

APPENDIX D

Department of Works, Services and Transportation - Relevant Specifications

FORM 130



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 131

ROAD OR BRIDGE DIVERSIONS

Where the work involves a diversion or diversions from the existing highway alignment, the Contractor shall be responsible for the maintenance of the existing road and bridges until the completion of the work. The contractor shall be aware of the requirements of Division 8.

However, should the Contractor establish that his equipment does not use the existing road and bridges, then maintenance of the existing road and bridges will be the responsibility of the Department.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 142

NAVIGABLE WATERS PROTECTION ACT

All regulations of the Navigable Waters Protection Act shall be strictly adhered to.

The Navigable Waters Protection Act, R.S.C., 1986, Chapter N-22, is a Federal Statute designed to protect the public right of navigation in navigable waters, as defined in the Statute, by prohibiting the building or placement of any "work" in, upon, over, under, through, or across navigable water without approval of the Minister of Fisheries & Oceans. The Act is administered by the Canadian Coast Guard, Department of Fisheries & Oceans.

Written comments concerning NWPA should be directed to:

REGIONAL SUPERINTENDENT
NAVIGABLE WATERS PROTECTION
CANADIAN COAST GUARD
DEPARTMENT OF FISHERIES & OCEANS
P.O. BOX 5667 ST. JOHN'S, NEWFOUNDLAND
A1C 5X1

PHONE(709) 772-2284 FAX(709) 772-3072

FORM 180



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 180

UNWATERING INCIDENTAL TO WORK

The term "Unwatering" shall mean the removal or keeping out of water from the site, in order that work may be carried out in accordance with the specifications.

Where unwatering is not a pay item, but is required in order to carry out other work, then such necessary unwatering shall be provided by the Contractor. The Contractor shall provide such temporary water-tight structures and pumps as are required for unwatering, and then after completion of the work, remove the unwatering facilities and clean-up and trim the site to sightly proportions, all at his own expense.

In an unwatering operation silt laden water containing more than 30 milligrams of suspended solids per litre shall not be disposed of directly into a watercourse or water body, and also silt laden water containing more than 350 milligrams of suspended solids per litre shall not be disposed of directly into a sewer. Silt laden water exceeding these limits shall be discharged to a vegetated area or to a sedimentation basin for removal of silt to within the appropriate limits before being disposed of into a water course or water body, or into a sewer. Where possible the vegetated areas shall be not less than 60 m from a water course or water body, unless otherwise directed by the Engineer.

Cofferdams when used shall be constructed with suitable materials so as to render the cofferdam non-erodible and non-polluting. Earthfill cofferdams shall be faced with plastic sheeting followed by sand bags, or equivalent if approved by the Engineer. The purpose of the plastic is to produce a dam that produces the least amount of infiltration.

Should silt fences be required in connection with unwatering, then the silt fences shall be included in the cost of unwaterings.



SECTION 190

WORKPLACE SAFETY REQUIREMENTS

8.1 GENERAL WORKPLACE HEALTH AND SAFETY

1. All work is to be performed in accordance with the requirements of the Newfoundland Occupational Health and Safety Act and regulations as amended.
2. Subsequent to awarding of the tender and prior to commencement of work, the contractor must prepare for each tender awarded, a detailed Health and Safety Risk Assessment and Management Plan for the owner.
3. The assessment must identify potential job specific hazards and the necessary control measures to be implemented for managing the hazards.
4. A copy of the Health and Safety Risk Assessment and Management Plan must be available to the Occupational Health and Safety Branch, Department of Environment and Labour *and the Owner* upon request.

8.2 NOTIFICATION (OHS Regs. 5)

1. In accordance with Section 5 of the Occupational Health and Safety regulations, for any construction project which is intended to continue for thirty (30) days or more, the contractor must, prior to the commencement of the project, notify, in writing, the Workplace Health and Safety Division, Department of Environment and Labour.
 - ii. Details of notification *shall* include:
 1. Name, where applicable, and location of construction site.
 2. Mailing address to which correspondences can be directed.
 3. The number of workers to be employed.
 4. The name of the firm under which the business is to be carried out.
 5. A copy of the Health and Safety Risk Assessment and Management Plan, if requested.

8.3 SUPERVISION AND EMERGENCY RESCUE PROCEDURE (OHS Act 5-b, OHS Regs. 32, First Aid Regs)

1. All aspects of the project are to be carried out under the direct supervision of competent persons who shall have responsibility for safety by ensuring the work complies with appropriate sections of the OHS Act and Regulation.
2. Provide and ensure sufficient number of supervisory personnel are assigned to all sites in respect of that project.
3. Ensure means of communication for, or other suitable means of checking the well-being of, all workers required to work alone.
4. Develop emergency rescue plan covering all work site locations.
5. Ensure all supervisors and workers are trained in the emergency rescue plan.
6. Provide adequate first aid facilities for each work site location in accordance with the First Aid regulations.
7. Provide minimum number of workers trained in first aid in accordance with the First Aid regulations.

8.4 HEALTH AND SAFETY REPRESENTATION (OHS Act 37)

1. Where ten or more workers are employed in respect of the project, an Occupational Health and Safety Committee must be established as per OHS Act (37).

8.5 PERSONAL PROTECTIVE EQUIPMENT (OHS Regs. 49-59, OHS Act 5)

1. Ensure all workers on a project site use personal protective equipment appropriate to the hazards identified in the Risk Assessment and Management Plan.
2. Ensure all workers requiring personal protective equipment receive training in the proper care, use and maintenance of personal protective equipment.

8.6 TRAFFIC CONTROL (OHS Regs 105-107)

1. Provide traffic control measures when working on, or adjacent to, roadways.
2. Traffic control measures to conform with "Traffic Control Manual for Road work Operations", Department of Works, Services and Transportation.

8.7 EXCAVATION SAFETY (OHS Regs. 139-143; Trench Excavation Safety Guide)

1. Ensure all excavations more than 1.25 metres deep are protected against cave-ins or wall collapse by side wall sloping to the appropriate angle of repose or an engineered shoring-sheathing system or an approved trench box.

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1. Provide a ladder which can extend from the bottom of the excavation to at least 0.91 metres above the top of the excavation.
2. Ensure all excavations less than 1.25 metres deep are effectively protected when hazardous ground movement may be expected.
3. Specification of trench boxes:
 1. Designed and certified by a professional Engineer.
 2. Fabricated by a reputable manufacturer and have manufacturer's Depth Certification Statement permanently affixed.
 3. Must be used in strict accordance with manufacturer's instructions and depth certification data.
4. For all excavations deeper than six (6) metres, the contractor must provide a certificate from a registered professional Engineer stating that the protection methods proposed have been properly designed in accordance with accepted engineering practice. The engineer's certificate must verify that the trench boxes, if used, are properly designed and constructed to suit the depth and soil.
5. Every superintendent who is responsible for trenching operations and every crew chief, foreperson and lead hand engaged in trench operations or working in trenches must have a copy of Department of Environment and Labour, "Trench Excavation Safety Guide" in his/her possession at all times.

8.8 BLASTING OPERATIONS (OHS Regs. 155-168; TDG Act; Explosives Act (Fed))

1. All blasting operations must be carried out under the direct visual supervision of a qualified Blaster registered with the Newfoundland Department of Environment and Labour.
2. All explosives to be stored in accordance with the "Explosives Act (Canada)".
3. Workers required to transport explosives must have Transportation of Dangerous Goods Training certification in accordance with the "Act to Promote Public Safety in the Transportation of Dangerous Goods" and "The Explosives Act (Canada)".
4. All explosives must be stored, transported, handled, and used in the manner prescribed by the manufacturer of the substance and subject to specific regulation.
5. For blasting operations in proximity to areas occupied by the public, suitable public notices, advertisements, house to house contacts etc., where applicable, must be made by the contractor advising the public of the blasting operations, the warning device to be sounded and the procedure to be used before detonation of individual blasts.
6. Prior to detonation of a blast, the plaster must give sufficient warning in every direction and ensure all persons have reached a place of safety before the blast is fired.
7. Contractors must file an Emergency Response Assistance Plan with the Explosives Branch, Natural Resources Canada.

8.9 CONFINED SPACE WORK (OHS Act 32, 36, 47)

1. Contractors must have approved air monitoring equipment available where workers are working in confined spaces.
 1. Test equipment must be calibrated, in good working order and used by trained persons.
2. Contractors must develop a confined space entry program specific to the nature of work and in accordance with the OHS regulations.
 1. All workers and supervisors to be trained in the confined space entry program.
 2. Personal protective equipment and emergency rescue equipment appropriate to the nature of the work to be provided and used.

8.10 WORKING AT ELEVATIONS (OHS Regs 60, 91-97)

1. Fall-restraint or fall-arrest devices to be used by all workers working at elevations greater than 3.05 metres above grade or floor level in accordance with appropriate CSA Codes Z259.
2. Scaffolding to be designed, erected and maintained in accordance with CSA S269.2-M87 and Sections 91-97 of the OHS regulations.

8.11 WORKING WITH CONTROLLED PRODUCTS (WHMIS Regs; OHS Regs. 25)

1. Use of all controlled products must be in accordance with the Workplace Hazardous Materials Information System (WHMIS) Regulations and Section 25 of the OHS regulations.
 1. Relevant Material Safety Data Sheets (MSDS) must be at all work locations.
2. All workers required to use or work in proximity to controlled products to have product specific training as per legislation.
3. All controlled products at work locations to be labeled as per legislation.
 1. Workers to be trained in use of such emergency equipment.
4. Provide appropriate emergency facilities as specified in the MSDS where workers might be exposed to contact with chemicals, eg. eye-wash facilities, emergency shower.
5. Provide appropriate personal protective equipment as specified in the MSDS where workers are required to use controlled products.
 1. Workers to be properly fitted for personal protective equipment .
 2. Workers to be trained in care, use and maintenance of personal protective equipment.

8.12 ASBESTOS HAZARDS (Asbestos Abatement Code of Practice)

1. Some older piping infrastructures may contain asbestos. Prior to any work on these systems, contractors must have a written assessment performed by a registered Asbestos Abatement contractor.
2. If asbestos material is confirmed by the assessment, all abatement work must be carried out by a registered Asbestos Abatement Contractor and conform to the Asbestos Abatement Code of Practice.

8.13 HEAVY EQUIPMENT (OHS Regs. 87, 103, 110-116, 124)

1. All mobile equipment of the type specified in legislation to be fitted with a Roll Over Protective (ROP) structure.
2. Operators of heavy equipment to have certificate of training in Power Line Hazards.
3. Contractor must obtain written clearance from the power utility where equipment is to be operated in proximity to (within 5.5 metres) overhead/underground power lines.
4. All cranes to have:
 1. An electronic limit switch (anti two block device).
 2. A legible load chart
 3. A maintenance log book

8.14 TREE AND BRUSH CLEARING (OHS Regs. 183-187)

1. All workers using chain saws to wear:
 1. CSA safety hat fitted with face screen or shield
 2. hearing protection, e.g. ear muffs
 3. Approved chain saw pants
 4. Approved chain saw boots
2. All workers using brush saws to wear:
 1. CSA safety hat fitted with face screen or shield or approved safety glasses
 2. Hearing protection
 3. CSA approved safety footwear
3. Chain saws must be equipped with a chain break

8.15 DIVING OPERATIONS (CSA Codes Z275.2-92 and Z275.4-97.)

1. All diving operations to conform with:
 1. Canadian Standards Association Z275.2-92 Occupational Safety Code for Diving Operations.
 2. Canadian Standards Association Z275.4-97 Competency Standard for Diving Operations

8.16 *The owner shall not be responsible for injury or damage occasioned by a failure of the Contractor to adhere to these provisions*

FORM 201



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 201 CLEARING AND GRUBBING

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- 201.01 DESCRIPTION**
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- 201.03 CLEARING AND GRUBBING OPERATIONS**
- 201.04 MEASUREMENT FOR PAYMENT**
- 201.05 BASIS OF PAYMENT**

201.01 DESCRIPTION

Clearing and grubbing shall consist of the removal and disposal of all trees, brush, logs, surface boulders, stumps, roots, matted roots and other vegetation from within areas selected by the Engineer.

201.02 PERMITS AND AUTHORIZATION

The Contractor is required to obtain a permit to cut trees. Application for a permit should be made to the local office of the Department of Forest Resources and Agrifoods.

Should the Contractor wish to burn brush, then prior permission must first be obtained from the Department of Forest Resources and Agrifoods.

201.03 CLEARING AND GRUBBING OPERATIONS

Areas in which clearing and grubbing are to be carried out will be staked on the ground beforehand by the Engineer.

Where clearing and grubbing operations are required near a watercourse or waterbody, the Contractor shall ensure that a minimum 15 m "no grub" zone is left between the watercourse or waterbody and adjacent work area. This "no grub" buffer shall be clearly marked in the field by the Engineer prior to any grubbing so that the area is visible to heavy equipment operators.

The cutting of trees shall not commence until the Contractor has obtained a cutting permit.

The Department, should it so wish, may permit the Contractor to dispose of any timber cut on Crown Land to his advantage providing the requirements of the Crown Lands Act, with respect to royalties, etc., are met.

Where timber to be cleared and grubbed is on land belonging or leased to private individuals, crown corporations or companies, the timber does not become the property of the Contractor. The Contractor must make prior arrangements with land owners or lessee for the disposal of the timber.

The Contractor shall not proceed with any burning operations during the fire season without securing the permission of the Department of Forest Resources and Agrifoods. The Contractor shall take all necessary precautions to guard against damage to surrounding timber and shall assume all liability for claims which may arise from any such damage.

Surface boulders, regardless of their size, shall be considered as part of clearing and grubbing. All surface boulders shall be removed and disposed of along with the other clearing and grubbing debris.

Clearing and grubbing debris shall be disposed of in the manner approved by the Engineer.

Where clearing and grubbing takes place within the right of way, then the debris shall, if the Engineer so requires, be disposed of in approved

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push lanes constructed at intervals adjacent to the right of way. In those instances where due to; the proximity of private land, environmental factors, or for other reasons the Engineer requires that push lanes not be used, then, the Contractor shall haul away and dispose of the clearing and grubbing debris in an approved waste disposal area. The approved waste disposal area shall be provided by the Contractor at his own expense.

Where clearing and grubbing takes place in preparation for a borrow area outside of the right of way then clearing and grubbing debris may be pushed upon adjacent land provided that in so doing the debris is not pushed onto land belonging to others, or pushed in or around stands of mature trees.

Where significant quantity of the topsoil exists and as directed by the Engineer, the Contractor shall stockpile topsoil separately from other material for possible rehabilitation work.

Clearing and grubbing debris, regardless of whether it is placed in push lanes, placed in waste disposal areas or pushed on adjacent lands, shall be trimmed to sightly proportions.

201.04 MEASUREMENT FOR PAYMENT

Measurements will be made of the horizontal area actually cleared and grubbed from within the area staked out by the Engineer. These measurements shall be computed to obtain the area in hectares, measured to three decimal places.

Clearing and grubbing beyond the limits staked will not be measured for payment.

201.05 BASIS OF PAYMENT

Payment at the contract price for Clearing and Grubbing shall be compensation in full for all labour, materials and equipment-use to carry out the work indicated in this specification or in any way connected with these operations.

No payment, other than that provided for in the contract price for Clearing and Grubbing, will be made for topsoil and surface boulders removed by clearing and grubbing operations, or for any and all haulage involved in clearing and grubbing debris disposal.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 202

CLEARING

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202.02 ENVIRONMENTAL PERMITS AND AUTHORIZATION

202.03 CLEARING OPERATIONS

202.04 MEASUREMENT FOR PAYMENT

202.05 BASIS OF PAYMENT

202.01 DESCRIPTION

Clearing shall consist of the cutting of trees and brush and the removal, piling and burning or other disposal of all trees, brush and logs from within areas designated by the Engineer. However, clearing will not normally be performed within areas selected as borrow pits and quarries, unless otherwise directed by the Engineer.

202.02 ENVIRONMENTAL PERMITS AND AUTHORIZATION

The Contractor is required to obtain a permit to cut trees within the highway right of way. Application for a permit should be made to the local office of the Forestry Division.

Should the Contractor wish to burn brush, then prior permission must first be obtained from the Forestry Division. Tires are not to be used in burning operations. Additionally, burning operations in residential areas should be carried out in a manner where airborne fire emissions will not impact these properties.

202.03 CLEARING OPERATIONS

Areas in which clearing is to be carried out will be staked on the ground beforehand by the Engineer.

Clearing operations shall not commence until the Contractor has obtained a cutting permit.

If so ordered by the Engineer, certain trees within the right of way shall be preserved. Underbrush, down timber, snags and roots shall be removed from the vicinity of such preserved trees to a cleared space within the right of way and then burned. Where possible, a 15 m vegetated buffer (trees, shrubs) shall be retained upstream and downstream of stream crossing structures.

All tree branches extending into the right of way which hang within six metres of the ground shall be cut off close to the trunk in a neat and workmanlike manner.

No trees shall be cut down outside the limits of the right of way except any tree or trees considered unsafe by the Engineer and no tree may be so cut down unless marked for cutting by the Engineer.

No timber, brush or logs shall in any event be piled upon adjacent lands unless authority is first obtained from the Engineer.

The limits of the right of way shall be left in proper shape for fencing.

Trees cut within the right of way and not required for departmental use will become the property of the Contractor.

The Contractor shall be permitted to use for construction purposes under the contract any timber cut on the right of way provided that the sizes and quality of such timber meets the requirements of the plans and specifications and is acceptable to the Engineer.

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The Contractor shall dispose of all brush and logs not suitable for salvage. Disposal shall be by burning, or by removal and disposal in an approved waste disposal area provided by the Contractor at his own expense.

The Contractor shall not proceed with any burning operations during the fire season without securing the permission of the Forestry Division.

The Contractor shall take all necessary precautions to guard against damage to surrounding timber and shall assume all liability for claims which may arise from any such damage.

202.04 MEASUREMENT FOR PAYMENT

Measurement will be made of the horizontal area actually cleared from within the area staked out by the Engineer. These measurements shall be computed to obtain the area in hectares, measured to three decimal places.

Clearing beyond the limits staked will not be measured for payment.

202.05 BASIS OF PAYMENT

Payment at the contract price for clearing shall be compensation in full for all labour, materials and equipment-use to carry out the work indicated in this specification and shall include all costs involved in obtaining and conforming to the conditions of required permits, together with either burning the debris, or obtaining an approved waste disposal area and hauling away and disposing of the debris in the waste disposal area.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 203

GRUBBING

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203.01 DESCRIPTION

203.02 GRUBBING OPERATION

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203.01 DESCRIPTION

Grubbing shall consist of the removal and disposal of all stumps, roots, surface boulders, embedded logs, debris, matted roots, and other vegetation from areas designed to be grubbed, and shall be performed by the Contractor on the sites of excavation and embankments together with other areas not affected by grading operations as directed by the Engineer. However, grubbing will not normally be performed on areas selected as borrow pits and quarries unless otherwise directed by the Engineer.

Where directed by the Engineer, trees, stumps and brush shall be cut even with the ground in order not to disturb the natural matting and this "close cutting" will be paid for as grubbing.

203.02 GRUBBING OPERATIONS

Areas in which grubbing is to be carried out will be staked on the ground beforehand by the Engineer. Under fills, areas to be grubbed will normally be determined in accordance with the spirit of the guidelines in Section 1208.

Where grubbing is required near a watercourse or water body; the Contractor shall ensure that a minimum 15 m "no grub" zone is left between the watercourse or water body and adjacent work area. This "No Grub" buffer area shall be clearly marked in the field by the Engineer prior to any grubbing so that the area is visible to heavy equipment operators. Where possible, ditch waters shall be directed to existing vegetation at least 30 m from watercourse crossing locations rather than directly discharging to the watercourse.

Surface boulders, regardless of their size, shall be considered as part of grubbing debris. All surface boulders shall be removed and disposed of along with the other grubbing debris, except such boulders which in the opinion of the Engineer can be incorporated in the project.

Grubbing shall be disposed of in a manner approved by the Engineer and shall if the Engineer so requires be disposed of in approved push lanes constructed at intervals adjacent to the right of way.

Where, due to the proximity of private land, for environmental factors, or for other reasons, the Engineer requires that push lanes not be used, then, the Contractor shall haul away and dispose of the grubbing debris in an approved waste disposal area. The approved waste disposal area shall be provided by the Contractor at his own expense.

Grubbing debris, regardless of whether it is placed in push lanes or placed in waste disposal areas, shall be trimmed to sightly proportions.

Grubbing operations as directed by the Engineer shall be carried out for a distance of at least one kilometre in advance of grading operations, excepting where grubbing and excavation are permitted as a joint operation.

203.03 MEASUREMENT AND BASIS OF PAYMENT

Measurements will be made of the horizontal area actually grubbed or close cut, as required by the Engineer. These measurements shall be computed to obtain the area in hectares, measured to three decimal places.

Grubbing or close cutting beyond the limits staked will not be measured for payment.

No payment, other than that provided for in the contract price for grubbing, will be made for topsoils and surface boulders removed by grubbing operations, or for any and all haulage involved in grubbing disposal.

