and spacing. The locations of underground utilities should be well marked in advance of planting and shown to the Contractor. Final locations will be staked and approved by the Landscape Architect prior to plant installation.

#### 621-3 TESTING REQUIREMENTS

The Contractor shall supply plant material that meets the Specifications. Any material that does not meet the Specifications will be removed from the site at any time before final acceptance of plants.

#### 621-4 CONSTRUCTION

Planting specifications shall be followed for planting and performed by a qualified landscape contractor using competent personnel.

Plants should only be installed within the time of planting (Standard Specifications, Section 621.0020). If the Contractor has to install plants outside of the required planting time, the Landscape Architect shall be consulted by the Resident. Planting time changes and extensions will be based on special circumstances, as well as the type of plant material, time of year and the current weather conditions.

The Contractor shall assure that plants are installed in accordance with the Plans and Specifications. To certify this, a percentage of plant pits should be randomly inspected. If the Contractor is consistently in compliance, fewer pits will need to be inspected; if the Contractor is not in conformity, more frequent inspections will be needed. The Contractor is responsible for complying with the Specifications whether the work is inspected or not. Payment will be withheld for non-conforming work, pending reasonable notification to the Contractor.

Planting shall progress in logical order:

- a) Layout or stake plant locations.
- b) Excavated plant pits can be round or square. Pits shall be as deep as the plant root ball. The sides of the pit should not be glazed; a rough texture is best. The plant pits should have a minimum of 150mm [6 in] from the plant root ball to the edge of the pit for shrubs, and up to 600mm [2 ft] for large tree stock.
- c) Plants shall be set plumb, to the same depth as in the nursery or slightly elevated. Broken branches shall be removed at this time.

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d) Pits shall be backfilled halfway and compacted using feet. Fertilizer tablets shall be installed at this time. The Contractor may water at this time. To offset dry soil conditions, and for additional compaction, it is preferred to apply water at this time during mid-summer. The first watering shall include liquid fertilizer. Complete backfilling and compact. Backfill mix should have a dark rich brown color, have detectable organic matter, not have any unpleasant smells and be moist but not saturated. Build an earthen saucer around the base of the plant about the size of the plant pit, to hold water. Plants should be mulched at this time to a depth of 100mm [4 in].

e) Plants shall be watered on the day they are planted. The first watering shall include a liquid fertilizer as per the Specifications. Once installed, the key to plant survival usually lies in the amount of water it receives. The amount of water necessary will depend on the soils, time of year, and the weather conditions. Plants in sandy soil will need more water than in clay soils. When plants are actively growing in the spring and in full leaf during the summer, they will need more water. The soil around the plants shall be kept moist but not saturated. Light watering will not reach the roots of the plant. Water applied too fast or at too high a pressure will run off and not penetrate to the roots.

f) Clean up and remove debris.

#### 621-5 INSPECTION

The Landscape Architect can assist the Resident in determining compliance with the suitability and preparation of the planting holes, the actual planting, mulching, pruning and fertilizing. The Landscape Architect will report all acceptable/unacceptable work to the Resident. The Landscape Architect will inspect the condition of the plantings during the establishment period. Any deficient-appearing plants will be documented and reported to the Contractor. The Landscape Architect will perform the final inspection of the plantings and certify acceptance in writing to the Resident.

#### 621-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's diary/Daily Report: Notes will be made each day in the Project Diary or Inspector's Daily Report, pertaining to the work done under these items. They will refer to number and approximate vicinity of plants installed and other pertinent specification requirements, along with any field changes. Final quantity for payment will be determined from field counts or field measurements entered directly in the Final Quantity Book or a Construction Book. If landscaping on the Project is extensive, the Landscape Architect must inspect and provide the Resident quantities. **All calculations and data must be signed, dated, and checked; the checker must sign and date his/her entries.**

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## **TRANSPLANTING TREES, SHRUBS, AND HEDGES**

### 622-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 717.01(b) Fertilizer

Section 717.04(c) Mulch

Section 717.09 Peat Humus

##### (2) Construction Manual - Section 621 Landscaping

##### (3) American Standards for Nursery Stock

This work shall consist of transplanting plant materials in accordance with the Specifications and in reasonably close conformity to the plans.

The use of the term "Landscape Architect" denotes the Department's landscape staff or approved consultant engaged by the Department.

The location of plants to be transplanted should be decided between the Resident and R/W negotiator, consulting with the Landscape Architect, and the Owner of the plant. The location of the plants and where they will be transplanted should be identified on the plan.

There shall be a pre-construction meeting with the Contractor, Resident, and the Landscape Architect to review the schedule of work, traffic control, utility locations, and Special Provisions. Transplanting is a fragile operation. The Resident and the Landscape Architect shall approve the timing of operations, planting season and dates.

When plant material is to be transplanted, the Resident will notify the Landscape Architect 48 hours in advance. The Landscape Architect and the Resident will approve locations before any planting.

### 622-2 LAYOUT AND CONTROL

Locations for plant material are generally delineated on the plans. At times, the locations may be changed because of unexpected site conditions. If there are questions or concerns, the Landscape Architect shall be

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contacted before the plant pits are actually dug, to certify locations and to assist with the proper relocation of the plants.

The Resident and Landscape Architect shall tag the plants to be transplanted and stake their destination. The Contractor should review the proposed locations of the staked plants, and assure that the plants are properly located to conform to actual site conditions. The locations of underground utilities should be well marked in advance of planting and shown to the Contractor. The Resident shall approve changes. Final locations will be staked and approved by the Landscape Architect prior to plant installation.

#### 622-3 TESTING REQUIREMENTS

All plant material must be inspected by the Landscape Architect, who will inform the Resident of the condition of each plant and recommend its suitability for transplanting.

#### 622-4 CONSTRUCTION

Planting Specifications shall be followed for transplanting and performed by a qualified landscape contractor using competent personnel.

Plants should be transplanted when they are dormant. If the Contractor has to transplant plants when they are growing or leafed out, the Landscape Architect shall be consulted by the Resident. Transplanting time changes and extensions will be based on special circumstances, as well as the type of plant material, time of year and the current weather conditions.

The Contractor shall assure that plants are installed in accordance with the Plans and Specifications. The Contractor is responsible for complying with the Specifications, whether the work is inspected or not. Payment will be withheld for non-conforming work, pending notification to the Contractor.

Planting shall progress in a logical order.

a) Layout or stake plant locations.

b) Dig plants. Soil shall be moist. If the soil is not moist it shall be watered before digging begins. The top of the plant shall be protected from damage. This may require the branches to be tied or other measures. The Contractor should dig a trench around the plant under the outer most branches (edge of canopy), forming a rough ball. The final root ball size shall conform to the "American Standards for Nursery Stock". Root balls shall contain enough plant roots to sustain the plant in a healthy condition after transplanting. The root ball shall not break or fall apart. This may require the ball to be secured with burlap or twine or other material. The Resident and the Landscape Architect shall determine if burlap and twine or other methods securing the root ball are required based on size of plant, soil type, etc. Roots that are cut shall

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be cut with a sharp tool producing a clean smooth cut without tearing. Evergreens transplanted in the fall should receive a coating of anti-desiccant to protect them.

c.) Heal in plants that cannot be immediately placed in a permanent location. Plants shall be placed in a protected area shielded from direct wind or sunlight. The root balls shall be covered with a mulch or soil and kept moist at all times.

d.) Planting shall comply with Standard Specifications, Section 621, and this Manual.

e.) Plants shall be watered on the day they are planted. The first watering shall include a liquid fertilizer as per the Specifications. Once installed, the key to plant survival usually lies in the amount of water it receives. The amount of water necessary will depend on the soils, time of year, and the weather conditions. Plants in sandy soil will need more water than in clay soils. When plants are actively growing in the spring and in full leaf during the summer they will need more water. The soil around plants shall be kept moist but not saturated. Light watering will not reach the roots of the plants. Water applied too fast or at too high a pressure will run off and not penetrate to the roots of the plant. Mulch shall be installed around the base of each plant to the outer limit of the plant pit saucer, to a depth of 100 mm [4 in].

f.) Clean up and remove debris.