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Cross sectioning for purposes of payment for excavated quantities for other items appearing in the contract documents will not be done until grubbing or clearing and grubbing operations in the designated area are completed.

Payment at the contract price for grubbing shall be compensation in full for all labour, materials and equipment-use to carry out the work indicated in this specification or in any way connected with these operations.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 204 GRADING OF FILL

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204.06.01 Basis of Payment for Grading of Fill where Materials are from sources provided by the Department

204.06.02 Basis of Payment for Grading of Fill where Materials are from sources provided by the Contractor

204.01 FILL MATERIALS

All material from cuts, excavation for foundation and ditch excavation shall be used in fill construction, provided that material is required to complete fills and provided that the material is suitable for this purpose.

All materials that are proposed to be incorporated into fills shall be subject to test by the Engineer to determine their suitability for the portions of the fill in which it is proposed that they be placed.

Only such materials as are approved by the Engineer shall be placed in fills.

Fill material shall not contain frozen lumps, weeds, sod, roots, logs, stumps or any other objectionable matter.

Material from rock cuts and quarries shall be thoroughly fragmented, well graded with fragments of greatest dimension of not more than 500 mm.

Surface boulders and stones larger than 150 mm present in other material may be placed in fill provided that they are placed in accordance with the requirements of this specification.

204.02 PLACING OF FILL

The Contractor shall remove such grubbing and unsuitable material as the Engineer requires removed from the area on which the fill is to be placed. The limits of the toe of the fill shall be staked by the Engineer. All culverts and drainage structures shall be constructed and no fill material shall be placed in the area until the ground has been inspected and approved by the Engineer.

The Contractor shall construct fills to the lines, grades and cross sections required by the Engineer.

The Contractor shall maintain a minimum 15 m undisturbed buffer strip between the fill area and watercourses to be crossed until such time that the crossing structure is ready for installation. The width of the buffer strip shall be determined by the Engineer.

Fill construction shall not be performed when the ground is frozen or when the fill material is frozen or when a blanket of snow prevents proper compaction.

On no account will the Contractor be allowed to construct a core through the fill and complete the fill by side dumping.

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Fill material shall be deposited and spread in layers of a loose thickness, before compaction, not exceeding 500 mm for the full width of the fill, except that the Engineer may order this thickness reduced, if in his opinion, such thickness does not respond to compaction methods. The top surface of each layer shall be suitably sloped with a cross-fall not to exceed five percent in order to shed surplus rain water, and the thickness of each successive layer shall be maintained uniform for the full width of the fill. Each layer of the section of the fill under construction at the time shall be brought up to its required grade and properly compacted as herein specified before the succeeding layer is applied.

204.02.01 Construction of Fill Adjacent to Steep Slopes

Where fill is to be placed on a side hill, sloping areas, or against an existing embankment, or where fill is to be built one half width at a time, then the slopes of the original side hill, sloping area, existing or new embankment, as the case may be, shall be cut into a minimum of two metres horizontally, or as may be directed by the Engineer. The fill shall then be placed in layers. After successive layers have brought the fill up to the level of the top of the aforesaid two metre wide cut, another horizontal cut of a similar nature shall be made into the original side hill or sloping area or into the existing or new embankment, so that proper bonding of new work to old may be obtained.

This procedure shall be followed throughout the entire construction of the fill. All material thus cut out shall be recompacted along with the new fill material.

204.02.02 Construction of Fill by the Sandwich Method

Embankments may, at the discretion of the Engineer, be constructed by the "sandwich" method. Under this system, alternate layers of materials from other material and rock sources shall be spread and compacted. The Contractor shall direct and organize his excavation forces so that an adequate supply of both materials is available at all times during embankment construction. The upper 500 mm of embankment subgrade shall consist of rock fill and all stones larger than 150 mm shall be removed from the material comprising the top 300 mm of the sub-grade.

204.02.03 Special Requirements for Placing O.M. Fill Containing Large Rocks

Surface boulders, removed during grubbing operations or stones larger than 150 mm present in other material may be used in other material fill provided that:

- (i) All boulders or stones larger than 500 mm shall be placed such that there will be at least 2 m of cover on all sides.
- (ii) All stones larger than 150 mm, but less than 500 mm in size, shall be kept at least 300 mm below sub-grade.
- (iii) No two boulders or stones larger than 500 mm shall be in contact with each other. All boulders and stones larger than 150 mm must be of such shape and placed in such position within the fill, that compaction equipment may operate efficiently between the rocks, and close up to all faces of each of the rocks, while successive layers of fill are being placed.
- (iv) The position of each boulder in the embankment shall be such that when resting on a horizontal surface, each boulder shall be in a stable position with the centre of gravity as low as possible.

204.03 FILL COMPACTION

Fill consisting of other material shall be compacted to at least 95% of the Standard Proctor Density (ASTM D698-78) by using approved compaction equipment.

In rock fill material where Standard Proctor tests cannot be carried out, compaction shall be continued until there is no visible movement of the fill under an approved vibratory compactor which is vibrating. The vibratory compactor shall be of a type designed for fill compaction, weigh at least 9 tonnes and exert a load when vibrating of at least 4.5 tonnes per metre of wheel width.

204.04 CLASSIFICATION

Where materials placed in the fill are from excavations within the highway right of way, or from borrow sources provided by the Department, then the fill materials will be classified in excavation in accordance with Section 205 "Classification of Excavated Materials".

However, where the fill material is supplied by the Contractor then the fill will be classified as either "Rock Fill in Place" or "Other Material Fill in Place". Rock Fill in Place and Other Material Fill in Place shall conform to the physical and other requirements given in Section 310 "Use of Pits and Quarries and Stockpiles for Production of Materials Supplied by the Contractor".

204.05 MEASUREMENT FOR PAYMENT

Where materials placed in the fill are from excavations within the highway right of way, or from borrow sources provided by the Department, then measurement for payment will be based on measurements of either volume of excavation or on weight, as given in other sections of this book.

However, for the fill materials supplied by the Contractor; "Rock Fill in Place" and "Other Material Fill in Place", the measurement for payment will be made of either; the volume of fill placed, or the weight of fill placed, depending on whether the unit price is given in cubic metres or tonnes.

204.05.01 Volume Measurement for Payment for Fill in Place

The quantity to be measured shall be the number of cubic metres (rounded to the nearest whole number) of fill as shown on the cross-section sheets between the position of the ground lines as cross sectioned before the "Fill in Place" material was placed, and the completed and accepted fill lines. Material placed outside of the required chainage limits, shoulders and toes of slopes will not be included in the calculations.

The volume of the fill shall be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

During the placing of fill operations whenever the fill material, as classified in 204.04 classification, changes from one type to another, the Contractor shall notify the Engineer so that proper measurements or cross sections may be made.

204.05.02 Weight Measurement for Payment for Fill in Place

Where "Rock Fill in Place" or "Other Material Fill in Place" is to be paid for in terms of the number of tonnes, then such materials shall be weighed on scales. The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the works shall be included in measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.

Materials placed outside of the required chainage limits, shoulders and toes of slopes will be excluded in computations for quantities.

204.06 BASIS OF PAYMENT

The basis of payment will depend on whether the fill material is from sources provided by the Department or from sources provided by the Contractor.

Where benching of slopes is required as part of the grading of fill operation, no payment shall be made in respect of quantities excavated to form the benches.

204.06.01 Basis of Payment for Grading of Fill where Materials are from Sources Provided by the Department

Where the materials placed in the fill are from excavations within the highway right of way or from borrow sources provided by the Department, then no separate payment will be made for the grading of fill. The grading of fill is part of the operation of excavating the material used in the fill, and payment at the appropriate contract price for the excavation material, depending on the source and type of material, shall be compensation in full for all labour, materials and equipment use for; excavating, handling, and hauling the excavated material up to 1 km, excavating such slope benches as may be required and placing and compacting both the excavated material and the material excavated from any slope benches in a fill in accordance with the specification for grading of fill.

Where the Engineer requires that excavation material be hauled in excess of 1 km before being placed in a fill, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavated Materials".

204.06.02 Basis of Payment for Grading of Fill where the Materials are from Sources Provided by the Contractor

Where the materials placed in the fill are from borrow sources provided by the Contractor, then payment shall be at the contract unit price per cubic metre, or per tonne, for either "Supply Rock Fill in Place", or "Supply Other Material Fill in Place", as appropriate. Such payment shall be compensation in full for all labour, materials, equipment-use and any other expenses to; provide a pit or quarry, obtain all required permits and approvals, clear, grub, and strip the pit or quarry, excavate the material, handle the material, provide all haulage of the material from the source to the fill, provide provision for weighing (if appropriate), place and compact the fill to the lines, grades and cross sections required, pay any royalties for the material, clean up and provide such other restoration to the pit or quarry as may be required, together with any other work necessary to complete the contract item.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 205

CLASSIFICATION OF EXCAVATED MATERIALS

Excavated materials shall be classified for the purposes of payment as "Solid Rock", or "Other Material" in conformity with the following:

- (a) Solid Rock - shall include all rock, in masses or ledges in their original or stratified bed or position, and all boulders and detached pieces or rock exceeding zero decimal five cubic metres in measurement which are present in Other Material.
- (b) Other Material - shall include all earth, sand, gravel, cemented gravel, clay, hardpan and boulders less than zero decimal five cubic metres in measurement and all excavated materials not classed as Solid Rock.

However, in those contract documents where quantities appear for items of excavated materials in addition to "Solid Rock" and "Other Material", as defined above, then these excavated materials shall be further classified for the purposes of payment in conformity with the following:

- (i) Quarried Rock - shall mean Solid Rock that is taken from a borrow area.
- (ii) Other Material Borrow - shall mean Other Material that is taken from a borrow area.
- (iii) Unsuitable Material - shall mean Other Material that is not suitable for use in grading of fill operations.
- (iv) Muskeg or Bog - shall mean Other Material consisting of bog and underlying pug together with such tree stumps, roots and vegetation that are present on and in the bog.
- (v) Ditching Solid Rock - shall mean Solid Rock that is taken from ditch excavation.
- (vi) Ditching Other Material - shall mean Other Material that is taken from ditch excavation.

FORM 206



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 206

GRADING OF CUTS

INDEX

- 206.01 DESCRIPTION
- 206.02 GENERAL REQUIREMENTS FOR OTHER MATERIAL CUTS
- 206.03 GENERAL REQUIREMENTS FOR ROCK CUTS
- 206.04 CLASSIFICATION
- 206.05 BASIS OF PAYMENT

206.01 DESCRIPTION

This work shall include labour and materials required to carry out all excavation such as that required to complete road cuts, roadside ditches, bench excavation of cuts and sub-excavations and shall include hauling up to 1 km, handling and incorporation of all suitable materials into fill construction in accordance with Section 204 "Grading of Fill", and shall include the hauling up to 1 km, and handling of the unsuitable materials and the trimming of such unsuitable materials along the embankment slopes or elsewhere, all as directed by the Engineer.

The Contractor shall excavate cuts to the grade required by the Engineer.

The width and side slopes of all cuts together with roadside ditches shall be made true to the required cross sections and trimmed to the satisfaction of the Engineer.

No undercutting of slopes within the limits of the theoretical slope lines will be permitted by power shovels or other earth moving equipment unless all material above the theoretical slope lines is also removed.

Where the quantity of excavation exceeds that required to construct the fills as directed by the Engineer, the surplus shall be used to widen the fills or otherwise disposed of as directed by the Engineer.

206.02 GENERAL REQUIREMENTS FOR OTHER MATERIAL CUTS

Surface soil and vegetable mold shall be removed when so directed by the Engineer.

The Contractor shall remove stones larger than 150 mm in greatest dimension from the top 300 mm of sub-grade.

206.03 GENERAL REQUIREMENTS FOR ROCK CUTS

All rock cuts shall be excavated and mucked out fully to 300 mm below sub-grade.

In rock cuts where pockets which will not drain are formed below the sub-grade by blasting, the Contractor shall, at his own expense, provide drainage by ditching to a free outlet, as ordered, and then backfill and compact to 95% of Proctor Density both the pockets and the trench to an elevation 300 mm below sub-grade. Backfill material shall be broken rock or coarse gravel.

Back slopes shall be carefully scaled down and all rocks and fragments, liable to slide or roll down the slopes, removed to the satisfaction of the Engineer.

Overbreak

Overbreak shall be defined as that portion of rock which is excavated, displaced or loosened outside and beyond the slopes or grade as established by the Engineer, with the exception of such material which occurs as slides, regardless of whether any such overbreak is due to blasting, to the inherent character of any formation encountered, or to any other cause.

All overbreak as so defined shall be removed by the Contractor at his own expense, at the direction of the Engineer. Provided however, that if the Engineer approves, such overbreak may be used to replace material which would otherwise have to be borrowed. In which case

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payment to the Contractor for such overbreak used will be the contract price bid per cubic metre for material which would otherwise have to be borrowed.

Excepting that if in the opinion of the Engineer, the Contractor has exercised due care in the performance of his work, and due to circumstances beyond his control overbreak has occurred, overbreak within 500 mm of the lines of the theoretical cross section will be paid for as solid rock excavation.

Large Blasts

The use of explosives in large blasts, as in seams, drifts, shafts, or pits, is prohibited unless on written authority of the Engineer.

The Contractor will be responsible for all damages to utility lines or to adjoining property caused by blasting or from any cause whatsoever resulting from any of his operations in connection with his work.

When the Department requires that a pole line be moved in order to safeguard it against damage from blasting operations, the Contractor will be required to pay fifty per cent of the labour cost. An estimate of costs will be obtained by the Department before any relocation or moving is done. This clause in no way relieves the Contractor from responsibility for damage.

206.04 CLASSIFICATION

Excavated materials will be classified in accordance with Section 205, Classification of Excavated Materials.

206.05 MEASUREMENT FOR PAYMENT

Volumes of all classes of excavation described in 206.04 Classification will be measured in excavation and computed in cubic metres rounded to the nearest whole number. Measurements shall be of the actual amount of material moved only, except as otherwise provided in this specification.

The quantity to be measured shall be the number of cubic metres of excavated material as shown on the cross section sheets between the original position of the ground lines as cross sectioned after grubbing operations have been completed (or when grubbing is to be removed as part of Other Material Excavation, or Unsuitable Material Excavation, the original position of the ground lies on top of the grubbing), and the completed and accepted excavation lines. The volume of this excavation is to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

For boulders present in other material; the three maximum rectilinear dimensions of boulders, actually moved, will be measured and the volume of each so determined. Volumes of the boulders which are equal to, or greater than, zero decimal five cubic metres in volume will be included for payment as Solid Rock.

During excavation operations whenever the character of material changes from one type to another, as classified in Section 205, then the Contractor shall strip the area, within the slopes, of all overlying material, and notify the Engineer in order that proper measurements or cross sections may be made. No allowance will be made for material excavated before such measurements or cross sections have been made.

Where the Engineer instructs that cuts be widened for the purposes of providing borrow, then the demarcation between quantities measured as "Other Material" and "Other Material Borrow", or "Solid Rock" and "Quarried Rock", as the case may be, shall be the theoretical face of cut line given by the cross sections. For rock cuts widened to provide "Quarried Rock", there will be no overbreak allowed for in the measurement of "Solid Rock".

Large rock fragments which are too large to be incorporated into the fill shall be measured and their volumes subtracted from the cross section volumes. Calculations for volume of large rock fragments shall be the product of the three maximum rectilinear dimensions of the fragments.

206.06 BASIS OF PAYMENT

Payment shall be at the contract unit price per cubic metre for either "Solid Rock", "Other Material", or "Unsuitable Material", as the case may be, hauled 1 km or under, except as otherwise provided in Section 206.03, Overbreak.

However should the contract not include quantities for "Muskeg or Bog", then all required excavation of muskeg or bog will be paid for at the contract price for "Unsuitable Material". Should the contract not include quantities for "Unsuitable Material" then all required excavation for muskeg or bog will be paid for at the contract price for "Other Material".

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Should the contract not include quantities for "Unsuitable Material" then all required excavation for unsuitable material will be paid for at the contract price for "Other Material".

Should the contract not include quantities for "Other Material", then all required excavation for Other Material will be paid for at the contract price for "Unsuitable Material".

Should the contract not include quantities for "Ditching Solid Rock", then all required excavation for Ditching Solid Rock will be paid for at the contract price for "Solid Rock", and vice versa.

Should the contract not include quantities for "Ditching Other Material", then all required excavation of Ditching Other Material will be paid for at the contract price for "Other Material", or vice versa.

Such payment shall be full compensation for all work herein described together with the labour and materials required for excavating, handling, hauling up to 1 km and placing and compacting in a fill as described in Section 204 "Grading of Fill", or placing and shaping up in a disposal area as required.

Where the Engineer requires that excavation material be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215, "Overhaul on Excavated Materials".

**SECTION 207****BORROW****INDEX****207.01 SCOPE****207.02 DESCRIPTION****207.02.01 Delays and Provision of Borrow Sites****207.02.02 Siting of Borrow Sites****207.02.03 Operation of Borrow Sites****207.02.04 Abandonment and Rehabilitation****207.03 PERMITS****207.04 CLASSIFICATION****207.05 MEASUREMENT FOR PAYMENT****207.06 BASIS OF PAYMENT****207.01 SCOPE**

This specification concerns borrow where the source of the borrow is supplied by the Department.

However, where the Contractor is required to supply the source of material, as in contract items such as, "Supply Rock Fill in Place" or "Supply Other Material Fill in Place", then the requirements are covered separately in Section 310 "Use of Pits and Quarries and Stockpiles for Production of Materials Supplied by Contractor".

207.02 DESCRIPTION

When sufficient quantities of material suitable for highway fills are not obtainable from the various excavations required for the construction of the highway, then the Engineer will authorize the provision of borrow material to be obtained from a borrow pit or pits or a quarry or quarries as the Engineer requires.

This work shall include all materials and labour required to excavate borrow materials, hauling up to 1 km, the handling and the incorporation of the materials into fill construction in accordance with Section 204 "Grading of Fill".

Where borrow sites are necessary outside the right of way, approval of the Department of Mines and Energy is required.

207.02.01 Delays and Provision of Borrow Sites

Where borrow pits or quarries are located outside the limits of the right of way, they will be provided and paid for by the Department.

Before the Department directs the Contractor to get borrow from a particular borrow area, the Department will make effort to determine the suitability of the material. However, if after borrow operations have begun the Department determines that the borrow is no longer suitable and that the borrow area may no longer be used, and should the Contractor be delayed while another borrow area is being obtained, then the Department will not assume responsibility for the first 14 days of such a delay and the Contractor shall indemnify and save harmless the Minister from all suits and actions for damages resulting from the first 14 days of the delay.

207.02.02 Siting of Borrow Sites

Borrow pits and quarries shall be located and confined to such limits as the Engineer may direct.

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Where borrow sites are necessary outside the highway right of way, the borrow area shall be hidden from view from the highway as much as possible. A buffer strip of 200 m shall be maintained between the highway right of way and the borrow area. Any trees within the buffer strip shall not be disturbed or damaged.

The borrow area shall not be subject to flooding. The bottom shall be drained to the nearest watercourse or culvert.

All access roads to the borrow area shall be bridged or culverted where watercourses are crossed.

207.02.03 Operation of Borrow Sites

The Contractor shall clear and grub the borrow area before excavation may begin, without causing disturbance or damage to surrounding trees.

The Contractor shall be responsible for all damages to utility lines or adjoining property caused by blasting or from any cause whatsoever resulting from any of his operations in connection with his work.

Any available topsoil or organic matter which overlies the deposit shall be stockpiled at the site without causing disturbance or damage to surrounding trees.

Trees cut within the borrow area and not required for Departmental use will become the property of the Contractor.

Any discharge of water, containing more than 30 mg/l of suspended solids, shall not be disposed of directly into a watercourse or water body. Silt laden water exceeding this limit shall be discharged to a vegetated area or to a sedimentation basin for removal of excess silt, before being disposed of into a watercourse or water body.

207.02.04 Abandonment and Rehabilitation

Before closure, the borrow site shall be trimmed and left neat and regular with side slopes conforming to the requirements set forth in the quarry permit issued by the Department of Mines and Energy.

In all quarry operations, the quarry faces shall be carefully scaled down and all rocks and fragments, liable to slide or roll down the slopes, removed to the satisfaction of the Engineer.

Any available topsoil or organic material that has been stockpiled shall be spread over the slopes to assist in revegetation. Where possible, borrow sites shall be hand seeded with a clover and hayseed mixture.

Waste material shall be disposed of in accordance with Division 8.

After completion of the operation or during periods of winter shutdown, the access road shall be ditched or barriers erected to prevent vehicular access unless instructed otherwise by the Engineer. Earth barriers shall be graded and trimmed to sightly proportions.

207.03 PERMITS

Approval by the Department of Mines and Energy is required for the establishment of borrow sites outside of the highway right of way.

207.04 CLASSIFICATION

Borrow materials will be classified as either "Solid Rock", "Quarried Rock", "Other Material", or "Other Material Borrow" in accordance with Section 205, "Classification of Excavated Materials".

207.05 MEASUREMENT FOR PAYMENT

Measurement for payment will only include measurement of quantities that are required by the Engineer.