#### 622-5 INSPECTION

The Landscape Architect can assist the Resident in determining compliance with the suitability and preparation of the planting holes, the transplanting, and the healing in, the actual planting, mulching, pruning, fertilizing, and staking. The Landscape Architect will report all acceptable/unacceptable work to the Resident. The Landscape Architect will inspect the condition of the plants during the establishment period. Any deficient appearing plants will be documented and reported to the Contractor. The Landscape Architect will perform the final inspection of the plants and certify acceptance in writing to the Resident.

#### 622-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Project Diary, Inspector's diary/Daily Report: Notes will be made each day in the Project Diary or Inspector's Daily Report, pertaining to the work done under these items. They will refer to number and approximate vicinity of plants installed and other pertinent specification requirements, along with any field changes. Final quantity for payment will be determined from field counts or field measurements entered directly in the Final Quantity Book or a Construction Book. If landscaping on the Project is extensive, the Landscape inspect and provide the Resident quantities. **All calculations and data must be signed, dated, and checked; the checker must sign and date his/her entries.**

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## MONUMENTS

### 623-1 GENERAL

#### References:

Standard Specifications

Section 502 - Structural Concrete

Section 503 - Reinforcing Steel

Section 623 - Monuments

Records of locations of R/W Monuments are kept by the Mapping Section. The monuments should be installed where indicated on the Plans, unless the location shown is either impossible or impractical from a construction point of view. An example might be when a location is in water or on the face of a steep ledge or large rock.

### 623-2 LAYOUT AND CONTROL

Monument locations shall be staked out and tied down by the Contractor. Right of Way Monuments should be staked out by a Registered Land Surveyor after all earthwork is done in that area. When the job is being staked out, high guard stakes should be placed to facilitate easy retrieval. These locations are normally flagged with blue ribbon.

If a Right of Way Monument cannot be physically located where shown on the plans, the monument should be relocated to another point on the R/W line, if possible, or replaced with a Survey Monument at some convenient point within the R/W, if necessary. A Change Order is required either for a change in location of the R/W Monument, or for substitution of a Survey Monument for the R/W Monument.

When laying out monuments, the Inspector should not forget the following basic data:

- a. Right of Way Monuments are always on the actual Right of Way line.
- b. Survey Monuments are not located on the Right of Way line.
- c. Bronze Pin Markers may be used to replace either R/W or Survey Monuments in locations where monuments cannot be set.

The Resident should ascertain whether the monument is to be set flush, below ground or above the ground for each monument location, and should so direct the Contractor for each location. It should be emphasized that R/W Monument, Survey Monument and Bronze Pin Marker locations are of the utmost importance in the

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overall consideration of the Construction project. These locations should be tied down such that they are readily reproducible at any time until the monument or marker is permanently set.

#### 623-3 TESTING REQUIREMENTS

None Required for Granite. Precast Concrete and Steel should be inspected at the casting location.

#### 623-4 CONSTRUCTION

R/W Monuments should be set so that the sides of the "H" in the top are perpendicular to the R/W line. Holes for monuments are almost always hand dug and hand backfilled. Monuments should not be shortened unless the rock base is solid and clean enough to adequately support a concrete collar.

If ledge is exposed, monuments shall be replaced with bronze pin markers in accordance with the Specifications. If ledge is below ground, installation shall be in accordance with Standard Details. The Inspector should keep in mind that if there is any possibility that the area may, in the future, be mowed by the State or by others, then any monuments in that area should be set flush with the ground surface.

#### 623-5 INSPECTION

A 2 meter [6 ft] rule and a plumb bob is usually all that is necessary to check monument locations after they have been set, providing the ties are still there. If the Resident is satisfied that the work is being done carefully and that control stakes are being preserved, it is not necessary for the Inspector to be present during the entire operation of setting all monuments. The Inspector will record the accepted monuments and enter the quantity and other pertinent data in the Final Quantity Book.

Depth of rock excavated will be measured and recorded as Structural Rock Excavation. (Refer to Section 206 of the Specifications and of this Manual.)

#### 623-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Field Documentation Depth of rock excavated will be measured and recorded as structural rock excavation. Quantity for payment will be figured from the top of ledge to depth authorized times a hypothetical diameter of 600mm [2 ft].

Quantities for final payment will be determined from field measurements recorded directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## **FOUNDATIONS, CONDUITS & JUNCTION BOXES FOR SIGNING, LIGHTING, AND SIGNALS**

### 626-1 GENERAL

#### References:

(1) Construction Manual

Section 206 - Structural Excavation

Section 304 - Aggregate Bases & Subbase

Section 502 - Structural Concrete

Section 709.01 - Reinforcing Steel

Section 712.06 - Precast Concrete

Section 715.02 - Steel Conduit

Section 715.03 - Non-Metallic Conduit

Section 715.04 - Prewired Conduit

Section 715.05 - Metallic Junction & Fuse Box

Section 720.07 - Anchor Bolts

(2) Standard Specifications - Section 626 - Foundations, Conduits & Junction Boxes

(3) Standard Details - Sheets 626(01) thru 626(09)

(4) National Electric Code

This work shall consist of furnishing, installing, modifying or removing concrete foundations, conduits and junction boxes for highway lighting, highway signing and traffic signal installations.

### 626-2 LAYOUT AND CONTROL

Locations for all foundations, conduit and junction boxes shall be the responsibility of the Contractor. They should be checked in the field by the inspector to assure compliance with the plans. DIG SAFE should always be consulted before any work starts.

- a. Foundations If foundations are not properly placed, the signs, lighting, and signals may not be effective. Special attention should be given to the orientation of the anchor bolts. The Contractor is responsible for grades required. In many cases, grades can best be obtained from the adjacent paved roadway.



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Foundations should not protrude more than 75 mm [3 in] above the adjacent surface or a “Deadly Fixed Object” will be created.

b. Conduit Layout for the conduit is generally shown on the Plans, but can be changed in the field by the Engineer. The voltage carried within determines the depth of the conduit. Check the NEC for details. Although a laborer may install the conduit, an electrician is required for pulling in the wires. Check for appropriate license and record the number in the FQB.

c. Junction Boxes Layout for junction boxes is not as critical as other items, but the grade should be flush with the surrounding terrain.

#### 626-3 TESTING REQUIREMENTS

Check the Minimum Testing Requirements for the project. Usually, there are requirements for concrete strength. Conduit should be marked in accordance with NEC and NESC standards. Some cities require electrical permits before any work is done. If the bases are to be precast, have the Contractor notify the Materials Testing Engineer so that appropriate inspection of the casting can be made. A Letter of Compliance is generally required for re-bar, poles, and anchor bolts. There is a 10-day functional test for traffic signals, and an inspection by the Traffic Engineering Section is required.

#### 626-4 CONSTRUCTION

As with any excavated hole, the key to success is proper backfill material with thorough compaction. Where possible, drainage or weepers should be provided to keep the foundation dry.