Large rock fragments which are too large to be incorporated into the fill shall be measured and their volumes subtracted from the cross section volumes. Calculations for volume of large rock fragments shall be the product of the three maximum rectilinear dimensions of the fragments.

Payment by Volume

For borrow materials described in Section 207.04 Classification, that are to be paid for in terms of the number of cubic metres of borrow material, then such materials shall be measured in cubic metres rounded to the nearest whole number.

The quantity to be measured shall be the number of cubic metres of excavated material as shown on the cross section sheets between the original position of the ground lines as cross sectioned after grubbing operations have been completed, and the completed and accepted excavation lines. The volume of this excavation is to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

Payment by Weight

For borrow materials, described in Section 207.04 Classification, that are to be paid for in terms of the number of tonnes, then such materials shall be weighed on scales. The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the works shall be included in measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.

207.06 BASIS OF PAYMENT

Where the contract includes quantities for "Quarried Rock", then all required excavation of solid rock from borrow areas will be paid for at the contract price for "Quarried Rock".

However, should the contract not include quantities for quarried rock, then all required excavation of solid rock from borrow areas will be paid for at the contract price for "Excavation Hauled 1 km or Under, Solid Rock".

Where the contract includes quantities for "Other Material Borrow", then all required excavation of other material from borrow areas will be paid for at the contract price for "Other Material Borrow".

However, should the contract not include quantities for other material borrow, then all required excavation of other material from borrow areas will be paid for at the contract price for "Excavation Hauled 1 km or Under, Other Material".

Payment shall be at the contract unit price per cubic metre, or per tonne, for either "Solid Rock", "Quarried Rock", "Other Material" or "Other Material Borrow", as the case may be, hauled 1 km or under. Such payment shall be full compensation for all work herein described together with all materials, labour, and equipment use required to carry out excavating, handling, provision for weighing (if appropriate), hauling up to 1 km and placing and compacting in a fill as described in Section 204 "Grading of Fill".

However, clearing and grubbing shall be paid for separately in accordance with Section 201 "Clearing and Grubbing".

Where the Engineer requires that borrow material be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavated Materials".

FORM 208



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 208 EXCAVATION OF DITCHES

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208.01	DESCRIPTION
208.02	GENERAL REQUIREMENTS FOR ROCK CUTS
208.03	CLASSIFICATION
208.04	MEASUREMENT FOR PAYMENT
208.05	BASIS OF PAYMENT

208.01 DESCRIPTION

This work shall include labour and materials required to carry out all excavation such as that required to complete roadside ditches and shall include hauling up to 1 km, handling and incorporation of all suitable materials into fill construction in accordance with Section 204 "Grading of Fill". The Contractor shall excavate the ditches to the grade required by the Engineer.

The width and side slopes of all roadside ditches shall be made true to the required cross sections and trimmed to the satisfaction of the Engineer.

To reduce siltation resulting from roadside drainage, the Contractor shall, if possible, terminate roadside ditches a minimum of 30 metres from any watercourse or water body or at a point designated by the Engineer. This will allow roadside drainage water to filter through a vegetated area prior to entering a watercourse or water body.

Where the quantity of excavation exceeds that required to construct the fills as directed by the Engineer, the surplus shall be used to widen the fills or otherwise disposed of as directed by the Engineer.

208.02 GENERAL REQUIREMENTS FOR ROCK CUTS

Overbreak shall be defined as that portion of rock which is excavated, displaced or loosened outside and beyond the back slopes of the ditches as established by the Engineer, with the exception of such material which occurs as slides, regardless of whether any such overbreak is due to blasting, to the inherent character of any formation encountered, or to any other cause.

All overbreak as so defined shall be removed by the Contractor at his own expense, at the direction of the Engineer. Provided, however, that if the Engineer approves, such overbreak may be used to replace material which would otherwise have to be borrowed. In which case payment to the Contractor for such overbreak used will be the contract price bid per cubic metre for material which would otherwise have to be borrowed.

Excepting that if in the opinion of the Engineer, the Contractor has exercised due care in the performance of his work and due to circumstances beyond his control overbreak has occurred, overbreak within 500 mm of the lines of theoretical backslopes and within 300mm of the theoretical ditch bottom will be paid for as solid rock excavation.

The use of large blasts is prohibited unless on written authority of the Engineer. The Contractor will be responsible for all damages to utility lines or to adjoining property caused by blasting or from any cause whatsoever resulting from any of his operations in connection with his work.

When the Department requires that a pole line be moved in order to safeguard it against damage from blasting operations, the Contractor will be required to pay fifty percent of the labour cost. An estimate of costs will be obtained by the Department before any relocation or moving is done. This clause in no way relieves the Contractor from responsibility for damage.

208.03 CLASSIFICATION

Excavated materials will be classified in accordance with Section 205, Classification of Excavated Materials.

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208.04 MEASUREMENT FOR PAYMENT

Volumes of all classes of excavation described in Section 208.03 Classification will be measured in excavation and computed in cubic metres rounded to the nearest whole number. Measurements shall be of the actual amount of material moved only, except as otherwise provided in this specification.

The quantity to be measured shall be the number of cubic metres of excavated material as shown on the cross section sheets between the elevation of the edge of the subgrade shoulder and the theoretical neat lines of the ditches as shown in Section 1205 of the Specifications Book.

These quantities shall be calculated from cross sections taken after grubbing operations have been completed.

If the ditches are widened to provide a source of material for fills, then the materials excavated from areas outside of the ditches as shown on typical cross sections in the Specifications Book will be paid for under Section 207 Borrow.

For boulders present in other material, the three maximum rectilinear dimensions of boulders, actually moved will be measured and the volume of each so determined. Volumes of the boulders which are equal to, or greater than, zero decimal five cubic metres in volume will be included for payment as solid rock.

Large rock fragments which are too large to be incorporated into the fill shall be measured and their volumes subtracted from the cross section volumes. Calculations for volume of large rock fragments shall be the product of the three maximum rectilinear dimensions of the fragments.

208.05 BASIS OF PAYMENT

Payment shall be at the contract unit price per cubic metre of either "Ditching Solid Rock", or "Ditching Other Material", as the case may be, hauled 1 km or under, except as otherwise provided in Section 208.02, General Requirements for Rock Cuts.

However, should the contract not include quantities for "Ditching Solid Rock", then all required excavation of "Ditching Solid Rock" will be paid for at the contract price for "Solid Rock".

Should the contract not include quantities for ditching other material, then all required excavation of "Ditching Other Material" will be paid for at the contract price for "Other Material".

However, should the Engineer require that unsuitable material or bog be excavated, then such excavation of unsuitable material or bog shall be paid for at the contract price for excavation hauled 1 km or under "Ditching Other Material".

Payment at the contract price for Ditching Other Material or Ditching Solid Rock, shall be compensation in full for all labour, materials, and equipment use required for all work herein described together with the excavating, handling, hauling up to 1 km and placing and compacting in a fill as described in Section 204 "Grading of Fill", or placing and shaping up in a disposal area as required.

Where the Engineer requires that excavated material be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavated Materials".

FORM 211



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 211

EXCAVATION OVERHANGING ROCK AND ROCK SLIDE DEBRIS

INDEX

211.01 DESCRIPTION

211.02 MEASUREMENT FOR PAYMENT

211.03 BASIS OF PAYMENT

211.01 DESCRIPTION

This work shall include labour and materials required to excavate overhanging rock and rock slide debris from the faces of existing rock cuts, the hauling up to 1 km and the placing and compaction of the material in fills.

Overhanging rock shall be excavated true to the slope as staked by the Engineer.

Boulders or large rock fragments, from the excavated overhanging rock or from the rock slide debris shall be broken up with explosives, or other means, so that the resultant pieces may be used as fill material on the job.

The excavated overhanging rock and rock slide debris shall be thoroughly cleaned out from the ditches.

The Contractor shall take every precaution to avoid disturbing the existing shoulder of the road during the operations.

However, should the shoulder be disturbed during the work, then the Contractor shall at his own expense restore the shoulder to its original condition and compact the shoulder.

The excavated overhanging rock and rock slide debris shall be hauled to a fill as directed by the Engineer, and incorporated into the fill and compacted in accordance with Section 204 "Grading of Fill". Should the material not be required for fill construction, then the material shall be trimmed along embankment slopes or elsewhere as directed by the Engineer.

211.02 MEASUREMENT FOR PAYMENT

The volume for payment shall be the net volume of Excavation Overhanging Rock and Rock Slide Debris actually placed in a fill.

Measurement will be made in excavation and will be from the cross section sheets showing the original ground lines and the completed and accepted excavation lines as cross sectioned. The volume of this excavation is to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

No allowance will be made for material excavated before original cross sections have been made.

Large rock fragments which are too large to be incorporated into the fill shall be measured and their volumes subtracted from the cross section volumes. Calculations for volume of large rock fragments shall be the product of the three maximum rectilinear dimensions of the fragments.

The volume for payment shall be measured in cubic metres rounded to the nearest whole number.

211.03 BASIS OF PAYMENT

Payment shall be at the contract unit price per cubic metre for Excavation Overhanging Rock and Rock Slide Debris, hauled 1 km or under, and such payment will be compensation in full for all operations herein described

However, where the Engineer requires that materials be hauled in excess of the 1 km freehaul before being placed, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavated Material", at the appropriate rate for Overhaul on Excavation Rock.

FORM 212



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 212

EXCAVATION OF MUSKEG OR BOG

INDEX

212.01 DESCRIPTION

212.02 MEASUREMENT FOR PAYMENT

212.03 BASIS OF PAYMENT

212.01 DESCRIPTION

This work shall include labour and materials to excavate muskeg or bog from within areas staked on the ground by the Engineer, together with the spreading and trimming of the excavated material.

Whether or not, and to what width bog is to be excavated will normally be determined in accordance with the spirit of the guidelines in Section 1209.

The Contractor shall ensure that all bog, together with the accompanying pug, if any, is removed from within the designated areas.

The Contractor shall dispose of, within the right of way adjacent to the excavation, as much of the excavated material as is practically possible without the necessity of loading and hauling, by widening embankments, flattening side slopes and constructing such modified cross sections as the Engineer may direct. Excavated material which cannot be accommodated within the right of way adjacent to the excavation shall be loaded and hauled to other disposal areas either within the right of way or in approved waste disposal areas.

The excavated material shall be spread and trimmed to slightly proportions, taking care not to interfere with water courses.

212.02 MEASUREMENT FOR PAYMENT

Volumes of excavation of muskeg or bog will be measured in excavation and computed in cubic metres rounded to the nearest whole number.

Measurements shall be by means of cross sections, or where wet conditions make the obtaining of after sections impractical, by means of a combination of original sections and bog soundings.

The quantity to be measured shall be the number of cubic metres of excavated material as shown between the position of the ground lines as cross sectioned beforehand, and the completed and accepted excavation lines measured either by cross sections or bog soundings. Material excavated outside of the required limits will not be included in measurement for payment. No measurement for payment will be made for the removal of materials that slide or slough into the excavation, nor shall separate payment be made for the removal of such material.

The volume of the excavation is to be computed by the average end area method of computation or as wedges or pyramids, as the case may be when terminating at grade points.

No allowance will be made for material excavated before cross sections have been made.

212.03 BASIS OF PAYMENT

Where the contract includes quantities for "Muskeg or Bog", then all required excavation of muskeg or bog will be paid for at the contract price for "Muskeg or Bog".

However, should the contract not include quantities for muskeg or bog, then all required excavation of muskeg or bog will be paid for at the contract price for "Excavation Hauled 1 km or Under, Unsuitable Material". Should the contract not include quantities for unsuitable material, then all required excavation for muskeg or bog will be paid for at the contract price for "Excavation Hauled 1 km or Under, Other Material".

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Payment shall be at the contract unit price per cubic metre for "Muskeg or Bog" or "Unsuitable Material" or "Other Material" as the case may be, hauled 1 km or under. Such payment shall be full compensation for labour, materials and equipment use required to carry out the operations herein described.

However, where the Engineer requires that excavated muskeg or bog be hauled in excess of the 1 km freehaul before being placed, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavated Material", at the appropriate rate for overhaul on excavation Other Material.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 301 SCARIFYING AND RESHAPING

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301.01 SCOPE

301.02 OPERATIONS

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301.04 MEASUREMENT FOR PAYMENT

301.04.01 Measurement for Payment where subgrade and Select Granular Base Course are in the same contract.

301.04.02 Measurement for Payment where road surface was constructed under a previous contract.

301.05 BASIS OF PAYMENT

301.05.01 Basis of Payment where subgrade and Select Granular Base Course are in the same contract.

301.05.02 Basis of Payment where road surface constructed under a previous contract.

301.01 SCOPE

This specification covers the requirements for the scarifying and reshaping of a road surface prior to the application of Selected Granular Base Course or Asphaltic Pavement.

301.02 OPERATIONS

Where directed by the Engineer, the Contractor shall scarify and reshape a road surface prior to the application of Selected Granular Base Course or Asphaltic Pavement. The scarifying and reshaping shall be carried out within the lengths designated by the Engineer, and within the width to be covered by the proposed pavement plus 0.3m on each side, or to such other width as the Engineer may designate.

Where the road surface consists of Selected Granular Base Course of a particular type, then the scarifying shall be to the full depth of the base course of that type or to a depth of 300 mm, whichever is less.

Where the subgrade consists of subgrade consisting of Other Material, then the scarifying shall be to a depth of not less than 300 mm.

Where the road surface consists of subgrade consisting of rock, then scarifying as such will not be required, and scarifying and reshaping operations shall simply consist of just reshaping the road surface.

Unsuitable roadbed materials, as determined by the Engineer, which are encountered during the scarifying operation shall be excavated to the lateral limits and depth directed by the Engineer and shall be disposed of as directed. Such work shall be carried out in accordance with Section 206 "Grading of Cuts".

No boulders greater than 150 mm in diameter shall be left within 300 mm of the top of subgrade composed of Other Material. Such boulders over 150 mm in diameter which cannot be removed by the scarifying operation shall be removed by hand excavation, blasting or any other suitable method. All excavated boulders shall be removed from the subgrade and ditches and then disposed of.

Excavations resulting from the removal of boulders or Unsuitable Material shall be backfilled with approved material to the specified grades, in accordance with Section 204 "Grading of Fill".

Whenever the materials incorporated in the existing subgrade are insufficient to provide the required profile and cross section, the Contractor shall add additional approved material as directed by the Engineer. Such work to be carried out in accordance with Section 204 "Grading of Fill".

The maximum variation from the specified profile and cross section of the compacted, scarified and reshaped road surface shall be 30 mm, except in those instances where paving is to take place directly on top of the scarified and reshaped material, in which case the finished surface shall not deviate at any place on a 3m straight edge by more than 10 mm.

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Where due to traffic use, or for whatever other reason, the scarified and reshaped road surface no longer lies within the required tolerance, then before placing the next materials, the Contractor shall scarify and reshape the affected area again, at his own expense.

301.03 COMPACTION

Road materials disturbed by the scarifying and reshaping shall be compacted.

Where subgrade is scarified and reshaped, the disturbed materials shall be compacted to not less than 95% of the maximum Standard Proctor Dry Density (ASTM D698-78).

Where select granular base course is scarified and reshaped, the disturbed materials shall be compacted to not less than 100% of the maximum Standard Proctor Dry Density.

301.04 MEASUREMENT FOR PAYMENT

301.04.01 Measurement for Payment where subgrade and Select Granular Base Course are in the same contract.

Where subgrade was constructed under the same contract which also calls for the placing of selected granular base course, then any required scarifying and reshaping of the subgrade prior to placing granulars will not be measured for payment and no payment for the scarifying and reshaping will be made.

Boulders removed from the top 300 mm of Other Material fill subgrade, on a grading and placing selected granular base course job, will not be measured for payment. However, boulders removed from the top 300 mm of subgrade in Other Material cuts will be measured for payment in accordance with Section 206 "Grading of Cuts".

Additional fill material shall be measured for payment in accordance with the provisions of Section 206 "Grading of Cuts" or Section 207 "Borrow", as appropriate.

301.04.02 Measurement for Payment where road surface was constructed under a previous contract.

Where subgrade was constructed, or some selected granulars were placed under a previous contract, then such scarifying and reshaping of the road surface as the Engineer requires shall be carried out and measured for payment. This measurement for payment shall be of the horizontal area actually scarified and reshaped from within the limits of length and width as designated by the Engineer, and will be measured in square metres, rounded to the nearest whole number.

Boulders removed from the top 300 mm of Other Material subgrade, on a job where subgrade was constructed on a previous contract will be measured for payment in accordance with Section 206 "Grading of Cuts". The measurement for payment will be done in this case regardless of whether the boulders were from a cut or a fill.

The excavation of Unsuitable Material in the roadbed shall be measured for payment in accordance with the provisions of Section 206 "Grading of Cuts".

Additional fill material shall be measured for payment in accordance with the provisions of Section 206 "Grading of Cuts" or Section 207 "Borrow", as appropriate.

301.05 BASIS OF PAYMENT

The basis of payment for any excavation of Unsuitable Material in the roadbed, and any additional fill material shall be in accordance with the provisions of Section 206 "Grading of Cuts" or Section 207 "Borrow", as appropriate.

301.05.01 Basis of Payment where subgrade and Select Granular Base Course are in the same contract.

Where subgrade was constructed under the same contract which also calls for the placing of selected granular base course, then no payment will be made for either the scarifying and reshaping or for the required compaction of the materials disturbed in the scarifying and reshaping operations.

For those boulders, removed from the subgrade in Other Material cuts, and which conform to the definition of Solid Rock as stated in Section 205 "Classification of Excavated Materials" the basis of payment will be the contract unit price per cubic metre for Solid Rock hauled 1 km or under. Such payment shall be full compensation for all labour, materials and equipment-use to excavate, handle, haul up to 1 km and dispose of the boulders of individual size equal to or exceeding zero decimal five cubic metres in measurement.

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Where the Engineer requires that "Solid Rock" boulders from Other Material Cuts, be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavation".

The cost of excavating and disposing of the other boulders greater than 150 mm in diameter and of carrying out the scarifying and reshaping and the compaction is considered compensated for as part of Section 204 "Grading of Cuts" and Section 207 "Borrow", as appropriate.

301.05.02 Basis of Payment where road surface was constructed under a previous contract.

Where subgrade was constructed, or some selected granulars were placed under a previous contract, then payment for scarifying and reshaping shall be on the basis of the contract price for scarifying and reshaping, and such payment shall be full compensation for all labour, materials and equipment-use to: scarify and reshape the roadbed, excavate, haul and dispose of all boulders greater than 150 mm in diameter but less than 0.5 cubic metres in volume which occur within the required depth of scarifying in Other Material roadbed, and to compact the area disturbed by the scarifying and reshaping.

However, for those boulders removed from the required depth of scarifying, and which conform to the definition of Solid rock as stated in Section 205 "Classification of Excavated Materials" the basis of payment will be the contract unit price per cubic metre for Solid Rock hauled 1 km or under. Such payment shall be in full compensation for all labour, materials and equipment-use to excavate, handle, haul up to 1 km and dispose of the "Solid Rock" boulders.

Where the Engineer requires that "Solid Rock" boulders be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavation".

No separate or additional payment will be made for second and subsequent scarifying or reshaping made necessary from any cause whatsoever.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 310

USE OF PITS, QUARRIES AND STOCKPILES FOR PRODUCTION OF MATERIALS SUPPLIED BY CONTRACTOR

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310.01 SCOPE

This specification covers the Department's requirements for the use of pits and quarries for the production of materials to be supplied by the Contractor, namely; selected granular base courses, paving aggregates, winter sand, concrete aggregates, chip seal aggregate, armour stone, rip rap stone, select bedding for storm sewers, and such other materials that may be specified to be supplied by the Contractor, together with Rock Fill In Place and Other Material Fill In Place where the contract item states "Supply Rock Fill In Place", or "Supply Other Material Fill In Place". Also included in this specification are the requirements for the stockpiling of; aggregates, winter sand, and selected granular base courses.

However, this specification will not apply, but Section 201 "Clearing and Grubbing" and Section 207 "Borrow" will both apply for the use of pits and quarries for the production of borrow where the required borrow material is specified in the contract item as "Excavation Hauled 1 km or Under Solid Rock", "Excavation Hauled 1 km or Under Quarried Rock", "Excavation Hauled 1 km or Under Other Material", or "Excavation Hauled 1 km or Under Other Material Borrow".

310.02 PIT AND QUARRY INFORMATION

The Department will make available to the Contractor all information obtained by the Department as to sources of supply. Such information represents only the opinion of the Department as to the location, character or quantity of the material encountered and is available only for the convenience of the Contractor.

The Department assumes no responsibility whatever in respect to the sufficiency or accuracy of the information and there is no guarantee, either expressed or implied, that the conditions indicated are representative of those existing throughout the work or that unanticipated developments may not occur. It shall be the Contractor's responsibility to locate sources and to furnish and haul the aggregate and/or selected granular base course.

310.03 PIT AND QUARRY SAMPLING

The Department will make its testing facilities available to the Contractor for the purposes of testing the suitability of pits or quarries for the production of the required materials.

Preliminary approval of the quality and nature of the material submitted in samples will not constitute general acceptance of all the material in the source of supply.