#### 626-5 INSPECTION MEASUREMENT AND FIELD DOCUMENTATION

The Inspector should keep a log of foundations installed, lengths of conduit buried, and junction boxes placed, daily in the Inspector's Diary. A construction book is useful to document each sign location, signal support pole, and light pole foundation.

Final measurements should be made after the conduit run is completed. Note that conduit placed within 300mm [1 ft] from each structure is incidental to the structure. Measurement shall be recorded in the Final Quantity Book, and referenced back to the inspector's diary or construction book.

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#### 626-6 Field Documentation, Measurement, and Payment

Project Diary, Inspector's Diary/Daily Report: the Resident or Inspector will keep notes regarding the Contractor's progress of work on the installation of foundations, poles, signs, lights, and traffic signals. He/she will document inspection and approval of forms, re-steel or steel wire mesh, anchor rods, and conduit in the foundation units.

If the project is primarily a signing or lighting job, the Resident should set up a "Sign Book" before the Contractor begins work. Signs will be identified in this book by location. The Resident or Inspector will record the type of sign required and will document when the foundation is placed, when the poles, signs and lights are erected, and lengths of conduit and wiring installed. As noted above, inspection and acceptance of forms, re-steel, anchor rods, and conduits will be recorded; other pertinent information will be noted as required.

Final Quantity Book: Final quantity for foundations, junction boxes, conduit, and wiring will be entered under the appropriate items in the Final Quantity Book. Reference will be made to field counts or field measurements. The Sign Book can be eliminated if signing and lighting is not a major portion of the contract; measurements and documentation can be entered directly in the Final Quantity Book or in the Construction Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 627 Pavement Markings -- 2 Pages

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## PAVEMENT MARKINGS

### 627-1 GENERAL

#### References

- (1) Manual of Uniform Traffic Control Devices 2001
- (2) Standard Details, Revision of December 2002
- (3) Standard Specifications,

Section 627

Section 708.03, Pavement Marking Paint

Section 712.05, Reflectorized Plastic Pavement Marking

This work shall consist of furnishing and placing reflectorized pavement lines and markings, removing pavement lines and markings, and furnishing and applying reflectorized paint to curbing in reasonably close conformity with the plans and as designated by the Resident.

### 627-2 LAYOUT AND CONTROL

Layout shall be the responsibility of the Contractor. It is a good idea to check with the Division Traffic Engineer if any new features have been added to the project, or the alignment has changed appreciably so as to affect the passing sight distance. All pavement markings placed shall meet the tolerance limits shown on the plans. Painted lines or Temporary Object Markers (T.O.M.s) can be used as temporary pavement marking lines. Special Provision 652 and/or the Construction Notes, will state when only painted lines are acceptable.

### 627-3 TESTING REQUIREMENTS

Check the Minimum Testing Requirements for the project. Usually there are requirements for plastic materials. A Certificate of Compliance covers this item.

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## 627-4 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Standard Specifications, Section 627.09 explains payment of the various types of striping. Some items are paid Plan Quantity, subject to field changes; some items are field measured and paid by the linear or square unit.

All measurements should be recorded in a bound field book or the Final Quantity Book.

Quantities will be determined from field measurements recorded directly in the Final Quantity Book, or references to the work being done according to Plan. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 629 Hand Labor -- 1 Pages

## HAND LABOR

### 629-1 GENERAL

#### Reference:

Standard Specifications Section 629 - Hand Labor

This item is more or less a catch-all for work that must be done by hand, not covered by another contract item.

### 629-2 LAYOUT AND CONTROL

No particular layout and control is required for this item. The nature of the work contemplated will govern the requirements for any layout required.

### 629-4 CONSTRUCTION

The actual work will be as required or as directed by the Resident. Tools may be shovels, rakes, axes, wheelbarrows, or other hand tools as necessary to complete the stated work.

### 629-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Daily Report of Labor and Equipment Rental: The Resident will use this form to document hours for payment. Approval for hourly work, if not bid items, will be in writing by Work Order, and verbally by the Resident if bid items are involved. A detailed explanation of the work done and references should be noted in the Remarks section of the Report.

Whereas payment for hourly work often is extra and unforeseen and therefore authorized by work order, the Resident should refer to Section 109.

Final quantity for payment will be entered in the Final Quantity Book, signed and dated. Reference will be made to notes in the Daily Report of Labor and Equipment Rental. **All calculations and data must be signed, dated, and checked; the checker must sign and date his/her entries.**

#### Exhibit 629-A

#### 629.05 Hand Labor, Straight Time

Date	Report #	Hours	Accum. Hours	Entry By & Date
8-15-03	1	3		B.B. 8-15-03
8-17-03	2	2.5	5.5	B.B. 8-17-03

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Section 631 Equipment Rental -- 2 Pages

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## EQUIPMENT RENTAL

### 631-1 GENERAL

#### Reference:

Standard Specifications, Section 631 - Equipment Rental

A Contract Modification is not necessary for equipment rental work unless the total hours listed on the Bid have been substantially exceeded. When such work is part of an Extra Work Order, the quantities should be included in the Order, whether it exceeds the original estimated quantity or not. Correct procedure is to estimate the work to be done and submit the Change or Extra Work Order if necessary.

### 631-2 LAYOUT AND CONTROL

Layout and Control will be in accordance to the requirements of the work involved.

### 631-4 CONSTRUCTION

The equipment specified is the minimum that is expected to do average work on a project. If heavier equipment is required, a rate for its hire should be requested, but if the equipment specified will do the work, any heavier and/or higher cost equipment used by the Contractor should not be authorized. This is particularly true of "small" vs. "large" trucks, and also bulldozers.

### 631-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Daily Report of Labor and Equipment Rental: The Resident will use this form to document hours for payment. Approval for hourly work, if not bid items, will be in writing by Work Order, and verbally by the Resident if bid items are involved. A detailed explanation of the work done and references should be noted in the Remarks section of the Report.

Whereas payment for hourly work often is extra and unforeseen and therefore authorized by work order, the Resident should refer to Section 109.

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Hours will be based on production rates of experienced operators familiar with the work being performed. Operators determined to be below normal acceptable standards will be paid for at reduced hours, as determined by the Resident.

When it is necessary to pay for work by the use of equipment rental items, the work should be performed at a time when the Contractor's regular sequence of operations places the necessary equipment in the vicinity of the work site. However, if the work cannot await such timing the Resident may authorize the payment of moving time from within the project limits, to and from the site. Supervision of equipment rental work is incidental unless expressly stated on the plans or notes.

Final quantity for payment will be entered in the Final Quantity Book, signed and dated. Reference will be made to notes in the Daily Report of Labor and Equipment Rental. **All calculations and data must be signed, dated, and checked; the checker must sign and date his/her entries.**

#### Exhibit 631-A

Item #    Description

Date	Report #	Hours	Accum. Hours	Entry by & Date
8-15-03	1	3		B.B. 8-15-03
8-17-03	2	2.5	5.5	B.B. 8-17-03

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Section 634 Highway Lighting -- 3 Pages

## HIGHWAY LIGHTING

### 634-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 502 - Structural Concrete

Section 703.06 - Aggregate Base and Subbase

Section 709.01 - Reinforcing Steel

Section 713.01 - Structural Steel

Section 715.01 - Aluminum Light Standards

Section 715.02 - Steel Conduit

Section 715.03 - Non-Metallic Conduit

##### (2) ASTM A-153 - Galvanizing

##### (3) Standard Details - Section 634

##### (4) National Bureau of Standards Handbook H-32

### 634-2 LAYOUT AND CONTROL

Location of light standard bases should be accurately done. Consideration should be given to actual curb thickness, taper of bases and other possible sources of interference. Elevations of bases should be set in accordance with actual (as-built) grades.

Underground conduit should be placed so it will not interfere with other construction, particularly signposts, delineator posts, guardrail, or other items that are wholly or partially underground. The exact layout of conduit so that it does not conflict with other construction, is determined by the Contractor from roadway line and grades as shown the Standard Detail Sheets. Plowed-in conduit shall be located as shown on Special Detail Sheets.

### 634-3 TESTING REQUIREMENTS

Testing Requirements are usually satisfied by Certification - Refer to Division 700, Materials & Tests



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<u>Concrete:</u>	Cement	1 Statement from M & R
	Quality	1 per source
	Gradation	1 Set of Field Gradations per 40 M <sup>3</sup> [50 yd <sup>3</sup> ] of Concrete.
	Colorimetric	1 per source
	Cylinders	1 set per 40 M <sup>3</sup> [50 yd <sup>3</sup> ] of Concrete.

#### 634-4 CONSTRUCTION

Excavation work, if required, is usually done by backhoe or by hand. Pre-wired conduit is "plowed" in using special equipment. Some special locations may call for the conduit to be embedded in concrete. In such cases, forms are not usually used. Excavation should be kept to minimum widths and depths. Regardless of the method of construction used, the Resident should be fully aware of the locations of existing conduits, pipes and other items that may conflict with the new system.

Drainage tees should be used only where they will perform the function of draining the conduit in which they are installed.

#### 634-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

The assigned Inspector should be satisfied that location of conduit is such that it will not interfere with other installations or work on the project.

Conduit connections should be tight. Connector sleeves should be checked to make sure they have not split when installed.

Concrete inspection will be done by a qualified Inspector assigned through the Resident. Measurement and documentation of concrete for payment will be in accordance with Section 502 of this Manual. The quantity of concrete is not usually measured separately for payment, but the minimum testing requirements require an approximate measurement to ascertain the frequency of testing.

The Inspector will verify and note in the Project Records that the size of the forms for bases conforms to plan dimensions.

Reinforcing steel should be checked to make sure it is according to plan. Refer to Section 503 of this Manual for inspection, measurement and documentation procedures for reinforcing.

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Bolt templates should be the thickness that bolts protrude to make sure that the bolts will be perfectly plumb. The Inspector should make sure that the bolts do protrude enough to assure that there is enough room for the leveling nuts, the base and the attachment nuts.

Backfill around bases should be thoroughly compacted in maximum 200 mm [8 in] layers.

Shop drawings from pole and other parts manufacturers must be approved and on file prior to installation or erection of any item. Refer to Standard Specifications, Section 105.7.

Where the area behind bituminous concrete curb is filled to the level of the top of curb, standards and pull boxes should also be set to the elevation of top of curb. This is especially true at the noses of outlet ramps.

Upon setting the standard, care should be taken that washers are used on both sides of the base plate, and that all leveling and top nuts are pulled tight. The National Electric Underwriters' Code requires grounding of all systems by a separate, continuous grounding wire. The grounding wire will then be properly attached to a standard ground rod at the power source, thus effectively grounding the entire system.

Before the Resident accepts any electrical system, the Traffic Engineering Division should be contacted and an Electrical Inspector should inspect and approve the electrical portions of the work. Before acceptance of the work, the Electrical Inspector should write a statement to the Project Resident that the installation was accepted on that date.

The Inspector should check that the concrete foundation is level, the weep holes for the base are clear, and that the nuts are tightened to torque requirements.

Inspection and acceptance of Highway Lighting items paid by the unit and field measured lengths of conduit will be noted in the records, preferably in the Final Quantity Book.

#### 634-6 FIELD DOCUMENTATION, MEASUREMENT, AND PAYMENT

Quantities will be determined from actual field measurements for items paid by the linear foot and from statements of acceptance for items paid by the unit or by Lump Sum.

Excavation is usually not paid for unless it is necessary to undercut. In cases of undercut, it is measured and paid for in the same manner as Standard Specifications, Section 206, Structural Excavation. Excavation in rock and undercut in unsuitable soil will be field measured for payment.

Quantities will be determined from field measurements recorded directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 635 Prefabricated Bin Type Retaining Wall -- 3 Pages

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## **PREFABRICATED BIN TYPE RETAINING WALL**

### 635-1 GENERAL

#### References:

- (1) Construction Plans
- (2) Approved Shop Drawings
- (3) Standard Specifications

Section 635 - Prefabricated Bin Type Retaining Wall  
Section 502 - Structural Concrete  
Section 701 - Structural Concrete Related Materials  
Section 703.06 - Aggregate Subbase  
Section 712.06 - Precast Concrete  
Section 713.07 - Metal Bin Type Retaining Wall

### 635-2 LAYOUT AND CONTROL

Control reference points will be established by an MDOT survey crew, as part of the project control, at the direction of the Resident. The Contractor will be responsible for layout of the wall using the control points provided. The Inspector should coordinate with the Contractor to ensure that the layout has been properly done and is correct, or alternately should spot check the Contractor's layout.

### 635-3 TESTING REQUIREMENTS

Refer to the Minimum Testing Requirements for the project to determine the tests and/or certifications required. Refer to the Standard Specifications or the Special Provisions, Section 700 for requirements of materials certifications.

### 635-4 CONSTRUCTION

The Inspector should review the approved shop drawings to become familiar with the wall details walls.

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The Contractor is responsible for the proper compaction and depth of gravel bedding and correct grading of the gravel, as well as correct details of any footings or other substructures. The Inspector should work with the Contractor to ensure these details are adhered to, and require the Contractor to remove and replace any defective work found.

The Plans and/or Specifications will determine if the manufacturer of the bin wall is required to send their representative to the job, and the duration the representative is required to be on-site. The Inspector should ensure that this requirement is met, unless such on-site representation is not warranted. A reason for this could be that the Contractor is very experienced in doing this work. Regardless, the Contractor is responsible for the correct performance of the work

Any work that is damaged will be required to be repaired or replaced. On metal bin walls, dents or minor scratches may be repaired by touching-up with an asphalt coating on the unexposed side only. The manufacturer's recommendations should always be obtained when doing repair work. Work which is damaged beyond repair or which compromises the integrity of the work shall be replaced. Examples of metal bin walls that must be replaced are sections that are badly dented, twisted, have holes through the metal, or are otherwise badly damaged. Examples of precast walls that must be replaced are sections which have been cast incorrectly so that they will not fit properly, are so badly damaged in transit or installation that they will not fit properly, have been damaged to expose reinforcing steel, or the face is damaged or not properly finished such that a neat appearance cannot be obtained.

The Plans should be reviewed to determine that all wall drainage, including underdrains, has been installed, and backfill placed to the required limits. Backfill must be placed in horizontal layers and thoroughly compacted all the way back to where the original ground has been excavated.

#### 635-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

The compaction and grading of the foundation bedding is critical, as is the compaction of the backfill. Remind the Contractor that the final appearances and correct fitting and alignment of all the members above will depend upon this, and it must be correct if the finished wall is to be correct. A slight error at the bottom may well result in the upper courses being out of alignment enough so that they cannot be properly bolted together. Such discrepancies in the beginning may result in final rejection of the work.

The Minimum Testing Requirements may require a number of gradation and compaction tests. At a minimum, spot-checking with random compaction tests should be done to document proper compaction, and a gradation obtained to document the proper material.