310.03.01 Additional Pit and Quarry Sample Requirements for Selected Granular Base Courses, Winter Sand, and all Aggregates.

The Contractor shall submit representative samples of all materials proposed for use as selected granular base courses, winter sand, paving aggregates, concrete aggregates, and chip seal aggregates. The Contractor shall deliver the samples to the Department's Laboratory in St. John's for approval of quality and nature prior to use in the work. Each sample shall contain not less than 25 kg of material.

Unless otherwise specified by the Engineer, initial samples for quality testing may be of the materials in their natural state. The Contractor shall at his own expense, sufficiently expose his proposed source of aggregates either by opening at the face, by excavating test pits, or by core drilling so that representative samples of the material can be obtained. Subsequent and progress samples for quality testing shall be of the processed materials.

310.04 PERMITS AND AUTHORIZATION FROM OUTSIDE BODIES

310.04.01 Municipal or Local Government

The Contractor is responsible for ensuring that his pit or quarry operations are carried out in conformity with all land-use or zoning regulations which may apply.

310.04.02 Department of Mines and Energy

Contractors are advised, that should the Contractor wish to carry out his pit or quarry operations on lands for which the mineral and quarry rights are vested

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in the crown, then the Department of Mines and Energy requires that prior approval be obtained before pit or quarry operations may begin. It is the responsibility of the Contractor to obtain the quarry permit from the Department of Mines and Energy.

310.04.03 Department of Forest Resources And Agrifoods

Should the removal of trees be involved in the preparation of a pit or quarry, then the Contractor is required to obtain a permit to cut the trees.

Application for a cutting permit should be made to the local office of the Department of Forest Resources and Lands.

Should the Contractor wish to burn brush, then prior permission must first be obtained from the Department of Forest Resources and Lands.

310.04.04 Department of Government Services and Lands

Contractors wishing to set up an aggregate washing operation at a site must first obtain environmental approval before proceeding.

Contractors must apply in writing to the Department of the Environment for a Ministerial Approval as required in Section 24 of the Department of the Environment Act, 1981. The following information must be supplied with the application:

1) LOCATION OF THE PROPOSED SITE.	3) RATE AT WHICH WATER IS TO BE USED (L/S).
2) EXPECTED DATES OF OPERATION OF THE WASHING PLANT:	4) NUMBER AND DIMENSIONS OF SETTLING PONDS AND THE METHOD OF LINING OF THE PONDS.
-PROPOSED STARTING DATE -TOTAL DAYS IN OPERATION	-HOURS IN OPERATION PER DAY -PROPOSED COMPLETION DATE

310.05 CONTRACTOR'S NOTICE OF INTENT TO PRODUCE AGGREGATES, WINTER SAND, AND SELECTED GRANULAR BASE COURSES

Prior to the production of; aggregates, winter sand, and selected granular base courses, written notice of intent shall be provided to the Manager of Materials Engineering and to the appropriate Regional Engineer. Such notice of intent shall contain the scheduled starting date, pit or quarry location and processing equipment to be used. This notice of intent shall be received by the above mentioned Department personnel at least 7 days prior to any production.

310.06 STRIPPING PITS AND QUARRIES

Prior to excavating materials, the area to be worked shall be cleared, grubbed and stripped of all unsuitable surface materials.

The topsoil shall be removed separately from the underlying materials and stockpiled. The Contractor shall ensure that the quality of the topsoil is not reduced by mixing with other materials removed during the grubbing or stripping operations.

A sufficient area shall be opened ahead of the quarrying or pit excavating operation to positively prevent contamination by deleterious materials.

310.06.01 Additional Requirements for Stripping Pits and Quarries Intended for Aggregate, Winter Sand, and Selected Granular Base Course Production

Where the pit or quarry is intended for use in the production of aggregates, winter sand or selected granular base course, then the pit or quarry shall also be stripped of all weathered zones.

310.07 WORKING OF PITS SUITABLE FOR AGGREGATE OR SELECTED GRANULAR BASE COURSE PRODUCTION

The Contractor will not be permitted to work natural sand or gravel deposits in an indiscriminate manner that results in otherwise usable natural gravels being rendered unfit for future use in aggregate, winter sand or selected granular base course production. In such pits, the Contractor will be required to use equipment which will excavate a vertical face extending from the floor of the pit to the surface of the deposit. The undermining of high faces will not be permitted. The use of scrapers, bulldozers, draglines and other types of equipment, which remove the deposit in more or less horizontal layers is prohibited, except for unique circumstances where it is demonstrated to the satisfaction of the Engineer that an acceptable and consistent product can be obtained by this method.

310.08 PHYSICAL AND OTHER REQUIREMENTS

310.08.01 Physical and Other Requirements for Aggregates, Winter Sand and Selected Granular Base Courses

Paving aggregates, concrete aggregates, chip seal aggregate, winter sand and selected granular base courses shall conform to the appropriate physical and gradation requirements for that required type of material, as expounded in; Section 330 "Hot Mix Asphaltic Concrete", Section 904 "Concrete Structures", Section 340 "Chip Seal", Section 317 "Winter Sand", and Section 315 "Selected Granular Base Course", respectively.

Chip seal aggregate shall be screened and washed over a 6.35 mm screen. If the chip seal aggregate is to be stockpiled then screening and washing shall be performed before stockpiling.

310.08.02 Physical and Other Requirements for Armour Stone and Rip Rap Stone

Armour stone and rip rap stone shall conform to the requirements given in Section 615 "Armour Stone" and Section 610 "Rip Rap Treatment", respectively.

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310.08.03 Physical and Other Requirements for Material to be used as "Rock Fill in Place"

Material to be used as rock fill in place, shall only consist of quarry material which before it was excavated consisted entirely of Solid Rock as defined in Section 205 "Classification of Excavated Materials".

The rock fill shall be thoroughly fragmented and well graded with fragments of greatest dimension not more than 500 mm. The rock fragments shall consist of hard durable material.

The rock fill material shall not contain frozen lumps, weeds, sods, roots, logs, stumps or any other objectional matter.

Material that is proposed to be used as rock fill material shall be subject to test by the Engineer to determine its suitability for the portions of the work in which it is proposed that it be placed. Only rock fill material approved by the Engineer shall be placed in the work.

310.08.04 Physical and Other Requirements for Material to be used as "Other Material Fill in Place"

Material to be used as "Other Material Fill in Place" shall consist of only well graded other material which is approved for use by the Engineer.

Other material containing stones larger than 150 mm will not be acceptable for use as "Other Material in Place" unless the Contractor places the larger stones in accordance with the requirements of Section 204 "Grading of Fill".

For the top 500 mm of fill immediately below subgrade, the material for use as "Other Material In Place" shall have no more than 12% passing the 75 µm sieve, unless otherwise specified.

The other material shall not contain frozen lumps, weeds, sods, roots, logs, stumps or any other objectional matter.

Material that is proposed to be used as other material fill shall be subject to test by the Engineer to determine its suitability for the portions of the work in which it is proposed that it be placed. Only Other Material Fill material approved by the Engineer shall be placed in the work.

310.09 AGGREGATES AND SELECTED GRANULAR BASE COURSE SAMPLING AND APPROVAL

A field laboratory conforming to the requirements of Section 111 "Field Laboratory" shall be set up on the site of the project and be ready for

use, before any crushing of material may take place. The laboratory shall also be set up and be ready for use before any placing of selected granular base course may take place.

All aggregates and selected granular base courses shall be subject to sampling and testing by the Engineer at all times, and the Engineer shall be provided ample opportunity to sample any material at any time. Any material of a quality or nature not suitable for its intended use will be rejected.

Only materials approved by the Engineer shall be incorporated in the work.

310.09.01 Selected Granular Base Course and Chip Seal Aggregate Sampling and Approval

Where selected granular base course or chip seal aggregate are taken from the crusher and placed in stockpiles, acceptance or rejection shall be decided on the basis of test results of samples taken from the stockpile as it is being constructed.

However, the Department reserves the right to terminate acceptance of material in stockpile at any time during the stockpiling operation regardless of test results. If acceptance of material in the stockpile is terminated, then material stockpiled previously and accepted for incorporation into the work will not be rejected.

310.09.02 Paving Aggregates Sampling and Approval

The Department will undertake preliminary testing at any time to assist the Contractor in locating and producing suitable aggregates. The tests will be carried out solely for the benefit and guidance of the Contractor and will not necessarily constitute acceptance of the aggregate.

The Contractor shall take great care in the crushing of aggregates to ensure the production of consistent and uniform material.

310.10 STOCKPILING OF AGGREGATES, WINTER SAND AND SELECTED GRANULAR BASE COURSES

Paving aggregate, chip seal aggregate, concrete aggregate, winter sand, and selected granular base course aggregate shall be handled, transported and stockpiled at all times in such a manner and with such equipment that will avoid segregation and/or contamination by any deleterious material. The Contractor will provide and ensure legal access for the Department or its agents to this stockpile area.

Materials shall be stockpiled on a flat, well draining area of sufficient size to accept the entire quantity to be produced. The area shall be free from all foreign material and be of adequate bearing capacity.

Materials shall be stockpiled in layers not exceeding 1 m in depth. Each layer shall be completed over the entire area of the stockpile before beginning the next layer. The back layer of the stockpile shall be spread by a dozer, with a blade of suitable design, in such a manner that the materials are thoroughly mixed to a uniform consistency. Special attention should be given, that each one metre layer is interlocking to the adjoining one. Materials delivered to the stockpile in trucks shall be uniformly spot-dumped and levelled, complying to the method as specified above.

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Coning stockpiles or spilling material over the edges of the stockpiles will not be permitted under any circumstances.

It is the express responsibility of the Contractor to ensure that stockpiles, when constructed, contain material of acceptable quality, uniformly distributed throughout. Aggregates which have become mixed with foreign matter of any description, segregated by any means, or have become mixed with each other, shall not be used and shall be removed from the stockpile immediately.

Aggregates separated during processing, aggregates secured from different sources, and aggregates from the same source but of different gradations, shall be placed in individual stockpiles.

Individual stockpiles shall be either far enough apart or separated by substantial dividers to prevent intermingling.

Where stockpiles are constructed for use by others, the storage area shall be situated on solid ground with a suitable access road provided. Storage and access area must withstand working with heavy equipment and trucks. Such storage area and access road shall be subject to the approval of the Engineer.

310.11 ENVIRONMENTAL REQUIREMENT OF PITS AND QUARRIES

310.11.01 Siting

Pits and quarries shall be hidden from view from the highway as much as possible. A buffer strip of 200 m shall be maintained between the highway right of way and the pit or quarry. Special attention is drawn to Government Directive to have pits or quarries hidden from view from the road.

The Contractor shall ensure that the pit or quarry is not subject to flooding. The bottom of the pit or quarry shall be drained to the nearest watercourse or culvert.

All access roads to the pit or quarry shall be bridged or culverted where watercourses are crossed.

310.11.02 Operation Requirements

Any topsoil or organic matter shall be removed separately from the underlying materials and stockpiled during the grubbing or stripping operations. The Contractor shall ensure that no silting of watercourses occurs due to erosion of the pit or as a result of washing operations.

Any discharge of water, including washing water, containing more than 30 mg/L of suspended solids, shall not be disposed of directly into a watercourse or water body. Silt laden water exceeding this limit shall be discharged to a vegetated area or to a sedimentation basin for removal of excess silt, before being disposed of into a watercourse or water body.

Hydrocarbon storage shall be in accordance with Division 8.

310.11.03 Abandonment and Rehabilitation

Upon completion of operations, all equipment and unnatural features must be removed and the pit or quarry must be restored to the satisfaction of the Engineer and the Department of the Environment. Depending on the location, this restoration will include any or all of the following:

(1) PITS AND QUARRIES SHALL BE TRIMMED TO SMOOTH AND STABLE GRADES WITH SIDE SLOPES CONFORMING TO THE REQUIREMENTS SET FORTH IN THE QUARRY PERMIT ISSUED BY THE DEPARTMENT OF MINES AND ENERGY.	(5) TRENCHING OR OTHERWISE BLOCKING OFF, THE ENTRANCE TO THE PIT OR QUARRY TO PREVENT VEHICULAR ACCESS. ENTRANCE TRENCHES OR BARRIERS SHALL BE GRADED AND TRIMMED TO SIGHTLY PROPORTIONS.
(2) SPREADING OVER THE SIDE SLOPES OF ANY TOPSOIL OR ORGANIC MATTER CONSERVED DURING THE STRIPPING OPERATION.	(6) WASTE MATERIAL SHALL BE DISPOSED OF IN ACCORDANCE WITH DIVISION 8.
(3) RE-VEGETATION OF NEWLY OPENED PITS AND EXTENSIONS OF EXISTING PITS WITHIN ONE YEAR	(7) DRAINING AND FILLING IN OF ANY SETTLING PONDS OR DEPRESSIONS WHICH MAY BECOME A HAZARD.
(4) SCALING DOWN OF QUARRY FACES TO REMOVE ALL ROCKS AND FRAGMENTS LIABLE TO SLIDE OR ROLL DOWN.	

310.12 MEASUREMENT FOR PAYMENT

310.12.01 Measurement for Payment for Paving Aggregates and Concrete Aggregates

For paving aggregates or concrete aggregates no separate measurement for payment is normally made, since the paving aggregates or the concrete aggregates are usually paid for as part of the asphaltic mix or as part of the concrete, respectively.

However, should the contract item state; the supply of stockpiled paving aggregate, or the supply of stockpiled concrete aggregate then the material shall be measured for payment.

310.12.02 Measurement for Payment for Chip Seal Aggregate

For chip seal aggregate, measurement for payment may be by; the amount of chip seal aggregate placed on the road, the area of treated road surface, or the amount of chip seal aggregate stockpiled.

310.12.03 Measurement for Payment for Selected Granular Base Courses

Measurement for payment for selected granular base courses may be by the actual amount of selected granular base course placed in the work,

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the nominal amount of selected granular base course placed in the work, or the amount of selected granular base course stockpiled.

310.12.04 Measurement for Payment for Winter Sand

Winter sand shall be measured for payment in accordance with the provisions of Section 317 "Winter Sand".

310.12.05 Measurement for Payment for Armour Stone and Rip Rap Stone

Armour stone and stone used in rip rap shall be measured for payment in accordance with the provisions of Section 615 "Armour Stone" and Section 610 "Rip Rap Treatment".

310.12.06 Measurement for Payment for "Supply Rock Fill in Place", and "Supply Other Material Fill in Place"

Measurement for payment for "Supply Rock Fill in Place" and "Supply Other Material Fill in Place" shall be in accordance with the provisions of Section 204 "Grading of Fill".

310.12.07 Stockpiled Materials Weight Measurement for Payment

Where on the contract unit price table it states that aggregate or selected granular base course materials are to be stockpiled and the unit of measurement is stated in tonnes, then such materials shall be weighed on scales before being placed in stockpiles. The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the stockpile shall be included in measurement for payment. The weight shall be computed in tonnes, rounded to one decimal place.

310.12.08 Stockpiled Materials Volume Measurement for Payment

Where on the contract unit price table it states that aggregate or selected granular base course materials are to be stockpiled and the unit of measurement is stated in cubic metres, then such stockpiles shall be cross sectioned and the volume computed in cubic metres rounded to the nearest whole number.

The quantity to be measured shall be the number of cubic metres of stockpiled material as shown on the cross section sheets between the graded base of the stockpile as cross sectioned before stockpiling begins and the cross sections made over the completed stockpile. The volume of this stockpile being computed by the average end area method of computation or as wedges or pyramids, as the case may be when terminating at grade points.

310.13 BASIS OF PAYMENT

310.13.01 Basis of Payment for Stockpiled Materials

Where a contract item in the Highway Unit Price Table specifies that a material be stockpiled, then the payment shall be at contract price per tonne or per cubic metre, as the case may be, for the appropriate type of stockpiled material. Such payment shall be full compensation for all labour, equipment-use, materials and any other expenses to: provide a pit or quarry, obtain all required permits and approval, provide and transport pit or quarry samples to the Department's Soils Laboratory in St. John's, clear, grub and strip the pit or quarry, process pit or quarry material to the required gradation and physical requirements, provide and maintain a field laboratory, provide scales if required, provide a site for the stockpile, provide an access road to stockpile, transport and place the material in the stockpile, clean up the pit or quarry, pay any royalties for the material, and provide such other restoration to the pit or quarry as may be required.

In the particular case of stockpiling chip seal aggregate the basis of payment shall also include washing the chip seal aggregate before it is placed in the stockpile.

310.13.02 Basis of Payment for Aggregates and Selected Granular Base Courses

Where paving aggregates, chip seal aggregates, concrete aggregates, selected granular base courses and select bedding for storm sewers is placed in the work, then payment will be in accordance with the provisions of the appropriate specification for the item.

310.13.03 Basis of Payment for Armour Stone and Rip Rap Stone

The basis of payment for armour stone and rip rap stone will be in accordance with the provisions of Section 615 "Armour Stone" and Section 610 "Rip Rap Treatment".

310.13.04 Basis of Payment for "Supply Rock Fill in Place" and "Supply Other Material Fill in Place"

The basis of payment for "Supply Rock Fill in Place" and "Supply Other Material Fill in Place" shall be in accordance with the provisions of Section 204 "Grading of Fill".

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 315

SELECTED GRANULAR BASE COURSE

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315.01 SCOPE

This specification covers the requirements for the supply and the placing of a road bed, Selected Granular Base Course Granular "A", Granular "B", Granular "C" and Maintenance Grades No. 1, No. 2 and No. 3, included as an integral part of these requirements are the provisions of Section 310 "Use of Pits, Quarries and Stockpiles For Production of Materials Supplied by Contractor".

315.02 MATERIALS

315.02.01 Physical and Gradation Requirements

The granular materials shall be composed of clean, hard, uncoated particles and shall be free from organic matter, clay lumps and deleterious materials such as shale, slate, ochre and schists.

Materials from deposits acceptable as to the quality of the particles, but deficient in sizes to provide the required gradation, may be accepted if the Contractor furnishes and satisfactorily incorporates into the product supplementary sizes from other sources to produce the required grading. If the deficiencies occur in Granular "B" or Granular "C" materials, corrections may be attempted by crushing to a smaller maximum particle size. In that event, the Department will furnish special grading limits based on the actual maximum particle size.

Materials shall be considered unsuitable even though particle sizes are within the specified gradation limits if particle shape or any other characteristic precludes satisfactory compaction or fails to provide a roadway suitable for traffic. If, in the opinion of the Engineer, an improved particle shape can be achieved by using a different crushing unit from that proposed by the Contractor, then the Contractor shall supply and use a crushing unit of the type directed by the Engineer.

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Materials shall conform to the gradation requirement given in Table I and to the physical requirements given in Table II. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and the plotted curve shall flow in a manner free from acute changes in direction.

Granular "A", Granular "B" and all the maintenance grades materials shall be processed by crushing and, when necessary to eliminate surplus fines passing the 4.76 mm sieve, shall be screened and washed.

Crushing of Granular "C" materials shall not be required except that the Contractor may, at his opinion, elect to crush any oversize as an alternative to screening.

315.02.02 Recycled Asphalt Pavement (RAP)

The Contractor will be permitted to use RAP in Granular "B". The Recycled Asphalt in the mixture of Virgin Granulars plus RAP will be limited to a maximum of 30% under the asphalt and 50% in the granular shoulders. The quality and gradation of the Virgin Granulars and the mixture of RAP and virgin materials shall meet the requirements for Granular "B", when tested individually. In areas where only surface course asphalt is to be applied, as an overlay, the Contractor will be permitted to use all RAP (100%) in the granular shoulders. In this case, the RAP shall not contain material larger than 5cm. In diameter.

The Contractor shall provide the Department with a minimum 30 day notice of his intention to use RAP. The Department reserves the right to accept or reject any particular source of RAP, irrespective of its quality.

TABLE 1
Gradation Requirements

Percent Passing By Dry Weight				Maintenance Grades		
Sieve Sizes	Granular "A"	Granular "B"	Granular "C"	No. 1	No. 2	No. 3
101.6 mm			100			
76.1 mm						
50.8 mm		100	75-100			
25.4 mm		50-100			100	100
19.0 mm	100			100		
15.9 mm						
9.51 mm	50-80			55-80	55-80	55-80
4.76 mm	35-60	20-55	20-55	35-60	35-60	35-60
1.20 mm	15-35	10-35	10-35	15-35	15-35	15-35
300 µm	5-20	5-20	5-20	5-20	5-20	5-20
75 µm	2-6 (Pit Source)	2-6 (Pit Source)	0-12	3-8	3-10	6-10
	2-8 (Rock Source)	2-8 (Rock Source)				

- 1 µm = 0.001 mm
- If not available, the 80 µm sieve may be substituted for the 75 µm.
- The percentage of material finer than the 75 µm or 80 µm sieve shall be determined by ASTM C117, or CSA A23.2-5A.
- While Granular A and Granular B materials are produced from natural gravel deposits, a maximum of 6% passing the 75 µm sieve shall be permitted.
- Where Granular A and Granular B materials are produced from quarried rock, a maximum of 8% passing the 75 µm sieve shall be permitted.
- Where forty percent or more of other material is blended to a rock source for the production of granular materials, it shall then be treated as a pit source.