The metal bin wall must be checked to confirm that proper erection of pieces was done, and that the bolts were properly torqued to the manufacturer's specifications. Random checks with a torque wrench will suffice. A

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visual inspection of bolts will often detect bolts that were not torqued, in that they will not shine like bolts that were hit with an impact wrench.

For precast concrete walls, the proper erection sequence as detailed in the shop drawings must be followed. The manufacturer's detailed instructions for the erection of the units must be followed to obtain a satisfactory finished wall.

The batter of the face of a bin wall must be closely maintained. For precast concrete walls, the alignment and batter is critical for a neat finished appearance. The sequence of erection is also critical, and the shop drawings are to be followed in this regard. The Contractor should make a slope template several feet long to check the face batter as he proceeds. The Inspector may use the Contractor's template to verify that the installation, or portion thereof, has been completed and is correct.

Document the work completed with a statement of inspection and acceptance either in a bound field book or Inspector's Daily Report, along with any field changes and measurements. The Inspector may plot the progress on the shop drawing erection plan, which helps to keep track of the work done. Measurements of the completed work are by the square meter of the surface area to the dimensions shown on the plans or as approved.

Quantities for final payment will be determined from plan dimensions, or from field measurements recorded in a Construction Book directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## DUST CONTROL

### 637-1 GENERAL

#### References:

Standard Specifications

Section 637 - Dust Control

Section 712.02 - Calcium Chloride

It is the general policy of the Department to apply water and/or calcium chloride on the roadway or haul roads before dust becomes a nuisance or may constitute a hazard. Inattentive abutters, citizens, or environmentalists do not help the Department's public image. It is therefore required of every Resident to use water and/or calcium as necessary, to preclude any complaints from the public regarding dust on construction projects.

### 637-4 CONSTRUCTION

Areas designated to be treated should be well-watered before the calcium is applied.

It is preferable to spread calcium with a mechanical type spreader. Most contractors have such a machine that can be used.

A reasonable figure for job estimating is approximately 550 Mg/km [2 ton/mile] for a normal 7.2 m [24 ft] roadway when applied with a mechanical spreader. For smaller areas, apply about 0.5 to 1 kg/m<sup>2</sup> [1 to 1 ½ lb/yd<sup>2</sup>]. for the first application. (This should last about a week. Additional applications, if necessary, can be at about ½ to ¾ the above amounts.) Calcium should be washed off the clothes and skin with clear water as soon as possible. Also, rubber footwear should be used as Calcium will dry out and ruin leather.

Water must be applied under pressure as specified. The Specifications definitely prohibit the use of salt or brackish water. If the Contractor has a source and requests to use salt or brackish water, the request should be submitted as a Change Order changing the specification.

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#### 637-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

For a "Quantity" Contract The Resident or Inspector should determine the volume of sprinkling trucks and document the fact in a hardbound field book, preferably the Final Quantity Book. Tank volume may be determined from the manufacturer's rated capacity, by measurement, or by weighing. 1 Mg of water equals 1 M<sup>3</sup> of water. Sprinkling shall be measured by the M<sup>3</sup> [1000 gal]. Calcium shall be measured by the Mg [ton].

The documentation of tank volumes must be related to the tank used, if the tank is a trailer or a skid tank. The measurements and/or volumes should be recorded in a hardbound field book and properly referred to when documenting their use.

Documentation for the calcium used on weekends or holidays must be completed on the first working day following the use of the materials. At this time, properly completed delivery slips must be picked up by the Inspector and documented that the materials were used on a certain date, both by notations in the Inspector's Diary, if applicable, and by recording Delivery Slips in the Final Quantity Book. (See Exhibit 637-A.)

Quantities of water and calcium chloride will be measured by delivery slip. Only one delivery slip for each day's application of water or calcium will be required. Daily totals will be entered directly into the Final Quantity Book as the delivery slips are received. Entries must be initialed and dated; then checked, initialed and dated.

For a "Lump Sum" Contract Documentation should be made in the Project Diary, consisting of weekly statements of acceptance. If Special Provision 637 for Lump Sum Dust Control is included in the Bid book, but there is no item in the Schedule of Items, this work is considered incidental to the Contract.

#### 637-6 COMPUTATION OF QUANTITIES

For a Bid Items Contract, quantities will be determined from Delivery Slips documented as required in 637-5 above.

Final quantity for payment will be determined from delivery slip totals recorded directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## STEPS

### 642-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 642 - Steps

Section 502- Structural Concrete

Section 708.01 - Exterior Paint

Section 708.05 - Timber Preservative

Section 712.06 - Precast Concrete Units

##### (2) Standard Details, Section 642

Steps are usually tailored to individual situations, and the design will vary depending upon what has to be matched, if anything. Individual details will be indicated on the Plans.

### 642-2 LAYOUT AND CONTROL

Layout will, in general, be by the Contractor or Subcontractor. This is a job for an experienced carpenter experienced in laying out stairs. The Resident or Inspector should check the run and rise as laid out to ensure that the completed steps will be satisfactory in that respect.

### 642-3 TESTING REQUIREMENTS

Certification Letter on wood and precast concrete steps

Method C Specification on cast-in-place concrete steps

### 642-4 CONSTRUCTION

Wood Steps This work should be done by an experienced carpenter. The Inspector should be sure the base is upon solid ground and that the work is in a workmanlike manner and is according to Plan details and



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Specifications. Cuts made in CCA treated lumber should immediately be treated with approved preservative to prevent absorption of moisture, which causes splitting.

Concrete Steps Specifications require a 300 mm [12 in] base of Aggregate Subbase Gravel (Item 304.10) under the steps. Plans might call for insulation board in the gravel to prevent frost heaving.

Precast units are almost always currently used. Specifications allow the use of steps of alternate but equal design to the steps depicted. Designs should be checked for compliance with American Disabilities Act regulations.

Cast-in-place steps might be necessary to fit local conditions. This work should be as per Sections 502 of this Manual and Standard Specifications, Section 502, Structural Concrete.

#### 642-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

Lumber materials for wood steps should be dry. The delivery slip should state the grade of lumber delivered and it should match that specified. Nails specified to be galvanized can be aluminum type if so desired.

Precast steps are usually paid per Each. An entry in the Final Quantity Book with reference to a Diary of the work will be sufficient documentation.

Cast-In-Place steps will require measurements of the treads and width of the steps. A check of the rebar, which is incidental, should be noted in a Diary. The quantity of concrete will have to be calculated for payment. (See Standard Detail 642(01))

The gravel base will be measured in place and paid as Item 304.10, Aggregate Subbase Course - Gravel.

Quantities for final payment will be determined from calculations, either on computation sheets or in a bound field book, or from field counts or measurements recorded directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## TRAFFIC SIGNALS

### 643-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 626 Foundations

Section 634 Highway Lighting

Sections 715.02 through 715.07

Section 718 Traffic Signal Materials

Section 720 Structural Supports for Highway Signs, Luminaires and Traffic Signals.

##### (2) Standard Details, Section 643

##### (3) NEMA or UL Standards

##### (4) NEC, ASTM Standards, and ANSI Specifications

### 643-2 LAYOUT AND CONTROL

Layout will, in general, be by the Contractor or Subcontractor. This is a job for an experienced Electrician. The Resident should check the distance from the stop bar to the signal heads for maximum visibility and compliance with the MUTCD. The most important thing is that the Contractor calls DIGSAFE and all underground utilities are located before the signal work begins.