TABLE 2
Physical Requirements

Physical Test	ASTM Designation	Granular "A"	Granular "B"	Granular "C"	Maintenance Grades		
					No. 1	No. 2	No. 3
Los Angeles Abrasion*(loss % Maximum)	C131-89 C535-89	35	35	40	35	35	35
Percent Crushed (Minimum)**	D5821	50	50	-	50	50	50
Plasticity Index	D4318-84	0	0	0	0	0	0
Petrographic Number (Max.)	(CSA 23 2-M90)	150	150	-	150	150	150
Micro-Deval Test for Fine Aggregate(% Maximum)	CSA A23.2-23A	30	30	-	-	-	-
Micro-Deval Test for Coarse Aggregate (% Max.)	MTO LS.618	25	25	-	-	-	-

* For Granular "A", "B" and "C", the rates of the loss after 100 revolutions to the loss after 500 revolutions shall not exceed 0.280.

- ** The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight contained on the 4.76 mm sieve. Pieces having one or more freshly fractured faces only will be considered as crushed material. Pieces with only small chips removed will not be considered as crushed.

315.03 SAMPLING AND APPROVAL

In addition to the requirements for pit and quarry sampling and processed material sampling and approval, as set forth in Section 310 "Use of Pits, Quarries and Stockpiles for Production of Materials Supplied by Contractor", where materials are hauled directly from the source to the roadway, acceptance of the material, or rejection of the material shall be decided on the basis of test results of samples taken from the roadways.

315.04 PREPARATION OF ROAD SURFACE

The Contractor shall prepare the road surface to the satisfaction of the Engineer before commencing placement of any selected granular base course materials. Except for the special cases of preparation on an existing or a proposed shoulder, adjacent to existing pavement, the preparation of the road surface shall be carried out in accordance with Section 204 "Grading of Fill", Section 206 "Grading of Cuts" and Section 301 "Scarifying and Reshaping".

315.04.01 Preparation of Existing Shoulder When Recapping with Addition of Paved Shoulder

Where it is intended to recap existing pavement and simultaneously add a paved shoulder where a gravel shoulder existed before, then the Contractor shall prepare the existing shoulder prior to the placing of additional Granular "A" and paving. The preparation of the existing shoulder shall involve levelling followed by compaction.

315.04.02 Preparation of Existing Granulars Prior to Providing Gravel Shoulder on Previously Paved Area

Where existing pavement has been removed because it is intended to provide a gravel shoulder, then the Contractor shall level off and compact the existing granulars prior to shouldering with additional selected granular base course.

315.04.03 Excavation of Existing Gravel Shoulder Prior to Butt Jointing Additional Pavement

Where it is intended to widen existing pavement by butt jointing new pavement against existing pavement, then the existing gravel shoulder material shall be removed so that the required new Granular "B" and Granular "A" may be placed in preparation for the new pavement.

The Contractor shall excavate the existing gravel shoulder to the depth needed so that the required thickness of Granular "B" and Granular "A" may be placed. The excavated shoulder material shall be spread over the adjacent subgrade. The spread excavated shoulder material and the excavated shoulder shall be levelled and compacted.

315.05 PLACING SELECTED GRANULAR BASE COURSE ON ROAD

The Contractor shall place all granular bases in such a manner as to prevent contamination by other materials and to prevent segregation. If, in the opinion of the Engineer, the methods and techniques used by the Contractor cannot overcome contamination or segregation, then the Engineer may direct a modification in these methods which may require the use of an approved spreader box or other acceptable device. All granular bases shall be placed in uniform layers such that the thickness of the compacted layer does not exceed 150 mm. This requirement may be waived if the Contractor can demonstrate to the complete satisfaction of the Engineer, a method of placing and compacting thicker layers of materials such that the specified density is uniformly attained.

Prior to closing down operations for each working day, all granular materials shall be bladed and compacted to the specified compaction.

The materials shall be sprayed with water when and as directed by the Engineer, either to aid compaction or reduce dust nuisance or both. When water is added to aid compaction, it shall be applied immediately ahead of the compacting unit.

Each layer of granular base shall be bladed, shaped and compacted as necessary to produce the required profile and cross section. The finished surface shall not deviate at any place on a 3m straight edge by more than 20 mm for Granular "B" and "C" and 10 mm for Granular "A". The upper layer shall be maintained to these tolerances and to the specified density upon completion of the contract, or until the surface is paved. This may require keeping the moisture content at the appropriate value during periods of dry weather in addition to regrading and recompacting as frequently as may be deemed necessary by the Engineer.

Calcium chloride shall be applied uniformly by mechanical means when, and as directed by the Engineer.

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315.05.01 Special Requirement for Placing Granular Base Course Granular "A" on Paving Contracts

In paving contracts which also include the placing of Granular Base Course Granular "A", the Contractor shall so coordinate his granular base course Granular "A" placing operations and his paving operations, such that at any given time no more than 3 km of granular base course Granular "A" treated unpaved road is subject to use by public traffic.

On roads used by public traffic where the Granular "B" was produced from a rock source, or if natural gravel source produced Granular "B" gives a rough driving surface, then the Contractor shall place at least a portion of the Granular "A" over the Granular "B" to provide a smoother driving surface. The Contractor shall carry out his operations in such a way that no one place on the road has this type of Granular "B" left without a running surface of Granular "A", for more than 3 days.

315.06 SHOULDERING

The placing of granular materials for shoulder construction shall be carried out by means of an approved spreader. Spreaders shall consist of a box to hold shouldering material and a suitable mechanism to control the width and rate of application and to prevent materials getting onto the pavement.

Granular materials for shoulder construction shall be placed directly on the shoulder and any spillage and materials dragged onto the pavement surface shall be immediately removed, without damage to the pavement, and the area so effected shall be thoroughly cleaned by the use of a power broom or other suitable method.

The shoulders shall be sloped to the specified lines, grades and cross section.

Shouldering operations shall not commence along any section of pavement until 24 hours have elapsed from the time of completion of the final pavement course in that section, but the shouldering operations shall be completed within 7 days of the final pavement course on sections which are open to traffic.

315.07 COMPACTION

All Granular "A", Granular "B", Granular "C" and the maintenance grades materials placed on the roadway, or placed on shoulders, shall be compacted to not less than 100% of the maximum Standard Proctor Dry Density (ASTM D698-78).

Compaction operations shall be carried out as closely as possible behind the placing and spreading operation. At the end of each working day, all materials placed shall have been compacted to the specified density.

Each layer of material shall be graded and compacted as specified before the next layer is placed.

Where necessary to obtain the required compaction, the Contractor shall apply sufficient water by means of an approved distributor.

315.08 MEASUREMENT FOR PAYMENT

Measurement for payment will only be made for those materials accepted for use under this specification.

Measurement for payment for Selected Granular Base Course materials may be by: the weight of material placed in the works, the nominal amount of the material placed in the works, or the amount of material stockpiled.

315.08.01 Weight Measurement for Payment

Where the unit of measurement for a particular type of Selected Granular Base Course material is stated in tonnes on the unit price table, then the material shall be weighed on scales.

The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the works at the required locations shall be included in measurement for payment.

The weight shall be computed in tonnes, rounded to one decimal place.

For quantities of Maintenance Grade material less than or equal to 10 000 tonnes, the Department will measure the material in stockpile by cross sectioning, calculating the number of cubic metres and converting the quantities to tonnes if the Contractor so desires. A standard conversion factor of 2.0 t/m³ will be applied for maintenance grade material measured in stockpile.

For quantities of maintenance grade material greater than 10 000 tonnes, the Contractor must provide weight scales.

315.08.02 Volume Measurement for Payment

Where the unit of measurement for a particular type of Selected Granular Base Course material is stated in cubic metres on the unit price table, then the material shall be assessed for volume in accordance with the specification for stockpiling, select bedding or such other item as the case may be.

315.09 BASIS OF PAYMENT

Payment at the appropriate contract price for the particular type of Selected Granular Base Course shall be full compensation for all labour, materials, equipment-use and any other expenses to; provide a pit or quarry, obtain all required permits and approval, provide and transport pit or quarry samples to the Department's Soils Laboratory in St. John's, clear, grub and strip the pit or quarry, process pit or quarry materials to the gradation and physical requirements for the required type of material, provide and maintain a field laboratory, provide scales if required, construct and maintain access road to the source of the material, provide for such prior reconditioning of the surface on which the selected granular base course is to be applied and which is required in accordance with Section 301 "Scarifying and Reshaping", but which is not a pay item under that specification, provide all haulage of the material from the source to where the material is to be placed, place, spread, grade and compact the material, provide such watering of the material as is required, maintain the placed material to the required compaction and to the specified cross section and profile tolerances until completion of the contract, pay any royalties for the material, clean up and provide such other restoration to the pit or quarry and the stockpile site as may be required, together with any other work necessary to complete the contract item.

Moreover, where at shoulders minor grading work of the types described in 315.04.01, 315.04.02 and 315.04.03 is required, then payment at the contract unit price for Granular "A" and Granular "B" shall also include compensation in full for all labour, materials and equipment-use to carry out the shoulder excavation, spreading, levelling and compaction as described.

Where instead of placing the required select granular materials, the Contractor had chosen, of his own choice, to place temporary fill material level with the finish grade, then the Contractor shall excavate the fill material to make room for the select granulars, at his own expense. No payment will be made for the work of carrying out this excavation, or recompacting the underlying materials. An example where this might occur, would be in connection with the installation of a culvert across an existing paved road, and the Contractor chose in one operation to place temporary backfill right up the level of the pavement; instead of placing backfill only to subgrade, and then placing the required select granulars.

FORM 317



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 317

WINTER SAND

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317.01 SCOPE

This specification covers the requirements for the supply and delivery of winter sand.

317.02 PHYSICAL AND GRADATION REQUIREMENTS

Materials shall be natural or manufactured from natural aggregates and consist of sound and durable predominately angular particles completely resistant to breakdown under traffic or freezing conditions.

Materials shall be composed of clean, hard uncoated particles and shall be free from organic matter, clay lumps, and deleterious materials such as shale, salts, ochre and schists.

Materials shall conform to the gradation requirements as given in Table I. The gradation shall not show marked fluctuations from opposite extremes of the limiting sizes and the plotted curve shall flow in a manner free from acute changes in direction.

TABLE 1 GRADATION REQUIREMENTS

<u>Sieve Sizes</u>	<u>% Passing by Dry Weight</u>
6.35 mm	100
4.76 mm	70-95
2.00mm	50-80
0.420 mm	5-25
0.075 mm	0-6

317.03 SAMPLING AND INSPECTION

Materials will be sampled and inspected by the Department at the designated stockpile locations. This acceptance shall not preclude further stockpile sampling, which may or may not lead to material rejection. Materials will not be sampled at the source.

The quantity of these tests shall be determined by the Engineer. They shall be sufficient in number to ensure an acceptable product.

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317.04 USE OF PITS AND STOCKPILES

The use of pits for the production of winter sand, together with the requirements for the stockpiling of the winter sand, shall be in compliance with the provisions of Section 310 "Use of Pits, Quarries and Stockpiles for Production of Materials Supplied by Contractor".

317.05 ENVIRONMENTAL PROVISIONS

The work shall be carried out in accordance with the environmental provisions of Section 310 "Use of Pits, Quarries and Stockpiles for Production of Materials Supplied by Contractor".

317.06 MEASUREMENT FOR PAYMENT

The measurement for payment will only be for those materials accepted for use under this specification.

317.06.01 Volume Measurement for Payment

Where the contract unit price table states that winter sand is to be stockpiled and the unit of measurement is stated in cubic metres, then such stockpiles shall be cross sectioned and the volume computed in cubic metres rounded to the nearest whole number.

The quantity to be measured shall be the number of cubic metres of stockpiled winter sand as shown on the cross section sheets between the graded base of the stockpile as cross sectioned before stockpiling begins and the cross sections made over the completed stockpile. The volume of this stockpile being computed by the average end area method of computation or as wedges or pyramids, as the case may be when terminating at grade points.

In the event cross sections determine excess material has been placed in the stockpile, the contractor has five (5) days after this determination is made to remove the sand if he so desires. The owner reserves the right to then do a final cross section. Engineering costs will be free on first quantity measurement and charged to contractors for additional engineering quantity measurements.

317.06.02 Weight Measurement for Payment

Where the contract price table states that winter sand is to be stockpiled and the unit of measurement is stated in tonnes, then the material shall be weighed on scales.

The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the works at the required locations shall be included in measurement for payment.

The weight shall be computed in tonnes, rounded to one decimal place.

For quantities of winter sand less than or equal to 10 000 tonnes, the department will measure the material in stockpile by cross sectioning, calculating the number of cubic metres and converting the quantities to tonnes if the Contractor so desires. A standard conversion factor of 1.8 t/m³ will be applied for winter sand measured in stockpile.

For quantities of winter sand greater than 10 000 tonnes, the Contractor must provide weight scales.

317.07 BASIS OF PAYMENT

Payment at the contract price per cubic metre for winter sand shall be full compensation for all labour, equipment-use, materials and any other expenses to; provide a pit, obtain environmental approval, provide and transport pit samples to the Department's Soils Laboratory in St. John's, clear, grub and strip the pit, process pit material to the required gradation and physical requirements, transport and place the material in the stockpile, clean up the pit, pay any royalties for the material, and provide such other restoration to the pit as may be required, together with the provision of scales if required.

FORM 401



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 401

DITCHING FOR STREAMS

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401.01 DESCRIPTION

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401.01 DESCRIPTION

All stream channel excavations pertaining to the drainage of the highway, whether within the limits of the right of way or not, shall be considered part of the contract. All materials excavated from ditches if suitable for constructing roadway fills shall be incorporated into fill construction in accordance with Section 204 "Grading of Fill". Materials not suitable for roadway fills shall be deposited in flat waste banks where and as directed by the Engineer and shall be levelled and trimmed to slightly proportions and contours to the Engineer's satisfaction.

In swamps, bogs and other wet areas, the Contractor if he so desires, may excavate ditches to the satisfaction of the Engineer by the use of ditching dynamite.

The term "Ditching for Streams" will include all excavations lying beyond the actual ends of footings for culverts and other drainage structures, and will include excavations for stream diversions.

The Contractor shall carry out the work in such a way so as to cause a minimum of disturbance and siltation to the water course and not to impact water quality.

Water courses carrying water shall not be blocked off until alternative water courses are completed and able to carry the water. The new channel shall be excavated in the dry. The channel bottom and side slopes shall be constructed of stable non-erodible material. When the new channel is completed, the old channel shall be closed off with impervious non-erodible material.

Care shall be taken to prevent fish being stranded in closed off diversions. Any fish that are stranded must be captured and transferred to the new stream.

The Contractor shall excavate the ditches to the lines, grades and cross section limits staked by the Engineer.

The Contractor shall minimize the crossing of water courses by heavy equipment. The same crossing place shall be used for such crossings as are unavoidable. At the completion of operations, the crossing place shall be put back to its original condition.

401.02 MEASUREMENT FOR PAYMENT

Measurement will be made in excavation and will be from the cross section sheets showing the original ground lines and the completed and accepted excavation lines as cross sectioned. The volume of this excavation to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

Excavation below grade, or beyond the cross section limits staked will not be measured for payment.

No allowance will be made for material excavated before original cross sections have been made.

The volume for payment shall be measured in cubic metres, rounded to the nearest whole number.

401.03 BASIS OF PAYMENT

Payment shall be at the Contract Unit Price per cubic metre for either Ditching for Streams, Solid Rock, hauled 1 km or under, or Ditching for Streams, Other Material hauled 1 km or under, as the case may be, and such payment will be compensation in full for all labour and materials required to carry out the operations herein described.

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However, should the contract not include quantities for Ditching for Streams, Solid Rock hauled 1 km or under, then all required excavation of solid rock for ditching of streams will be paid for at the contract price for "Ditching Solid Rock hauled 1 km or under".

Should the contract not include quantities for ditching for streams, other material hauled 1 km or under, then all required excavation of other material for ditching of streams will be paid for at the contract price for "Ditching Other Material Hauled 1 km or Under".

However, where the Engineer requires that materials excavated from ditches be hauled in excess of the 1 km freehaul before being placed, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavation Materials".

FORM 403



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 403

EXCAVATION FOR FOUNDATIONS

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403.06 BASIS OF PAYMENT

403.01 SCOPE

This work shall include labour, equipment and materials required to carry out excavation such as that required to obtain a foundation for such structures as bin-wall, culverts, footings, and gabions, and shall include hauling up to 1 km, handling and incorporation of all suitable materials into fill construction in accordance with Section 204 "Grading of Fill", and shall include the hauling up to 1 km, and handling of the unsuitable materials and the trimming of such unsuitable materials along embankment slopes or elsewhere, all as directed by the Engineer.

The work shall also include excavation required prior to disposal or salvage of culvert or pipe.

The work shall not include the excavation of those materials which the Contractor had previously placed, of his own choice as a temporary measure, and is required to excavate to facilitate the placing of, for example, select granulars. Any such excavation of materials which were placed as a temporary measure by choice of the Contractor, shall be at the Contractor's expense.

403.02 ENVIRONMENTAL REQUIREMENTS

The Contractor shall be aware of Division 8. Where unwatering is required, it shall be carried out as specified in Section 180.

403.03 EXCAVATION FOR FOUNDATION

The Contractor shall excavate along the lines, to the width and to the grade required by the Engineer.

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403.03.01 Excavation for Foundation for Culverts Installed in All Places Other than Across Existing Roads

In the particular case of excavation for foundation for culverts installed in all places except across existing roads, the Contractor will normally be required to excavate for a width equal to the nominal diameter of the pipe, or the nominal span of the arch in the case of pipe arches, plus a distance of 300 mm on each side of the culvert, unless required otherwise by the Engineer. The depth of the excavation shall be as shown on Form 1236 "Typical Culvert Bedding and Backfill Details", Form 1231 "Typical Structural Plate Round Pipe Bedding and Backfill Details", or Form 1232 "Typical Structural Plate Pipe Arch Bedding and Backfill Details", as appropriate, or as directed by the Engineer.

Excavation in addition to that required by the Engineer, will be considered incidental to the works.

403.03.02 Excavation for Foundation for Culverts Installed Across an Existing Road in a Low Fill

In the particular case of excavation for foundation for culverts installed across an existing road where the excavation is 1.25 m deep, or less, the Contractor will be required to excavate for a width equal to the nominal diameter of the pipe, plus 0.3 m on each side.

The depth of excavation shall be as shown on Form 1236 "Typical Culvert Bedding and Backfill Details", or as directed by the Engineer.

Excavation in addition to that required by the Engineer, will be considered incidental to the works.

403.03.03 Excavation for Foundation for Culverts Installed Across an Existing Road in a High Fill

In the particular case of excavation for foundation for culverts installed across an existing road where the excavation is deeper than 1.25 m, the Contractor will be required to excavate for a width at the bottom of the trench, equal to the nominal diameter of the pipe, plus 0.3 m on each side. However, at the top of the trench, the width shall be equal to the bottom width plus two times the depth of the trench.

The depth of excavation shall be as shown on Form 1236 "Typical Culvert Bedding and Backfill Details", Form 1231 "Typical Structural Plate Round Pipe Bedding and Backfill Details", or Form 1232 "Typical Structural Plate Pipe Arch Bedding and Backfill Details", as appropriate, or as directed by the Engineer.

Excavation in addition to that required by the Engineer, will be considered incidental to the works.

403.03.04 Excavation for Foundation for Gabions

In the case of excavation for foundations for gabions, the Contractor will normally be required to excavate an area slightly larger than the nominal base area, to a depth as required by the Engineer.

403.03.05 Excavation for Foundation for Footings

In the case of excavation for concrete footings for structural plate arches, the excavation pay lines shall be the length of the footing plus 300 mm on each end times the width of the footing plus 300 mm on each side times the depth between original ground line and foundation elevation or as directed by the Engineer. All excavation in addition to the above will be considered incidental to the works.

When a footing is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation. In soft or wet conditions, the final removal of material to foundation level shall not be made until the Contractor is ready to proceed with the construction of the footing.

When material at the founding elevation is Other Material and has been over excavated, the elevation shall be re-established by replacing with suitable material and compacting it to the bearing capacity of the original material as approved by the Engineer. When the founding material is Solid Rock and has been over excavated, the foundation elevation shall be re-established to the original elevation with mass concrete. First, all loose and compressible material shall be removed from the excavation to the satisfaction of the Engineer. Next, concrete shall be placed to the foundation elevation and shall fill the entire volume of the over excavation. Concrete shall be of a quality compatible with that used in the footing. No compensation will be provided for the cost of remedial measures required by the Engineer as a result of over excavation by the Contractor.

403.03.06 Excavation for Foundation for Bin-Type Retaining Wall

In the case of excavation for bin-type retaining wall, the excavation lines shall be the length of the structure plus one metre on each end times the width of the structure plus one metre on each side times the actual depth from original ground to the base elevation or 200 mm below the base elevation where an unyielding or rock foundation exists. When the foundation is soft or has non-uniform bearing capacity, the lines for the excavation shall be as directed by the Engineer.

FORM 403

All excavation in addition to the above will be considered incidental to the works.

403.03.07 Backfill Material

Materials excavated as excavation for foundations will be used for backfill if the material is deemed suitable by the Engineer.

If there should be insufficient backfill material available from the excavations, then the Engineer will direct that material from a cut or from a borrow area will be used to complete the backfilling.

Frozen materials shall not be acceptable as backfill material.

403.04 CLASSIFICATION

Excavated materials will be classified as either "Solid Rock" or "Other Material" in accordance with Section 205 "Classification of Excavated Materials".

403.05 MEASUREMENT FOR PAYMENT

Volumes of all classes of excavation described in 403.04 "Classification" will be measured in excavation and computed in cubic metres rounded to the nearest whole number.

During excavation operations whenever the character of material changes from one type to another, as classified in Section 205, then the Contractor shall strip the area, within the limits, of all overlying material, and notify the Engineer in order that proper measurements or cross sections may be made. No allowance will be made for material excavated before such measurements or cross sections have been made.

For boulders present in Other Material; the three maximum rectilinear dimensions of boulders, actually excavated, will be measured and the volume of each so determined. Volumes of the boulders which are equal to, or greater than, zero decimal five cubic metres will be included for payment as Excavation for Foundation Solid Rock.

Where excavation for foundation is carried out during existing pipe removal operations, the cross-sectional area of the pipe to be removed shall be determined, and deducted for excavation end areas used in volume of excavation determinations.

403.05.01 Measurement for Payment for Excavation for Foundation for Culverts Installed in All Places Other than Across Existing Roads

Measurement for payment for Excavation for Foundation for culverts installed in all places other than across existing roads shall be by means of the nominal volume of excavation.

Nominal volume of excavation shall be computed by an adaption of the Average End Area method of volume computation, in which end areas are calculated as the product of the required depth of excavation, times the nominal width of excavation.

The nominal width of excavation shall be taken as either: 1.0 m, or the nominal diameter of the culvert plus 0.6 m, whichever is greater.

403.05.02 Measurement for Payment for Excavation for Foundation for Culverts Installed Across an Existing Road in a Low Fill

Measurement for payment for Excavation for Foundation for culverts installed across an existing road where the excavation is 1.25 m deep, or less, shall be by means of the nominal volume of excavation.

Nominal volume of excavation shall be computed by an adaption of the Average End Area method of volume computation, in which end areas are calculated as the product of the required depth of excavation, times the nominal width of excavation.

The nominal width of excavation shall be taken as either: 1.0 m, or the nominal diameter of the culvert plus 0.6 m, whichever is greater.

403.05.03 Measurement for Payment for Excavation for Foundation for Culverts Installed Across an Existing Road in a High Fill

Measurement for payment for Excavation for Foundation for culverts installed across an existing road where the excavation is deeper than 1.25 m, shall be by means of the nominal volume of excavation.

Nominal volume of excavation shall be computed by an adaption of the Average End Area method of volume computation, in which end areas are calculated as the product of the required depth of excavation, times the nominal average width of excavation.

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The nominal average width of excavation shall be defined as the nominal width of excavation at the top, plus the nominal width of the excavation at the bottom, divided by two.

The nominal width of excavation at the bottom is defined as the nominal diameter of the culvert plus 0.6 m. The nominal width of excavation at the top is defined as the nominal width of excavation at the bottom plus two times the required depth of excavation.

403.05.04 Measurement for Payment for Excavation for Foundation for Items Other than Culverts

Measurements shall be of the actual amount of material moved from within the limits required by the Engineer.

The quantity to be measured shall be the number of cubic metres of excavated material as shown between the position of the ground lines as cross sectioned after grubbing operations have been completed (or when excavation for foundation is to be carried out in a cut, after grading of cut or excavation of muskeg or bog operations have been completed as the case may be), and the completed and accepted excavation lines. Material excavated outside of the required limits will not be included in measurement for payment. The volume of the excavation to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

403.06 BASIS OF PAYMENT

Payment shall be at the Contract Unit Price per cubic metre for Excavation For Foundation, Solid Rock or Other Material, as the case may be, hauled 1 km or under. Such payment shall be full compensation for all work herein described together with the labour, materials, and equipment-use required for excavating, handling, hauling up to 1 km, placing, and compacting in a fill as described in Section 204 "Grading of Fill".

Where the Engineer requires that Excavation for Foundation material be hauled in excess of 1 km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavation".

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 405

TEMPORARY DIVERSION OF STREAMS

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405.06	CLEAN UP OF REDUNDANT CHANNEL
405.07	MEASUREMENT FOR PAYMENT
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405.01	SCOPE

This specification covers the requirements for the temporary diversion of streams. Temporary stream diversions are often needed for example, where it is required that a culvert be installed in the dry.

405.02 ENVIRONMENTAL REQUIREMENTS

Contractors are reminded that the requirements of Division 8 apply to all work associated with this specification.

405.03 CUTTING TREES AND BRUSH FOR TEMPORARY DIVERSION

The proposed temporary diversion site shall be cut to the limits designated by the Engineer. This work shall be carried out and paid for in accordance with the provisions of Section 202 "Clearing".

405.04 GRUBBING FOR TEMPORARY DIVERSION

The Contractor shall only grub within the limits designated by the Engineer.

In order to minimize siltation into the temporary stream diversion, grubbing shall initially be confined to within the limits of from one proposed stream bank to the other, leaving wide ungrubbed strips adjacent to each bank. After the temporary diversion has been abandoned the balance of the required grubbing may be carried out.

The grubbing shall be carried out and paid for in accordance with Section 203 "Grubbing".

405.05 PREPARATION OF CHANNEL FOR STREAM DIVERSION

The channel shall be excavated to the lines, cross sections and grades designated by the Engineer. The channel shall be excavated in the dry. The Contractor shall carry out the work in such a way so as to cause a minimum of disturbance and siltation to the water course. The channel shall be lined with polyethylene sheeting of suitable strength.

In order to minimize siltation, excavated material shall not be placed adjacent to the banks.

The stream shall not be diverted until the channel has been prepared to the satisfaction of the Engineer.

When the diversion is made, the old channel shall be closed off with sand bags, or such other non-silting, non erodible and impervious material which is satisfactory to the Engineer.

Care shall be taken to prevent fish being stranded in closed off diversions.

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The Contractor shall minimize the crossing of water courses by heavy equipment. The same crossing place shall be used for such crossings as are unavoidable. At the completion of operations, the crossing place shall be put back to its original condition.

405.06 CLEAN UP REDUNDANT CHANNEL

After the stream has been diverted to the new culvert or water course, and the temporary diversion is no longer required, then that portion of the temporary diversion that will not be covered by fill, shall be graded and trimmed to sightly proportions and stabilized as directed by the Engineer.

405.07 MEASUREMENT FOR PAYMENT

Measurement for payment shall be by the number of cubic metres of excavated material as shown between the position of the ground lines as cross sectioned after grubbing operations have been completed, and the completed and accepted excavation lines. Material excavated outside of the required limits will not be included in measurement for payment. The volume of the excavation to be computed by the average end area method of computation or as wedges or pyramids, as the case may be, when terminating at grade points.

During excavation operations whenever the character of material changes from Other Material to Solid Rock, then the Contractor shall strip the area, within the limits, of all overlying material, and notify the Engineer in order that proper measurements for cross sections may be made. No allowance will be made for material excavated before such measurements or cross sections have been made.

For boulders present in Other Material; the three maximum rectilinear dimensions of boulders, actually excavated, will be measured and the volume of each so determined. Volumes of the boulders which are equal to, or greater than, zero decimal five cubic metres will be included for payment as rock.

405.08 BASIS OF PAYMENT

Payment shall be at the contract price per cubic metre for either Excavation for Temporary Diversion of Streams, Solid Rock, hauled 1 km or under; or Temporary Diversion of Streams, Other Material, hauled 1 km or under, as the case may be. Such payment shall be compensation in full for all labour, materials and use of equipment to: excavate the material from within the required horizontal alignment, cross section and profile, load and transport the material up to the 1 km freehaul limit and place and compact the material in a fill, supply and place such sand bags or other items necessary to divert the water to the temporary diversion, divert the stream to the diversion, divert the stream to the new culvert or water course after the permanent features have been put in place, and to grade and trim the temporary diversion channel to sightly proportions after it is no longer required.

Where the Engineer requires that excavated materials be hauled in excess of the 1 km freehaul limit before being placed, additional payment for overhaul will be made in accordance with Section 215 "Overhaul of Excavation Materials".

Should the contract not include quantities for "Excavation for Temporary Diversion of Streams, Solid Rock", then payment for that quantity shall be at the contract price for "Ditching Solid Rock".

Likewise, should the contract not include quantities for "Excavation for Temporary Diversion of Streams, Other Material", then payment for that quantity shall be at the contract price for "Ditching Other Material".

FORM 411



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 411

SELECT BACKFILL FOR LONG SPAN STRUCTURAL PLATE STRUCTURES

INDEX

411.01 DESCRIPTION

411.01 DESCRIPTION

This specification covers the requirements for the provision of select backfill for use with those long span structural plate structures for which the Contractor is responsible for the design.

The select backfill for long span structural plate structures shall meet the gradation and other requirements specified by the long span structural plate structure design Engineer.

The long span structural plate structure design Engineer's shop drawings for the long span structure, which must be submitted to the Department for approval, shall also indicate the select backfill envelope and gradation chart, and compaction requirements.

The Department will conduct all compaction testing and sieve analysis on the select backfill to ensure compliance with the designers requirements.

The supply, transport, placement and compaction of select backfill, meeting the designers requirements shall be compensated for as part of the basis of payment for the design, supply and installation of the long span structural plate structure.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 421

SUPPLY AND INSTALLATION OF PIPE CULVERTS

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421.07.02 Basis of Payment for Pipe Restocking

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421.01 SCOPE

This specification covers the requirements for the supply, installation and backfilling of factory fabricated pipe culverts, including the extension of existing culverts. Pipe culverts may be round or arched pipe.

Should end-treatments such as concrete headwalls, gabions or rip rap be required, then the requirements for these will be covered separately in other items and specifications.

421.02 MATERIALS

Pipe shall consist of galvanized corrugated steel pipe. However, contractors are advised that consideration will be given to proposals to substitute with corrugated polyethylene pipe for diameters of up to and including 600mm. The pipe shall be of the type and size specified in the Unit Price Table.

421.02.01 Corrugated Steel Pipe Materials

Corrugated steel pipe, couplers, nuts and bolts shall meet CSA Standard CAN3-G401-M81, or latest edition thereof.

The pipe shall have a wall thickness of at least that specified in the Unit Price Table. However, should the wall thickness not be specified, then the wall thickness shall be at least the corresponding thickness given in the following table for pipe of the size and type required.

PIPE DIAMETER	WALL THICKNESS
100 mm to 500 mm	1.6 mm FOR ANY CORRUGATION
600 mm to 1200 mm	2.0 mm FOR ANY CORRUGATION
1400 mm to 1800 mm	2.0 mm for 76 mm x 25 mm HELICAL CORRUGATION
2000 mm to 2400 mm	2.8 mm for 76 mm x 25 mm HELICAL CORRUGATION & 125 MM X 25 MM ANNULAR CORRUGATION

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The Contractor shall supply the pipe, couplers, nuts and bolts. Should strutting be required during backfill operations, then the Contractor shall provide the necessary timber.

Fill material to be placed within 300mm of the top, bottom and the sides of corrugated steel pipe shall consist of clean well graded Other Material, or small sized shot rock. The maximum dimension of any stone in the Other Material, or in the shot rock, shall not exceed 150mm.

421.02.02 Plastic Pipe Materials

Couplers and plastic pipe, consisting of corrugated polyethylene pipe, shall be of a type, size and strength acceptable to the Engineer. The Contractor shall provide the plastic pipe and couplers.

Contractors are advised that should plastic pipe be used, then the pipe shall be installed in a Select Backfill Material consisting of well graded Other Material having no more than 10% passing the 0.075mm sieve with a maximum particle size not exceeding 75mm.

421.02.03 Aluminized or Double Zinc Corrugated Steel Pipe Materials

Aluminized corrugated steel pipe, couplers, wyes, tees, bends, adapters, nuts and bolts shall conform to the requirements of the most recent revisions of the following specifications: AASHTO M274 and M36, ASTM A819 and A760 and CSA G401.

Double zinc corrugated steel pipe, couplers, wyes, tees, bends, adapters, nuts and bolts shall consist of galvanized steel of zinc coating mass (total on both sides) of not less than 1220 g/m². Double zinc pipe shall conform to the most recent requirements of CSA G401.

Wall thickness of the corrugated steel pipe will be as specified in 421.02.01.

421.03 ENVIRONMENTAL PERMITS AND AUTHORIZATIONS

Authorization from the Fish Habitat Management Branch, Fisheries and Oceans Canada, is required for work in or near any watercourse or water body deemed to be viable fish habitat.

Where required by Fisheries and Oceans, a downstream pool shall be provided at the culvert outlet.

The Contractor shall provide such unwatering as is required. The unwatering shall be carried out in accordance with the requirements of Section 180 "Unwatering Incidental to Work".

The Contractor shall be aware of Division 8.

Where the stream is deemed to be viable fish habitat, then in order to assist fish passage during minimum flow periods, the culvert shall be installed such that the bottom of the culvert is at least 300mm below natural stream bed.

In multiple culvert installations, then to assist fish passage, only one culvert need be installed with the invert at least 300mm below natural stream bed.

421.04 PIPE INSTALLATION

Culvert pipes shall be laid to the alignment, length and grade staked by the Engineer.

Driveway culverts will typically be: a minimum length of 7 m if rip-rap end treatment is used, and a minimum length of 8 m if no rip-rap is used.

The culvert shall be installed in accordance with the requirements given in Form 1236 "Typical Culvert Bedding and Backfill Details".

Should excavation be required to install the pipe at the required grade, then excavation shall be carried out and paid for in accordance with Section 403 "Excavation for Foundations".

Where unsuitable material is encountered at the proposed pipe invert grade, then the unsuitable material shall be excavated and replaced.

The replaced material shall be compacted to not less than 95% of Standard Proctor Density (ASTM D698-78).

The bed shall be shaped to conform to the bottom of the pipe and shall afford a uniformly firm bed throughout its entire length.

When extending an existing culvert, the Contractor shall brush off all soil sticking to that part of the existing pipe that will be lapped.

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When laying pipe, should the required culvert length be unobtainable from a combination of pipe lengths available on the site, then the Contractor shall cut a piece of pipe to obtain the required length of culvert. The cut or short section shall be placed on the down stream end.

Pipe cuts shall be made neatly at right angles to the axis of the pipe.

Riveted or annular corrugated steel pipe and plastic pipe shall be laid with the inside circumferential laps pointing in the direction of the flow. The longitudinal laps shall be located in the upper half of the pipe.

Helical corrugated plastic and steel pipe shall be installed so that the helix angle is constant for the total length of the installation and each pipe section shall be installed next to the previous section such that the lock seam forms a continuous helix.

Should concrete headwall be installed under another item, then backfilling against the headwalls shall not commence until the concrete has been cured to the specified design strength at 28 days. Should the Contractor wish to commence backfilling before 28 days after pouring, then the Contractor will be required to prove that the 28 days specified design strength has been obtained before permission to commence backfilling will be granted.

The material shall be carefully placed so that the intended shape of the pipe is maintained and no damage or movement of the culvert occurs.

The backfill material shall be placed simultaneously on both sides of the pipe in layers not exceeding 200mm in thickness. Each layer shall be thoroughly tamped to a compaction not less than 95% of Standard Proctor Density before a further layer is placed.

Backfilling shall be continued until all parts of the pipe culvert have not less than 300mm of backfill cover.

Any pipe which is not in the alignment and to the grade required by the Engineer after laying shall be taken up and relaid at the Contractor's expense.

421.04.01 Corrugated Steel Pipe Installation

Where excavation for foundation is required before a corrugated steel pipe may be placed in Other Material ground, then the excavation shall be to the proposed invert elevations and graded so as to provide a uniformly firm bed throughout the length of the culvert.

However, in solid rock, the excavation shall be carried out to a depth of 150mm below the proposed invert elevations so that fill material may be placed to provide a bed for the culvert. The fill material shall be placed and graded so as to provide a uniformly bed throughout the length of the culvert.

Where corrugated steel pipe is cut, drilled or welded, the pipe shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld splatter, and wiped clean. The clean surface shall receive at least one application of metal conditioner to de-oxidize, de-grease and phosphatize the metal surface to be treated if the surface is oily. Pre-mixed, ready-to-apply, liquid-zinc compound shall be applied to the prepared clean dry metal surface. The cold galvanizing compound must be of a type that imparts cathodic action against corrosion. The cold galvanizing compound should have a minimum 50mm overlap of the surrounding undamaged galvanized metal.

When applying metal conditioner and cold galvanizing compound near a watercourse or water body, the Contractor shall ensure that the application is carried out carefully so as to prevent leakage or spillage.

Both metal conditioner and cold galvanizing compound must be approved by Underwriters Laboratories Inc. for component coatings (organic) and meet or exceed Canadian Government Specifications 1-GP-181A. All materials must be applied in accordance with the manufacturer's instructions.

Corrugated pipe sections shall be jointed together by means of couplers. The couplers shall be installed to lap approximately equal portions of the pipe being connected and such that the corrugations or projections of the coupler properly engage the pipe corrugations. As the coupler is being tightened, it shall be tapped with a mallet to take up the slack. On asphalt coated pipe, the contacting surfaces of the coupler and pipe shall be lubricated with fuel oil, or a similar solvent, prior to tightening the coupler.

Strutting will be required for corrugated steel pipe culverts of diameter or span greater than 1500mm in order to ensure that the original shape of the culvert is retained after completion of backfilling operations.

Strutting shall be placed as directed by the Engineer. Struts shall be placed such that they bear onto longitudinally placed members. Under no circumstances shall struts be placed so that they bear directly onto the walls of the pipe.

Struts shall be left in place until ordered removed by the Engineer at the completion of backfilling operations.

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For corrugated steel pipe of diameter 2400mm or less, the minimum required cover to subgrade is 300mm. For corrugated steel pipe of diameter between 2400mm and 3600mm, the minimum required cover is 500mm.

421.04.02 Plastic Pipe Installation

Plastic pipe shall be laid on a bed of 150mm of Select Backfill Material.

Where excavation for foundation is required, the excavation shall be to 150mm below the proposed invert elevations so that Select Backfill Material may be placed to provide a bed for the culvert.

The Select Backfill Material shall be placed and shaped to conform to the underside of the culvert, and graded so as to provide a uniformly firm bed throughout the length of the culvert.

The cover shall not be less than the manufacturer's recommended minimum cover.

421.05 PROTECTION FROM TRAFFIC

Prior to allowing the movement of construction equipment or any vehicular traffic over the structure, the depth of cover over the culvert shall be at least equal to that stipulated under Section 421.04 "Pipe Installation". Cover for off highway construction equipment will be in addition to that specified above.

421.06 MEASUREMENT FOR PAYMENT

Measurement for payment for a culvert shall be the length of the culvert within the limits staked by the Engineer, measured in metres, to one decimal place, along the bottom of the new culvert. Should any part of the culvert extend beyond the limits as staked by the Engineer, then that part beyond the limits shall not be included in measurement for payment.

421.07 BASIS OF PAYMENT

421.07.01 Basis of Payment for Supply and Installation of Pipe Culverts

Payment at the contract price for the type and size of pipe culvert specified shall be compensation in full for all labour, materials and equipment use to: supply the pipe, couplers, nuts and bolts, transport the materials to the project, store the materials at the project, transport the materials to the site, cut the pipe if required, clean the cut end, supply and apply metal conditioner and cold galvanizing compound to all cuts and welds, assemble the culvert, place and compact bedding and backfill as required, supply and place any required strutting, remove the strutting and provide all required unwatering of the culvert site during installation.

Select Backfill for use with plastic pipe shall be paid for in accordance with Section 206 "Grading of Cuts", or 207 "Borrow", or Section 310 "Use of Pits, Quarries and Stockpiles for Production of Materials Supplied by the Contractor" as the case may be, but the additional requirements for these materials as stipulated in this specification shall be considered compensated for in the contract price for supply and installation of pipe culverts.

Backfill for use near corrugated steel pipes will be obtained from materials excavated to place the pipes. Should the engineer determine that the excavated material be unsuitable for backfill, or should additional backfill materials be required, the backfill materials shall be paid for in accordance with Section 206, Grading of Cuts or Section 207, Borrow, as the case may be, but the additional requirements for backfilling, as stipulated in this specification shall be considered compensated for in the contract price for supply and installation of pipe culverts.

421.07.02 Basis of Payment for Pipe Restocking

Contractors are advised that should less than the contract estimated quantity of pipe of a particular size and type be required, then the Contractor will be compensated for restocking this excess pipe at the rate of 15% of the Contract Unit Price for the supply and installation of pipe culvert of this size and type. Restocking shall include such things as handling, all transportation and any other expenses associated with removing the excess pipe from the project site, and returning it to the supplier or to the Contractor's permanent storage area.