### 643-3 TESTING REQUIREMENTS

Testing requirements are spelled out in the Standard Specifications. The Contractor will submit four sets of shop drawings for all materials incorporated into the project. The Resident should forward three copies to the Fabrication Engineer for distribution to the Traffic Section and Bridge Engineers for pole strength verification. A letter of certification will cover most of the materials.

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#### 643-4 CONSTRUCTION INSPECTION

Assure that the foundations will not interfere with other utilities both overhead and underground. Signal heads can be moved on span wires to correct some problems. The signal will only function properly if the detectors are placed where the traffic will trigger them. Loops must be accurately placed. Observe the existing traffic pattern and lane usage. Try to avoid placing loops in severely cracked pavement. If possible, placing the loops in a lower pavement lift or on the milled surface extends their life. Microwave sensors are becoming more reliable and less costly. Their placement is critical as they are limited in range and direction. Video cameras have been tried with varied results. They are limited by atmospheric conditions and weather variables. Assure that the controller cabinet is large enough to hold all of the components. Look for dents, scratches and poor workmanship. Call Traffic Engineering in Augusta and ask for an electrical inspection when the installation is complete. (A form for this purpose is included in the Resident's packet.) Measure and record the height of the signal heads.

The keys and operation manuals should be collected and turned in to Augusta at the completion of the project.

#### 643-5 COMPUTATION OF QUANTITIES

Final Quantity Book: final quantity for payment will be lump sum or per each. The final figure will be entered in the Final Quantity Book: signed dated, and referenced to Diary entries or field counts as appropriate. All calculations and data entries must be signed, dated and checked; the checker must sign and date his/her work. All entries should be made directly in the final Quantity Book as much as possible.

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## HIGHWAY SIGNING

### 645-1 GENERAL

#### References:

##### (1) Standard Specifications

Section 626 Foundations

Section 645 Highway Signing

Section 719.01 Reflective Sheeting

Section 719.02 Demountable High-Intensity Reflectorized Letter, Numerals, Symbols and  
Borders

Section 719.03 Aluminum Extrusions

Section 719.04 Aluminum Sheets

Section 719.05 Plywood

Section 719.06 Demountable Reflectorized Delineators

Section 719.07 Assembly Hardware

Section 720.01 Aluminum Supports

Section 720.03 Steel Supports

Section 720.06 Steel H-beam Poles

Section 720.07 Anchor Bolts

Section 720.08 U-channel Posts

Section 720.12 Wood Sign Posts

Section 721.01 Breakaway Devices

##### (2) AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals"

##### (3) Standard Details

This work consists of furnishing and installing new signs, signs supports, delineators, and breakaway devices, and removing, relocating, and/or modifying existing signs and sign supports as per Plans, Standard Specifications, Special Provisions, Supplemental Specifications, and/or as directed.

### 645-2 LAYOUT AND CONTROL

Layout will, in general, be by the Contractor or Subcontractor. This is a job for an experienced carpenter or land surveyor. The Resident or Inspector should check the offset and angle of approaching traffic to the sign face. Refer to the Standard Specifications, Section 645.06 (b).

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#### 645-3 TESTING REQUIREMENTS

Testing requirements are generally by Certification. If you suspect the contractor is using the wrong H-beam Posts, call your nearest IA inspector to verify galvanizing, thickness, and post dimensions. Reflectivity tests can be made in the field with appropriate equipment. Two sets of shop drawings are required for new signs and sign supports before any work is started. The Engineer in the field may approve these, but it is strongly suggested that they be submitted to the Fabrication Engineer for review. These drawings should address sign face, layout detail, and scale drawings.

For Bridge, Cantilever, and Butterfly-type sign supports the Contractor shall submit 3 Copies of detailed design computations for the structure, including the foundation. It is highly recommended that these be forwarded to the Fabrication Engineer for approval. Approval for overpass-mounted sign supports will be on the basis of the applicable provisions of the Standard Specifications, Section 105.7.

#### 645-4 CONSTRUCTION INSPECTION

The Inspector shall assure that all the work for the bases is in accordance with Section 626 of the Standard Specifications. If breakaway devices are used THERE IS NO TOLERANCE. Adapters may be used to shim the beam, but this is frowned upon. The Resident shall determine the exact location for the signing in the field, keeping clear of all visual obstructions and to provide the best possible visibility of the signs by the motorists. The Inspector shall assure that all dimensions are as specified on the Plans and that all materials incorporated into the project meet standards as specified in the Standard Specifications Section 700.

Demounting and reinstalling of existing signs and poles shall be carefully watched to see if the Contractor damages any of the material. The Resident shall specify the location of delivery for any signs or posts to be salvaged.

#### 645-5 MEASUREMENT AND FIELD DOCUMENTATION

The Inspector assigned to cover the item should check any layout by the Contractor. The Inspector will note in his diary, a record of work as it progresses. He/she shall measure all posts for length, all signs for size, and note the number of breakaway devices installed. Special Provisions and General Notes on the plans should be carefully read to determine what items are payable and what work is incidental.

#### 645-6 COMPUTATION OF QUANTITIES

Final Quantity Book: Final quantity for payment will be lump sum, per each, or by the unit and referenced to field measurements, field counts or statements of inspection and acceptance. Acceptance entries will be made directly in the Final Quantity Book when feasible or the Sign Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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## MAINTENANCE OF TRAFFIC

### 652-1 GENERAL

#### References:

- (1) Standard Specifications, Sections 652, 700, 719
- (2) Special Provisions & Supplemental Specifications
- (3) Standard Details, Highways and Bridges
- (4) Project Plans
- (5) Manual of Uniform Traffic Control Devices
- (6) NCHRP 350 Guidelines

This work consists of furnishing and maintaining traffic control items.

### 652-2 LAYOUT AND CONTROL

Layout for sign placement is done by the Contractor, and should be checked by the Resident/Inspector for visibility issues. Locations for Portable-Changeable Message Boards shall be determined by the Resident or by the Contractor if shown on the Plans. Keep in mind that these signs must be located behind suitable cones or barricades, so as not to be a “Deadly Fixed Object”. Usually the message boards are located just off the paved shoulder, well in advance of the actual construction signing.

### 652-3 TESTING REQUIREMENTS

Certification – See Standard Specifications, Section 700

### 652-4 CONSTRUCTION

Traffic Control Plan The Traffic Control Plan (TCP) is prepared by the Contractor, based on information provided in the 652 Standard Specifications or Special Provisions for minimum roadway width and equipment storage. The TCP must be submitted by the Preconstruction Meeting and no work using the TCP can begin without Department approval. The TCP shall contain:

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- a. The name, telephone number, and other contact numbers (cellular phone, pager, if any) of the Contractor's employee (the "Responsible Person") with overall responsibility for following the TCP, and who is empowered to immediately resolve any traffic control deficiencies or issues.
- b. Proposed construction phasing or sequencing that reasonably minimizes traffic impacts. The Contractor shall conduct the Work such that traffic delays do not exceed 5 minutes unless longer periods are authorized by the Department. The Contractor shall provide advance signing to warn motorists of expected traffic backups or queues.
- c. A written narrative and/or plan explaining how traffic and pedestrians will be moved through the Project Limits, including transitions during the change from one phase of construction to the next, as applicable.
- d. Temporary traffic control treatments at all intersections with roads, rail crossings, businesses, parking lots, pedestrian ways, bike paths, trails, residences, garages, farms, and other access points, as applicable.
- e. A list of all certified flaggers to be used on the Project, together with the number of flaggers which will be used for each type of operation that flagging is needed. If the Contractor is using a flagging Subcontractor, then the name and address of the Subcontractor may be provided instead of a list of flaggers.
- f. A procedure for notifying the Resident, local emergency officials, and local government officials (including the name and phone numbers of such officials) whenever significant traffic impacts are anticipated or occur. For a related provision, see Standard Specifications, Section 105.2.2 - Project Specific Emergency Planning.
- g. A description of any special detours including provisions for constructing, maintaining, signing, and removing the detour or detours, including all temporary bridges and accessory features, and complete restoration of the impacted land.
- h. The maximum length of requested contiguous lane closure. The Contractor shall not close excessive lengths of traffic lane to avoid moving traffic control devices.
- i. The proposed temporary roadway surface conditions and treatments. The Contractor shall provide an adequate roadway surface at all times; taking into account traffic speed, volume, and duration.
- j. The coordination of appropriate temporary items (drainage, concrete barriers, barrier end treatments, impact attenuators, and traffic signals) with the TCP.

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The Department will review the TCP for completeness and conformity with Federal requirements, Contract provisions, the current edition of the MUTCD, and Department policy and procedures. The Division Traffic Engineer can help with this review. If the TCP is ineffective, the Contractor is required to modify it at no additional cost.

General No equipment or vehicles of the Contractor shall be parked or stopped on lanes carrying traffic, or on lanes or shoulders adjacent to lanes carrying traffic, at any time, except as required by ongoing work operations. Contractor equipment or vehicles shall never be used to stop, block, or channelize traffic. The Contractor shall not store material or park equipment within 4.6 m [15 ft] of the edge of the established travel lanes. Equipment parked overnight between 4.6 and 9.1 m [15 and 30 ft] of the edge of the travel lane shall be placed behind positive barriers if feasible, or clearly marked by channelizing devices or other reflective devices. The Contractor shall provide a minimum roadway width of 6.7 m [22 ft] for two-way traffic and 3.4 m [11 ft] for one-way traffic. The existing travelway width shall be maintained to the maximum extent practical. Vertical panel markers, drums, cones, or striping shall be used to clearly delineate the roadway through the construction area. Two-way traffic operation shall be provided at all times that the Contractor is not working on the project. One-way traffic shall be controlled through work areas by flaggers, utilizing radios, field telephones, or other means of direct communication.

Channelization devices consisting of barricades or drums, at a maximum spacing of 15 m [50 ft], shall be used in guardrail areas when neither the existing guardrail nor the new guardrail is in place. The Contractor shall not remove guardrail until absolutely necessary for construction operations in that area. The guardrail shall be replaced as soon as possible thereafter.

#### Installation

Note: All Traffic Control Devices shall meet NCHRP 350 Guidelines and Standards.

Signs shall be erected on temporary sign supports so that the bottom of the sign is either 1) 300 mm [12 in] or 2) greater than 1.5 m [5 ft] above the traveled way. Post-mounted signs shall be erected so the bottom of the sign is no less than 1500 mm [5 ft] above the traveled way, and 2100 mm [7 ft] above the traveled way in business, commercial, and residential areas. Signs must be erected so that the sign face is in a true vertical position. All signs shall be placed so that they are not obstructed in any manner and immediately modified to ensure proper visibility if obstructed.

Vertical panel markers shall be mounted with the top at least 1200 mm [4 ft] above the traveled way. Drums shall not be weighted on the top. Drain holes shall be provided to prevent water from accumulating in the drums. Drums may be weighted with up to 150 mm [6 in] of loose dry sand.

The Contractor shall maintain the devices in proper position and clean them as necessary. Maintenance shall include the covering and uncovering of all signs when no longer applicable (even if for a very short



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duration). The sign shall be considered adequately covered when no part of the sign face is visible either around or through the covering. The Contractor shall replace damaged traffic control devices with devices of acceptable quality, as directed by the Resident.

#### 652-5 INSPECTION, MEASUREMENT & FIELD DOCUMENTATION

Traffic control devices should be routinely inspected for acceptable visibility, cleanliness, and condition. Items that do not meet these requirements shall be brought to the Contractor's attention for immediate action.

Cones shall be at least 700 mm [28 in] high with a band of retroreflective tape. Tack-covered cones are not allowed.

Drums shall 900 mm [36 in] high and 450 mm [18 in] in diameter.

SLOW/STOP paddles must be octagonal in shape with the appropriate color scheme.

All construction signs shall be in acceptable condition at the beginning of the Project. Marginal and unacceptable signs shall not be used. Signs shall be retroreflective (check for the honeycomb background).

a. Field Documentation Project Diary, Inspector's Diary/Daily Report: The Resident or Inspector will note at least weekly that the Maintenance of Traffic Control Devices is OK to pay for the week. If there is an accident, or unacceptable traffic control, the condition of the traffic control items should be noted.

b. Measurement and Payment Final quantity for traffic control can be figured by any one or a combination of the following methods:

1. Lump Sum The Lump Sum traffic control includes all Traffic Control Supervisor, approach signs, work area signs, drums, cones, delineators, barricades, etc. and maintenance thereof. Flaggers may be included also, check the Special Provisions, Section 652.

Maintenance of signs includes: replacing devices damaged, lost, or stolen, and cleaning and moving any signs as many times as necessary throughout the life of the contract, regardless whether the work areas or projects are geographically separated or not separated.

The Lump Sum will be payable in installments as follows: 5% of the Lump Sum once the approach signing is complete and approved, with the 95% balance to be paid as the work progresses at a rate proportional to the percentage completion of the Contract.

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Failure by the Contractor to follow the Special Provisions, Section 652 and/or The Manual on Uniform Traffic Control Devices (MUTCD) and/or The Contractor's own Traffic Control Plan will result in a reduction in payment, computed by reducing The Lump Sum Total by 5% per occurrence. The Resident has the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item.

There will be no payment for work done under this pay item after the expiration of contract time.

2. Pay Items Flashing Arrow Board, Type I, II, and III Barricades, Drums, Cones and Portable-Changeable Message Signs are measured by the each. The maximum number in use at any one time is paid for. For multi-PIN projects, it is the maximum number in use on all projects at one time. This maximum number is then pro-rated among the projects involved, based on the percentages in the Progress Estimate.

Construction Signs are paid by the square meter (2 decimal places) or square foot (one decimal place).

Maintenance of Traffic Control Devices is paid by the Lump Sum or Calendar Day. Acceptable MTCD should be noted at least weekly, and unacceptable MTCD should be noted daily. Days with unacceptable MTCD should not be paid for.

Flaggers are paid by the hour to the nearest ¼ hour. The Contractor shall supply a list of certified flaggers to the Resident. Uncertified or undocumented flaggers are not allowed to flag.

There will be no payment made for any 652 items after the adjusted completion date.

Final Quantity for payment will be entered in the Final Quantity Book and labeled as such. Reference will be made to diary entries, measurements, and computations in the project records, as necessary. Measurements must be entered in a bound book, which can be the Final Quantity Book or the Construction Book. Reference is made to Section 901 of this Manual for further discussion of field books. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date their work.**

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## **TEMPORARY EROSION CONTROL**

### 656-1 GENERAL

#### References:

- (1) MDOT Best Management Practices for Erosion and Sediment Control (MDOT BMP Manual), latest version.
- (2) Standard Specifications, Section 656
- (3) Special Provision, 105, (Instream Work)

In lieu of developing specific Erosion Control Plans for projects that would be subject to review and inspection by the Maine Department of Environmental Protection (MDEP), in 1997 the Department signed a Memorandum of Agreement with the MDEP and Maine Turnpike Authority (MTA) stating that all road and rail transportation projects shall comply with the requirements for Erosion and Sedimentation Control Plans as set out in Section II D and C respectively of the MDOT, BMP Manual. The Standard Specification 656 places the responsibility for developing and implementing a Soil Erosion and Water Pollution Control Plan (SEWPCP) to the Contractor. The Resident is responsible for reviewing and understanding the SEWPCP, and assuring the Contractor follows it. Temporary erosion and sedimentation control practices (BMPs) will be specified in the SEWPCP, and refer to the MDOT BMP Manual for material and construction specifications. Some projects have a State-written SEWPCP included in Special Provision 656 of the Bid book. This will serve as the Contractor's plan and will be paid for.