421.07.03 Basis of Payment for Purchase of Pipe

Contractors are advised that should less than the contract estimated quantity of pipe of a particular size and type be required, the Department reserves the right to purchase the excess. Compensation for purchase will be at the invoiced price for that pipe from the pipe supplier plus 10%.

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 423

SUPPLY AND INSTALLATION OF STRUCTURAL PLATE PIPE

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423.01 SCOPE

This specification covers the requirements for the supply and installation of structural plate round pipe and structural plate pipe-arch as new construction, or, where specified, to extend an existing structural plate pipe.

Should head wall treatment be required, it will be covered separately under another item.

423.02 ENVIRONMENTAL PERMITS AND AUTHORIZATIONS

Authorization from the Fish Habitat Management Branch, Fisheries and Oceans Canada, is required for work in or near any watercourse or waterbody deemed to be viable fish habitat.

Where required by Fisheries and Oceans, a downstream pool shall be provided at the culvert outlet.

Culvert pipes are to be installed such that the bottom of the culvert is at least 300 mm below the natural streambed. This will allow the deposition of stream gravels in the culvert providing a natural appearing streambed and will assist fish passage during minimum flow periods.

For stream crossings requiring multiple culvert installations, only the culvert designed to carry minimum flows shall be installed to maintain fish passage (i.e. countersunk a minimum of 300 mm). The other culverts shall normally be installed along the streambed or at an elevation determined by the Engineer.

Where unwatering is required, the contractor shall carry out this work in accordance with Section 180 - "Unwatering Incidental to Work". The Contractor shall be aware of the requirements of Division 8.

423.03 MATERIALS

The structural plate round pipe or structural plate pipe-arch shall be of the size, thickness, and type specified in the contract documents.

The Contractor shall supply the plates, nuts, bolts, washers, ribs if required, and all necessary hardware to the job site. All materials shall be of galvanized steel and conform to CSA Standard CAN 3-G401-M81, or the latest edition thereof.

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423.04 EXCAVATION

The Contractor shall excavate a foundation within the limits and to the grade as staked by the Engineer. This excavation shall be carried out and paid for in accordance with Section 403 "Excavation For Foundations".

The foundation shall be excavated to a depth of 300 mm below the proposed grade of the invert and to a width equal to the width of the proposed structural plate pipe or pipe-arch plus 600 mm, or as directed by the Engineer.

423.05 EXTENSIONS TO EXISTING STRUCTURAL PLATE

When specified, the work will involve extending an existing structural plate pipe. Where the pipe has a bevelled end on the end to be extended, then the Contractor shall remove the plates comprising the bevelled end before adding the extension. The plates comprising the dismantled bevelled end shall be disposed of by the Contractor at his own expense.

Where in order to secure the extension to the existing pipe, cuts need to be made, or bolt holes need to be drilled in the existing pipe, then the Contractor shall make such cuts or holes as are necessary. Cuts and holes shall be made in such a manner so as to leave neat edges.

In the case of extensions or modifications to existing pipe all cutting and drilling shall be approved by the supplier and the Engineer. Cuts (if essential) shall be made with saws and holes (if essential) shall be drilled. Following such alteration, the Contractor shall clean, pre-treat if necessary and coat all damaged sections with cold-galvanizing compound as outlined. The cold-galvanizing compound shall be allowed to thoroughly dry before adding the extension.

Where corrugated steel pipe is cut, drilled, or welded the pipe shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld splatter, and wiped clean. The clean surface shall receive at least one application of metal conditioner to de-oxidize, de-grease, and phosphatize the metal surface to be treated if the surface is oily. Pre-mixed, ready-to-apply, liquid-zinc compound should be applied to the prepared clean dry metal surface. The cold-galvanizing compound must be of a type that imparts cathodic action against corrosion. The cold-galvanizing compound should have a minimum 50 mm overlap of the surrounding undamaged galvanized metal.

When applying a metal conditioner and a cold galvanizing compound near a watercourse or waterbody, the Contractor shall ensure that the application is carried out carefully as to prevent leakage or spillage.

Both metal conditioner and cold galvanizing compound must be approved by Underwriters Laboratories Inc. for component coatings (organic) and meet or exceed Canadian Government Specifications 1-GP-181A. All materials must be applied in accordance with the manufacturer's instructions.

423.06 BEDDING

The Contractor shall prepare a bed to the alignment, shape of underside of the structural plate and grade, as required by the Engineer.

See Sections 1231 "Typical Structural Plate Round Pipe Bedding and Backfill Details", and 1232, "Typical Structural Plate Pipe Arch Bedding and Backfill Details".

Select bedding material shall be used to prepare the bed. Select bedding material shall consist of well graded other material, or other material borrow, having no more than 10% passing the 0.075 mm sieve and with a particle size not exceeding 75 mm.

The bedding directly below structural plate pipe shall be lightly compacted to the required grade and shaped with a thin layer of loose select bedding in direct contact with the invert plates. All remaining bedding shall be compacted to at least 95% of Standard Proctor Dry Density (ASTM D698-78).

423.07 ASSEMBLY

The Contractor shall load the plates, nuts, bolts, washers, ribs if required, and all necessary hardware at the point of supply and transport them to the installation site.

The cutting of plate(s) or the drilling of holes in new structural plate pipe construction will not be permitted. Any defective plate(s) must be reported to the supplier and corrective action taken by the supplier or the manufacturer.

The Contractor shall assemble the structure using procedures as recommended by the supplier and in accordance with the instructions of the Engineer.

The Contractor shall brush off all soil sticking to the outside of those parts of plates that are to be lapped when joined. On bituminous coated plates, the contacting surfaces of the plates shall be lubricated with fuel oil, or similar solvent, prior to tightening the

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bolts. When applying fuel oil, or a similar solvent, near a watercourse or waterbody, the contractor shall ensure that the application is carried out carefully as to prevent leakage or spillage.

Structural plate pipes may be assembled at the proposed location or at the side of the location. If the assembled structure has to be moved to its final position it shall be moved in such a manner that no damage or distortion is caused to the structure or the bedding.

The structural plate pipe shall be placed to the required alignment, and grade and be within the required limits, as specified by the Engineer.

After complete assembly all bolts shall be re-tightened with a torque wrench to not less than 200 N-m for plates of thickness up to and including 3.2 mm thick, and not less than 340 N-m for plate thicker than 3.2 mm.

423.08 BACKFILLING

Should concrete headwalls be installed under another item, then backfilling shall not commence until the concrete headwalls have been cured to the specified design strength at 28 days. Should the Contractor wish to commence backfilling before 28 days after pouring, then the Contractor will be required to provide that the 28 day specified design strength has been obtained before permission to commence backfilling will be granted.

Select backfill material shall be used in backfilling and it shall consist of well graded other material or other material borrow having no more than 10% passing the 0.075 mm sieve and with particle size not exceeding 75 mm.

The backfill material shall be carefully placed so that the intended shape of the structure is maintained and no damage or movement occurs.

The backfill material shall be placed simultaneously on both sides of the structure in layers not exceeding 200 mm in thickness. The backfill material shall be spread with a light dozer running parallel to, not at right angles to the structure.

Select backfill material shall extend along the sides of the structure at least one span width away from the steel surfaces.

Backfilling with select backfill material shall be continued until all parts of the pipe have not less than 1 m of backfill cover, or not less than the manufacturer's recommended minimum cover, whichever is less.

Each layer of select backfill material shall be compacted to at least 95% of Standard Proctor Density (ASTM D698-78), before a further layer is placed on top.

Compaction shall be provided by means of a hand held mechanical type compactor. Normal highway fill type compaction equipment shall not be used in close proximity to the structure.

Backfilling equipment and mechanical tampers shall not operate closer than 300 mm from the free ends. Compaction within this area shall be achieved by means of hand operated timber rams.

Particular care shall be taken to ensure that 95% of Proctor compaction is achieved in the haunches of the structure.

The diameter, span, and rise of the structural plate pipe shall not vary from the original dimensions by more than five percent during backfilling operations.

Any structural plate pipe which is not in the alignment or within the limits required by the Engineer, or which displays distortions greater than those stated above, shall be excavated and re-installed according to these specifications, at the Contractor's expense.

423.09 PROTECTION FROM TRAFFIC

Prior to allowing the movement of construction equipment or any vehicular traffic over the structure, the depth of cover over the structural plate pipe shall not be less than the manufacturer's recommended minimum cover for the particular loading condition.

423.10 MEASUREMENT FOR PAYMENT

Measurement for payment for a structural plate pipe shall be the actual length of the new pipe measured in metres, to one decimal place, along the bottom of the pipe.

FORM 423

423.11 BASIS OF PAYMENT

Payment at the contract price for the size, thickness, and type of structural plate pipe specified shall be full compensation for all labour, materials, and equipment-use required to: supply all plates, nuts, bolts, washers, ribs if required, together with all necessary hardware, load and haul the same from the supply point to the installation site, provide for temporary storage and all rehandling necessary, assemble the structure, locate to alignment, grade, and tolerance specified by the Engineer, place and compact select bedding and select backfill as specified herein, together with all labour, materials and equipment-use necessary to provide any required unwatering.

Where the work involves extending an existing structural plate pipe, then the basis of payment shall, in addition to the aforesaid, also include all labour, materials and equipment-use for: removing and disposing of the existing bevelled end or ends (if any), cutting plates (if needed), drilling holes (if needed), and treating, supplying and applying cold-galvanizing compound to any cuts or drilled holes.

Select bedding material and select backfill material shall be paid for in accordance with Section 206 "Grading of Cuts" or Section 207 "Borrow" or Section 310 "Use of Pits, Quarries, and Stockpiles for Production of Materials Supplied by the Contractor" as the case may be, but the additional requirements for bedding and backfilling as stipulated in this specification shall be considered compensated for in the contract price for structural plate pipe.

All excavation required for a new pipe or to expose the end of an existing pipe where an extension is required shall be paid for in accordance with Section 403 "Excavation for Foundations" (a) Solid Rock or (b) Other Material, as the case may be.

FORM 424



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 424

SUPPLY AND INSTALLATION OF STRUCTURAL PLATE ARCH

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424.08	BASIS OF PAYMENT

424.01 SCOPE

This specification covers the requirements for the supply, installation, and backfilling of a structural plate arch to extend an existing structural plate arch or new construction.

The provision of footings for the arch is covered under Section 450 "Concrete Footings for Structural Plate Arches".

Should concrete headwalls be required, then they will be covered separately under another item and specification.

424.02 ENVIRONMENTAL PERMITS AND AUTHORIZATIONS

Authorization from the Fish Habitat Management Branch, Fisheries and Oceans Canada's required for work in or near any watercourse or water body deemed to be viable fish habitat.

Where required by Fisheries and Oceans, a downstream pool shall be provided at the culvert outlet.

Where unwatering is required, the Contractor shall carry out this work in accordance with Section 180 "Unwatering Incidental to Work".

The Contractor shall be aware of the requirements of Division 8.

424.03 MATERIALS

The structural plate arch shall be of the span, rise, thickness, and type as specified in the contract.

The Contractor will supply the plates, unbalanced channel, nuts, bolts, washers, ribs if required, and all necessary hardware including the bolts necessary to fasten the structural plate arch to the unbalanced channel. All materials shall be of galvanized steel and conform to CSA Standard CAN3-G401-M81, or latest edition thereof.

424.04 ASSEMBLY

The Contractor shall load the plates, unbalanced channel, nuts, bolts, washers, ribs if required, and all necessary hardware at the point of supply and transport them to the installation site.

The Contractor shall allow the concrete footings to cure for at least three days before commencing the assembly of the structural plate and the bolting of the plates to the channel embedded in the footing.

The Contractor shall assemble the structure using procedures as recommended by the supplier and in accordance with the instructions of the Engineer.

FORM 424

When extending an existing arch, the Contractor shall brush off all soil sticking to the outside of those parts of plates that are to be lapped when joined.

The cutting of plate(s) or the drilling of holes in new structural plate arch construction will not be permitted. Any defective plates must be reported to the supplier and corrective action taken by the supplier or manufacturer.

When the Contractor is extending an existing structural plate arch all cutting and drilling shall be approved by the supplier and the Engineer. Cuts (if essential) shall be made with saws and holes (if essential) shall be drilled. Following such alteration, the Contractor shall clean, pre-treat if necessary and coat all damaged sections with cold-galvanizing compound as outlined.

Where corrugated steel pipe is cut, drilled or welded the pipe shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld splatter, and wiped clean. The clean surface shall receive at least one application of metal conditioner to de-oxidize, de-grease, and phosphatize the metal surface to be treated if the surface is oily. Pre-mixed, ready-to-apply, liquid-zinc compound should be applied to the prepared, clean dry metal surface. The cold-galvanizing compound must be of a type that imparts cathodic action against corrosion. The cold-galvanizing compound should have a minimum 50 mm overlap of the surrounding undamaged galvanized metal.

When applying metal conditioner and a cold-galvanizing compound near a watercourse or waterbody, the Contractor shall ensure that the application is carried out carefully as to prevent leakage or spillage.

Both metal conditioner and cold-galvanizing compound must be approved by Underwriters Laboratories Inc. for component coatings (organic) and meet or exceed Canadian Government Specifications 1-GP-181A. All materials must be applied in accordance with the manufacturer's instructions.

On bituminous coated plates, the contacting surfaces of the plates shall be lubricated with fuel oil, or similar solvent, prior to tightening the bolts. When applying fuel oil, or similar solvent near a watercourse or water body, the Contractor shall ensure that the application is carried out carefully as to prevent leakage or spillage.

After complete assembly all bolts shall be re-tightened with a torque wrench to a minimum of 200 N-m for plates of thickness up to and including 3.2 mm, and to a minimum of 340 N-m for plates thicker than 3.2 mm.

424.05 BACKFILLING

Backfilling shall not commence until footings and any concrete headwalls have been cured to the specified design strength at 28 days. Should the Contractor wish to commence backfilling before 28 days after pouring, then the Contractor will be required to prove that the 28 day specified design strength has been obtained before permission to commence backfilling will be granted.

Select backfill material shall be used in backfilling, and shall consist of well graded other material or other material borrow having no more than 10% passing the 0.075 mm sieve and with particle size not exceeding 75 mm.

The backfill material shall be carefully placed so that the intended shape of the structure is maintained and no damage occurs.

The backfill materials shall be placed in layers simultaneously on both sides and over the structure, such that each layer conforms to the shape of the structure. Layers shall not exceed 200 mm in thickness.

When backfilling arches without headwalls, or with headwalls not sufficiently strong to maintain the shape of the arch, the first fill shall be placed midway between the ends of the arch. This fill shall be kept in as narrow a strip as possible until the top of the arch is reached. The remainder of the backfill shall be placed from the top of the arch, starting at the centre and working both ways to the ends.

When backfilling arches with headwalls heavy enough to maintain the shape of the arch, backfill shall be placed against one headwall until the top of the arch is reached. Then backfill shall be placed towards the opposite headwall.

The backfill shall be spread with a light dozer running parallel to, not at right angles to the structure.

Select backfill material shall extend along the sides of the structure at least one span width away from the steel surfaces.

Backfilling with select backfill material shall be continued until all parts of the arch have not less than 1 m of backfill cover, or not less than the manufacturer's recommended minimum cover, whichever is less.

Each layer of select backfill material shall be compacted to at least 95% of Standard Proctor Density (ASTM D698-78) before a further layer is placed on top.

FORM 424

Compaction shall be provided by means of a hand held mechanical type compactor. Normal highway fill type compaction equipment shall not be used in close proximity to the structure.

Backfilling equipment and mechanical tampers shall not operate closer than 300 mm from the free ends. Compaction within this area shall be achieved by means of hand operated timber rams.

The span and rise of the arch shall not vary from the original dimensions by more than five percent during backfilling operations. Any arch which displays distortions greater than those stated above, shall be excavated and re-installed according to these specifications, at the Contractor's expense.

424.06 PROTECTION FROM TRAFFIC

Prior to allowing the movement of construction equipment or any vehicular traffic over the arch the depth of cover over the arch shall not be less than the manufacturer's recommended minimum cover for the particular loading condition.

424.07 MEASUREMENT FOR PAYMENT

Measurement for payment for the supply and installation of Structural Plate Arch shall be the actual length of the new structural plate part of the arch measured in metres, to one decimal place, along the bottom of one side of the new structural plate.

424.08 BASIS OF PAYMENT

Payment at the contract price for the size, thickness, and type of structural plate arch specified shall be full compensation for all labour, materials, and equipment use required to: supply all plates, unbalanced channel, nuts, bolts, washers, ribs if required together with all necessary hardware, load and haul the same from the supply point to the installation site, provide for temporary storage, and all necessary rehandling, assemble the structure, and bolt to unbalanced channel, locate to alignment, grade and tolerance specified by the Engineer, place and compact select backfill as specified herein, together with all labour, materials, and equipment use necessary to provide any required unwatering.

Where the work involves extending an existing structural plate arch the tendered price shall include full compensation for cleaning, pre-treating if necessary, including the supply and application of cold-galvanizing compound to all cuts, holes and damaged galvanizing.

Select backfill material shall be paid for in accordance with Section 206 "Grading of Cuts", Section 207 "Borrow" or Section 310 "Use of Pits Quarries or Stockpiles for Production of Materials Supplied by the Contractor, as the case may be, but the additional requirements for backfilling as stipulated in this specification shall be considered compensated for in the contract price for the supply and installation of Structural Plate Arch.

FORM 426



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 426

DESIGN, SUPPLY AND INSTALLATION OF LONG SPAN STRUCTURAL PLATE ARCH

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- 426.08 BASIS FOR PAYMENT**

426.01 SCOPE

This specification covers the requirements for the design, supply, and installation for a structural plate long span arch. The provision of footings for the arch is covered under Section 450 "Concrete Footings for Structural Plate Arches". Should headwalls be required, then they will be covered separately under another item and specification. The provision of backfill for the arch is covered under Section 411 "Select Backfill for Long Span Structural Plate Structures".

426.02 DESIGN

The Contractor shall be responsible for the design of the long span structural plate arch. The long span structure shall be of the stated length, span and rise, although minor variations from the stated span and rise will be considered.

The design shall be carried out in accordance with generally accepted standards of practice to meet CS-600 loading requirements, in accordance with the Canadian Highway Bridge Design Code.

The design shall be prepared by a Professional Engineer who shall submit shop drawings and installation procedures to the Department at least two weeks prior to start of construction. Shop drawings shall bear the stamp and signature of a Professional Engineer licensed to practice in the Province of Newfoundland and Labrador.

The shop drawings shall specify the intended plate corrugation profile, together with the plate thickness. The design calculations for plate thickness shall be included with the shop drawings.

Where the structure is intended as an underpass, provision shall be made to prevent water from the fill seeping through joints in the plates, and then leaking on to the road below. This may be accomplished by designing the plate overlap so that the water sheds to the fill side of the structure, rather than seeping through the joints.

Alternatively, such other means to prevent water seepage that are acceptable to the Engineer may be used.

426.03 ENVIRONMENTAL PERMITS AND AUTHORIZATIONS

Authorization from the Fish Habitat Management Branch, Fisheries and Oceans Canada's required for work in or near any watercourse or water body deemed to be viable fish habitat.

Where unwatering is required, the Contractor shall carry out this work in accordance with Section 180 "Unwatering Incidental to Work".

The Contractor shall be aware of the requirements of Division 8.

FORM 426

426.04 MATERIALS

The long span structural plate arch shall be of the length, span, rise, corrugation profile and plate thickness, as approved by the Department.

The Contractor will supply the plates, unbalanced channel, nuts, bolts, washers, ribs if required, and all necessary hardware including the bolts necessary to fasten the structural plate arch to the unbalanced channel. All materials shall be of galvanized steel and conform to CSA Standard CAN3-G401-M81, or latest edition thereof.

426.05 ASSEMBLY AND BACKFILLING

The Contractor shall allow the concrete footings to cure for at least three days before commencing the assembly of the structural plate and the bolting of the plates to the channel embedded in the footing.

The cutting of plates or the drilling of holes in new structural plate arch construction will not be permitted. Any defective plates must be reported to the supplier and corrective action taken by the supplier or manufacturer.

The Contractor shall assemble and install the structure in accordance with the designer's drawings, using procedures specified by the industry representative and in accordance with the instructions of the Engineer. Prior to starting the work, the Contractor shall provide a copy of assembly and installation drawings and procedures to the Engineer on site.

Backfilling shall not commence until footings and any concrete headwalls and wingwalls have cured to at least 70% of the specified design strength at 28 days or cured for seven days, whichever comes first.

Assembly and installation of the culvert shall be monitored by a qualified representative of the steel culvert industry, hereafter referred to as the industry representative. The industry representative will be responsible for approval of backfill materials; approval of procedures for placing and compacting backfill materials; supervising culvert assembly and installation; and generally ensuring that the culvert is installed in accordance with the requirements of the culvert designer and the culvert manufacturer. If the structure is intended to be an underpass, then the Contractor shall install such provisions as are required to make the structure watertight.

The industry representative shall monitor the Contractor's operations on a full time basis during backfill operations. The Department will carry out compaction tests on the backfill material under the direction of the industry representative.

Backfill material shall be carefully placed and compacted so that the correct shape of the structure is maintained. Deflections from the specified dimensions shall be within the tolerances permitted by the culvert designer.