### 656-2 LAYOUT AND CONTROL

The SEWPCP will specify the temporary BMPs to be employed, as well as their scheduled installation and location.

### 656-4 CONSTRUCTION

There are different erosion and sedimentation control practices specified in the MDOT BMP Manual. Reference this manual for specific construction specifications.

Materials shall be installed in accordance with the manufacturer's recommendations, when available.

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#### 656-5 INSPECTION, MEASUREMENT AND FIELD DOCUMENTATION

The SEWPCP designates the Contractor's "Environmental Coordinator." This person is responsible for providing inspection and monitoring of all BMPs for the duration of the project and keeping notes in a written log. The log must include daily on-site precipitation and air temperature, as well as performance, failure and any corrective action for the controls in place.

When work requires the placement of fresh concrete that will come in contact with natural water bodies, elevated pH levels are a concern, and a procedure for monitoring and treatment of pH will be specified in the SEWPCP. Documentation of pH readings shall be kept in the Contractor's log.

The Resident and/or Inspector should accompany the Environmental Coordinator on their weekly inspections to ensure that the SEWPCP is being followed.

Documentation by the Resident should be made in the Project Diary consisting of weekly statements of acceptance.

#### 656-6 COMPUTATION OF QUANTITIES

Quantities of BMP application are as specified in the SEWPCP. The Contractor is responsible for certification of installation. Payment is made on a Lump Sum basis. Ten percent is to be paid once the final SEWPCP is approved, and the initial soil erosion and water pollution controls are in place and certified by the Contractor. The ninety percent balance is to be paid as the Work progresses, at a rate proportional to the percentage of completion of the contract.

Failure by the Contractor to comply with its SEWPCP will result in a reduction in payment. Refer to the Standard Specifications, Section 656.5.1 for details.

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Section 657 Rehabilitation of Pits -- 1 Pages

## REHABILITATION OF PITS

### 657-1 GENERAL

#### References:

Standard Specifications -      Section 105.8.6 - Rehabilitation of Pits  
   Section 657 - Rehabilitation of Pits  
   Section 717.01- Fertilizer  
   Section 717.02 - Agricultural Ground Limestone  
   Section 717.03 - Seed

Work consists of grading, seeding, and mulching the surface area of the pit, if it is to be discontinued for an extended period. Active, commercial pits are not required to be rehabilitated if they are to remain active after the completion of the project. If any portion of the pit that has been utilized for the project is to be discontinued for an extended period, that portion alone shall be rehabilitated, even if the remainder of the pit is still active.

### 657-2 CONSTRUCTION

- a. Grading The pit shall be graded according to the Standard Specifications, depending on the type of material that was excavated from the pit.
- b. Surface treatment Loam and sod fields shall be seeded with Method No. 2 seed. In other areas, the seed material shall meet the requirements of section 657.02 of the Standard Specifications. Mulch is to be applied in accordance with Section 619 -- Mulch.

### 657-3 MEASUREMENT AND FIELD DOCUMENTATION

Pits eligible for payment will be measured by the unit (100 m<sup>2</sup> [1000 ft<sup>2</sup>]) and entered in a bound field book. Areas seeded will be paid under Item 657; areas mulched will be paid under Item 619. If there is no item for Seeding Pits in the Schedule of Items, all work and materials necessary to meet the requirements of Section 657 will be considered incidental to the contract. Documentation will consist of field measurements and notes in the Project Diary on the agreed load amount.

### 657-4 COMPUTATION OF QUANTITIES

Final Quantity book: Quantity for final payment will be determined from field measurements recorded directly in the Final Quantity Book or other field book. Referencing will be made as appropriate. **All calculations, checks, and data entries will be signed, dated.**

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Section 658 Acrylic Latex Color Finish -- 2 Pages

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## **ACRYLIC LATEX COLOR FINISH**

### 658-1 GENERAL

#### References:

Standard Specifications, Section 658

Work consists of applying a color finish to bituminous pavement or Portland cement concrete surfaces designated on the plans for median strips, islands, and certain crosswalks.

### 658-2 CONSTRUCTION

a. Materials Only materials on a provided list of approved acrylic latex coating shall be used. The list can usually be found in the Special Provisions.

b. Surface Preparation The pavement or concrete surface shall be free of loose dirt, dust, grease, oil, or any other contaminant. Grease and oils shall be removed by a detergent wash, flushed with water and followed by high-pressure water or air or hand sweeping. Pavement shall have been placed at least seven days prior to application of the coating.

New portland cement concrete must cure at least 30 days prior to the application of coating. The concrete surface shall first be washed with a phosphoric acid solution (8:1 water/acid ratio) then coated with a tie-coat before the color finish coat can be applied. The surface shall be accepted by the Inspector prior to application of the finish color coat.

c. Application The coating shall be applied according to the Manufacturer's recommendations. Particular attention should be paid to temperature and moisture of the air and the surface. No color coating should be allowed to run or drip onto adjacent areas, especially curbing.

### 658-3 MEASUREMENT AND FIELD DOCUMENTATION

The Color Finish shall be measured by the square meter of surface covered. If the covered area (sidewalk, island, etc.) was installed reasonably according to the Plans, and the area is a difficult shape to field measure, the area may be measured from the Plans with scales and/or a planimeter. Documentation will consist of field

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measurements and notes in a bound Field Book, usually the Construction Book, and final quantities to be entered into the Final Quantity Book.

The accepted quantity of Acrylic Latex Color Finish will be paid for at the contract unit price per square meter complete in place. If the Contractor chooses to apply the coating outside of the Manufacturer's recommendations for temperature or outside of specified dates in the contract, payment will be held until the following spring, pending the performance of the coating.

Quantities will be determined from the plans or from field measurements recorded directly in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**

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Section 660 On-the-Job Training -- 1 Page

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## ON-THE-JOB TRAINING

### 660-1 GENERAL

#### References:

Standard Specifications, Section 660

Office of Human Resources web page

[http://www.state.me.us/mdot/humnres/o\\_equalo/cdwbed\\_h.htm](http://www.state.me.us/mdot/humnres/o_equalo/cdwbed_h.htm)

Work consists training approved applicants for construction careers.

### 660-2 MEASUREMENT AND FIELD DOCUMENTATION

OJT is measured by the hour to the nearest ¼ hour. Weekly time sheets are completed and signed by the Contractor and signed by the trainee and the Resident. One copy is for the trainee, one for the Contractor, one for the Project files, and one copy to the DOT Office of Human Resources. (624-3066)

The trainees presence will be noted in the Project Diary once a week. Off-site training on non-DOT Projects, if approved by the Department, may count towards training purposes but are not eligible for payment.

Quantities will be determined from the weekly time sheets and recorded in the Final Quantity Book. **All calculations and data entries must be signed, dated, and checked; the checker must sign and date his/her work.**