426.06 PROTECTION FROM TRAFFIC

Prior to allowing the movement of construction equipment or any vehicular traffic over the arch the depth of cover over the arch shall not be less than the manufacturer's recommended minimum cover for the particular loading condition.

426.07 MEASUREMENT FOR PAYMENT

Measurement for payment for the long span structural plate arch shall be the actual length of the installed plate arch, measured along the bottom of one side. The measurement shall be computed in metres, rounded to one decimal place.

426.08 BASIS OF PAYMENT

Payment at the contract price for the design, supply, and installation of the long span structural plate arch shall be compensation in full for all materials, labour, and use of equipment to: design, supply, transport, assemble, and install the plate arch, provide any required unwatering, and place and compact the backfill, together with the provision of supervision by a qualified representative from the long span structural plate structure industry.

Included in the materials which shall be supplied by the Contractor are all plates, unbalanced channels, nuts, bolts, and washers, together with any thrust beams, distribution slabs, ribs and gaskets, select backfill and such other items which may be included in the design.

**SECTION 430****SCREEN END TREATMENT FOR CORRUGATED STEEL PIPE****INDEX****430.01 SCOPE****430.02 MATERIALS****430.03 FABRICATION AND INSTALLATION****430.04 MEASUREMENT FOR PAYMENT****430.05 BASIS OF PAYMENT****430.01 SCOPE**

This specification covers the requirements for the supply and installation of a screen to the end of a corrugated steel pipe culvert or to the inlet of a corrugated steel pipe storm sewer.

430.02 MATERIALS

Screens shall consist of 3.8 mm steel mesh welded to a standard pipe coupling of such size as to fit the size of pipe for which the screen is required. A drawing of a typical screen is shown in Section 1225, "End Treatment Screens for Corrugated Steel Pipe".

Coupler, nuts and bolts shall be of galvanized steel.

After fabrication, the screen shall be rust proofed with cold galvanizing compound.

When corrugated steel pipe is cut, drilled, or welded the pipe shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld splatter, etc., and wiped clean. The cleaned surface shall receive at least one application of metal conditioner to de-oxidize, de-grease, and phosphatize the metal surface to be treated if the surface is oily. Premixed, ready-to-apply, liquid-zinc compound should be applied to the prepared clean dry metal surface. The cold-galvanizing compound must be of a type that imparts cathodic action against corrosion. The cold-galvanizing compound should have a minimum 50 mm overlap of the surrounding undamaged galvanized metal.

Both metal conditioner and cold-galvanizing compound must be approved by Underwriters Laboratories Inc. for component coatings (organic) and meet or exceed Canadian Government Specifications 1-GP-181A. All materials must be applied in accordance with the manufacturer's instructions.

Should asphalt treatment be specified, then the fabricated screen shall be asphalt treated.

Materials including steel mesh, pipe coupling, cold galvanizing compound, nuts, and bolts together with asphalt, if required, shall be supplied by the Contractor.

430.03 FABRICATION AND INSTALLATION

The screen shall be fabricated to such size that it will fit over, and be capable of being secured to, the CSP for which it is required. The screen shall be constructed as shown in the drawings and then rust proofed as outlined above.

After the rust proof treatment is thoroughly dry, the screen shall be treated with asphalt if asphalt treatment is specified.

After all treatments are thoroughly dry, the screen shall be securely bolted to the end of the corrugated steel pipe.

430.04 MEASUREMENT FOR PAYMENT

Measurement for payment for screen and treatment for corrugated steel pipe shall be by the number of screen end treatments of a particular size and type made.

FORM 430

Screen end treatment sizes are specified in the unit price table in terms of the size of the pipes to which they will be connected.

430.05 BASIS OF PAYMENT

Payment at the contract price for each screen end treatment of the type and size specified shall be compensation for all labour, materials, and equipment use to supply the steel mesh and pipe coupling, to fabricate and rust proof the screen as outlined above, to treat with asphalt if so specified, to supply nuts and bolts, and to secure the screen to the corrugated steel pipe, together with such unwatering provisions as may be necessary to carry out the work.

FORM 450



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 450

CONCRETE FOOTINGS FOR STRUCTURAL PLATE ARCHES

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450.10 MEASUREMENT FOR PAYMENT

450.11 BASIS OF PAYMENT

450.01 SCOPE

This specification covers the Department's requirement for the construction of concrete footings for structural plate arches, and long span structural plate arches. The footings incorporating a galvanized channel, reinforcing steel, and dowels if required, shall be as shown on the drawings, or as directed by the Engineer.

Dowels where required, shall be a separate contract item.

450.02 MATERIALS

450.02.01 Galvanized Channel

The Contractor will supply the galvanized channel sections. Galvanized channel is supplied and paid for under Section 424 of the Specifications Book, "Supply and Installation of Structural Plate Arch".

450.02.02 Concrete

Concrete for use in constructing the footings shall be supplied by the Contractor and shall conform to the following specific requirements:

CLASS OF CONCRETE	30 MPa AT 28 DAYS
AGGREGATE	MAXIMUM SIZE 20mm
AIR CONTENT	5% TO 8%
SLUMP	20mm TO 80mm

All concrete shall conform with Section 904 "Concrete Structures".

FORM 450

450.02.03 Joints

Joint materials shall be supplied by the Contractor. Material for forming isolation joints shall be 12 mm thick bituminous fibre material.

Material for forming control joints shall be 12 mm thick bituminous fibre material for the set-in-place type, or a bituminous filler material for the saw-cut type.

450.02.04 Reinforcing Steel

Reinforcing steel shall be of the sizes shown in the drawings.

Reinforcing steel shall conform with the requirements of Section 905 "Concrete Reinforcement".

450.03 EXCAVATION

The Contractor shall excavate a foundation within the limits and to the grades as staked by the Engineer.

The excavation shall be carried out and paid for in accordance with Section 403 "Excavation For Foundations".

450.04 FORMWORK

Before placing formwork, the Contractor shall have drilled the required holes removed any dirt and debris that may be in the holes with compressed air or other acceptable means, inserted the required dowels, free of oil, grease, excessive rust and scale, and grouted them securely in place where the contract documents indicate that dowels are required. Holes to be drilled into the rock for the insertion of dowels shall have a maximum size of 1½-2 times the dowel diameter.

Formwork shall be supplied by the Contractor, and shall conform to the requirements of Section 907 "Formwork and Falsework".

450.05 PLACING OF REINFORCING STEEL

Reinforcing steel shall be placed in accordance with the requirements of Section 905 "Concrete Reinforcement".

450.06 PLACING CONCRETE AND CHANNEL

The Contractor shall load the channel sections at the point of supply and transport them to the installation site.

The lugs on the channels shall be bent down and twisted into the correct position.

The channel sections shall be cut to lengths such that when placed the channel will not be continuous through any of the joints.

The channels shall be placed in the footings to the lines and grades as staked by the Engineer and such that there will be a small gap between pieces of channel at all joints, at both the set-in-place type and at any future saw-cut control joints.

Concrete shall be placed in accordance with the requirements of Section 904 "Concrete Structures".

As soon as the concrete has been placed and consolidated, it shall be struck off true to grade on each side of the imbedded channel.

The surface shall then be floated with a wooden float until the mortar flushes to the top, and the entire surface, on each side of the channel, presents a tight and compact appearance.

450.07 JOINTS

The configuration and spacing of joints shall be as shown on the drawings, or as required by the Engineer.

Isolation joints shall extend the full width and depth of the footing. The 12 mm thick bituminous fibre panels comprising the joint shall be set in the forms before the concrete is poured.

Control joints shall extend over at least one quarter the least dimension, and be of length equal to the full length of the dimension

perpendicular to the least dimension.

Control joints may be formed using a 12 mm thick bituminous fibre panel cut to size and placed in the forms before the concrete is poured. Alternatively, control joints may be formed by saw-cutting the hardened concrete with a sufficient time of placing to prevent uncontrolled cracking. Saw-cut control joints shall be of thickness between 3 and 5 mm. Saw-cut joints shall be thoroughly cleansed of all dust and particles of foreign matter and then completely filled with a bituminous filler material.

450.08 CURING THE CONCRETE

Concrete shall be cured in conformity with the requirements of Section 904 "Concrete Structures".

450.09 TRIMMING

After the removal of the forms and after the initial curing of the concrete, the Contractor shall backfill adjacent material into any foundation trenches which may occur at the ends and at the stream sides of the footings. The ground next to the ends and the stream sides of the footings shall be made trim to sightly proportions.

450.10 MEASUREMENT FOR PAYMENT

Measurement for payment for Concrete Footings for Structural Plate Arches shall be calculated from the dimensions of the footings as laid out according to the instructions of the Engineer and such measurements will be computed to obtain the volume in cubic metres, rounded to two decimal places.

450.11 BASIS OF PAYMENT

Payment at the contract price for Concrete Footings for Structural Plate Arches shall be full compensation for all labour, materials, and equipment use: to supply and place formwork, to supply reinforcing steel, to protect and clean the reinforcing steel as required, to bend, cut and weld the reinforcing steel, to place the reinforcing steel in the work, to support the reinforcing steel during the placing, to supply and place concrete, to construct joints, to provide and place joint filler, to cut and place channel sections, to cure the concrete, to remove the forms and to trim the adjacent ground; together with labour, materials, and equipment use to provide such unwatering provisions that may be necessary in order to carry out the work according to these specifications.

It should be clearly understood, that the supply of the reinforcing steel is included in the basis of payment for Concrete Footings For Structural Plate Arches.

Dowels where required, shall be compensated for in a separate contract item.

**SECTION 522****DISPOSAL OR SALVAGE OF CULVERT OR PIPE****INDEX****522.01 SCOPE****522.02 EXCAVATION AND DISPOSAL OR SALVAGE****522.03 BACKFILLING AND COMPACTION****522.04 MEASUREMENT FOR PAYMENT****522.04.01 Measurement for Payment for Disposal of Pipe****522.04.02 Measurement for Payment for Salvage of Pipe****522.05 BASIS OF PAYMENT****522.05.01 Basis of Payment for Disposal of Pipe****522.05.02 Basis of Payment for Salvage of Pipe****522.01 SCOPE**

This specification covers the requirements for the excavation and removal of culvert, sanitary sewer, storm sewer, or other pipe followed with the backfilling and compaction of the excavated material together with either; the salvage, or the disposal of the pipe, as specified in the Contract item.

Excavation above and around the pipe shall be compensated for under Section 403 "Excavation for Foundations", but any additional hand work excavation required to remove the pipe shall be considered part of Section 522 "Disposal or Salvage of Culvert or Pipe".

522.02 EXCAVATION AND DISPOSAL OR SALVAGE

After Excavation for Foundations operations have been carried out to expose the pipe the Contractor shall dispose of, or salvage the pipe, as designated, within the limits as required by the Engineer.

The excavation of material abutting the top and sides of the pipe shall be performed in such a manner as to leave undisturbed, adjacent structure or other work to be left in place, and so that no damage occurs to pipe designated to be salvaged.

All excavated material shall be piled in a manner that will not endanger the work, and that will avoid obstructing sidewalks, driveways, and gutters.

Where pipe is designated to be salvaged, the Contractor shall carefully disassemble the couplers and joints and carefully remove the pipe from the trench in such a way as not to cause damage to the pipe. The salvaged pipe together with couplers shall be stored at a safe place on the job prior to reinstallation or transported to the nearest Department Depot.

Should any pipe lengths, designated for salvage, be damaged or lost by the Contractor, then the Contractor shall not receive payment for pipe salvage for the damaged lengths. Damaged material shall become the property of the Contractor and shall be disposed of.

Where pipe is designated for disposal, the Contractor shall remove and dispose of the pipe and couplers.

Pipe for disposal shall be removed and disposed of in an approved waste disposal area provided by the Contractor at his own expense.

The Contractor shall be aware of Section 825 "Waste Management".

522.03 BACKFILLING AND COMPACTION

Where concrete is placed in the excavation under another specification, such as concrete plugs in the ends of pipes left in place, then backfilling shall not take place until the concrete has reached at least the specified strength at 28 days.

FORM 522

Material excavated as part of the removal or salvage operations shall be used as backfill in the trench.

Backfill shall be placed in layers not exceeding 200 mm in thickness loose measurement. Each layer shall then be compacted to not less than 95% of the Standard Proctor density (ASTM D698-78) before a further layer is placed.

522.04 MEASUREMENT FOR PAYMENT

522.04.01 Measurement for Payment for Disposal of Pipe

Measurement for payment for disposal of pipe of a particular diameter and material type shall be the length in metres, to one decimal place, of that length of pipe required to be disposed of as measured along the centerline of the pipe before excavation.

522.04.02 Measurement for Payment for Salvage of Pipe

Measurement for payment for the salvage of pipe of a particular diameter and material type shall be the length in metres, to one decimal place, of the pipe of that size and type, when measured after being removed from the ground.

Pipes that are damaged to the extent that they will be unsuitable for re-use, will not be included in measurement for payment for pipe salvage.

522.05 BASIS OF PAYMENT

522.05.01 Basis of Payment for Disposal of Pipe

Payment at the contract price for the disposal of pipe of a particular material and size shall be compensation in full for all materials, labour, and use of equipment to: provide any hand work excavation necessary to complete the pipe disposal operation, remove the pipe and couplers, provide any dewatering necessary to carry out the work, provide an approved waste disposal site, transport pipes and couplers to the waste disposal site, dispose of the pipes and couplers, and backfill and compact the excavated material.

Excavation above and around the pipe shall be compensated for under Section 403 "Excavation for Foundations", but any additional hand work excavation required to remove the pipe shall be considered compensated for as part of payment for Section 522 "Disposal or Salvage of Culvert or Pipe".

522.05.02 Basis of Payment for Salvage of Pipe

Payment at the contract price for the salvage of pipe of a particular material and size shall be compensation in full for all materials, labour, and use of equipment to: provide any hand work excavation necessary to complete the pipe salvage operation, remove and salvage the pipe and couplers, provide any dewatering necessary to carry out the work, transport pipes and couplers to the storage site, store the salvaged pipes and couplers, and backfill and compact the excavated material.

Excavation above and around the pipe shall be compensated for under Section 403 "Excavation for Foundations", but any additional hand work excavation required to salvage the pipe shall be compensated for as part of payment for Section 522 "Disposal or Salvage of Culvert or Pipe".

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GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 580

SIGN AND SIGNPOST INSTALLATIONS

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580.01 SCOPE

This specification covers the requirements for the supply and installation of various types of signposts and the actual placing of highway signs on those signposts.

580.02 CLASSIFICATION OF SIGNPOST INSTALLATIONS

There are seven basic types of signpost installations, namely; Type A, Type B, Type C, Type D, Type E, Type F, and Type G.

Type A and Type B signpost installations are of various dimensions, but all are intended to support signs which require only one wooden vertical member for support.

For Type A and Type B signpost installations, the number following the letter denotes the required height of the sign to be placed on the post, measured in millimetres. See section 1290, "Sign Post Installation Details Type A", and Section 1291, "Sign Post Installation Details Type B", for an illustration.

Type C and Type D signpost installations are of various dimensions, but all are intended to support signs which require two wooden vertical

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members for support. Type C installations are intended for signs of width less than or equal to 2440 mm and a height of less than or equal to 1220 mm. Type D installations are intended for signs wider than 2440 mm but less than 4880 mm and/or higher than 1220 mm.

For Type C and Type D signpost installations the upper number following the letter denotes the required height of the sign board in millimetres, and the lower number denotes the length of the sign board in millimetres. See Section 1292 "Sign Board Installation Details Type C", and Section 1293, "Sign Post Installation Details Type D", for an illustration.

Type E signpost installations will be of various dimensions and are intended to support signs less than or equal to 2440 mm in height and between 4880 mm and 6096 mm in length which require three wooden vertical members for support. For Type E signpost installations, the upper number following the letter denotes the height of the signboard in millimetres and the lower number denotes the length of the signboard in millimetres. See section 1294 "Sign Post Installation Details Type E", for an illustration.

Type F signpost installations are intended to support signs between 2440 mm and 3050 mm in height and less than or equal to 4880 mm in length which require two vertical structural steel members for support. For Type F signpost installations, the upper number following the letter denotes the height of the sign panel in millimetres and the lower number denotes the length of the sign panel in millimetres. See section 1295 "Sign Post Installation Details Type F", for an illustration.

Type G signpost installations are intended to support signs greater than 2440 mm in height and less than or equal to 6096 mm in length which require three vertical structural steel members for support. For Type G signpost installations, the upper number following the letter denotes the sign panel height in millimetres and the lower number denotes the sign panel length in millimetres. See section 1296 "Sign Post Installation Details Type G", for an illustration.

580.03 MATERIALS

The Contractor shall supply all materials required to complete sign and signpost installations in accordance with these specifications.

All posts, footings, and braces for Types A to E shall be pressure treated eastern hemlock, western hemlock, or BC fir and be of the size specified for each post type.

Nails shall be galvanized with a length of 100 mm.

Lag bolts shall be galvanized with a length of 80 mm and a diameter of 10 mm and with Hex or Square Head only (carriage type head is not to be used on signs).

Washers shall be galvanized flat washers to fit 10 mm diameter lag bolts.

Posts for Type F and Type G shall be W250x49 structural steel members, grade 300W in accordance with CSA G40-21, latest edition. All welding is to conform to CSA W59 and companies are to be certified to W47.1, latest edition. All fabrication of structural steel shall be done in accordance with Section 910 "Structural Steel". No splicing of the vertical member will be permitted. The sign post shall be painted in accordance with Section 921 "Blast Cleaning and Painting of Structural Steel". The complete penetration groove weld between the vertical member and the base plate shall be designed by a qualified welding engineer to handle a factored moment of 135 kN-M (ultimate limit states), 103.85kN-M (fatigue limit states) a factored horizontal shear force of 32.5 kN (Ultimate limit states), 25.0 kN (fatigue limit states). The fatigue category shall be "B" for 2,000,000 cycles. Shop drawings bearing the seal of a registered professional engineer, licensed to practice in the Province of Newfoundland, shall be submitted for approval.

Brackets for attaching the aluminum panels to the steel post shall be manufactured from 8mm steel plate to the dimensions shown on Forms 1295 and 1296. The brackets are to be painted in accordance with Section 921 "Blast Cleaning and Painting of Structural Steel".

A 6mm thick x 245mm wide neoprene gasket shall be placed between the steel post and aluminum sign panels. The gasket is to extend the full height of the aluminum panels.

580.03.01 Additional Material Requirements For Type A Installations

Vertical members shall be 114 mm x 114 mm pressure treated lumber of length not less than that as calculated for the appropriate sign drawings as explained by Section 580.02 "Classification of Signpost Installations", and as illustrated on Section 1290 "Sign Post Installation Details Type A".

Footings for each post shall consist of six pieces of 38 mm x 89 mm pressure treated lumber of length not less than 450 mm.

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580.03.02 Additional Material Requirements For Type B Installations

Vertical members shall be 140 mm x 140 mm pressure treated lumber of length not less than that as calculated for the appropriate sign indicated by the contract drawings, as explained by Section 580.02 "Classification of Signpost Installation" and as illustrated on Section 1291

"Sign post Installation Details Type B".

Footings for each post shall consist of six pieces of 38 mm x 89 mm pressure treated lumber of length not less than 450 mm.

580.03.03 Additional Material Requirements For Type C Installations

Vertical members shall be 140 mm x 140 mm pressure treated lumber. Footings for each installation shall consist of two pieces of 38 mm x 89 mm pressure treated lumber. The length of vertical members and footings shall not be less than that as calculated for the appropriate sign board indicated by the contract drawings, as explained by Section 580.02 "Classification of Signpost Installations" and as illustrated on Section 1292 "Sign Post Installation Details Type C", and Section 1299 "Sub-Grade Widening for Types C, D, E, F and G Signpost Installations".

Cross bracing shall consist of two pieces of 38 mm x 89 mm pressure treated lumber of sufficient length to provide cross bracing for the installation of the required size.

580.03.04 Additional Material Requirements For Type D Installations

Vertical members shall be 184 mm x 184 mm pressure treated lumber. Footings for each installation shall consist of two pieces of 38 mm x 89 mm pressure treated lumber. Cross members for each installation shall consist of two pieces of 89 mm x 89 mm pressure treated lumber.

The length of vertical members, footings, and cross members shall not be less than that as calculated for the appropriate sign board indicated by the contract drawings, as explained by Section 580.02 "Classification of Signpost Installations" and as illustrated on Section 1293 "Sign Post Installation Details Type D", and Section 1299 "Sub-Grade Widening For Types C, D, E, F and G Signpost Installations".

Cross bracing shall consist of two pieces of 38 mm x 89 mm pressure treated lumber of sufficient length to provide cross bracing of the installation of the required size.

Nuts, bolts, and washers for connecting cross members shall be galvanized. The bolt shall be of length 150 mm and be of diameter not less than 15 mm or greater than 25 mm.

580.03.05 Additional Material Requirements For Type E Installations

Vertical members shall be 184 mm x 184 mm pressure treated lumber. Footings for each installation shall consist of two pieces of 38 mm x 89 mm pressure treated lumber. Cross members for each installation shall consist of three pieces of 89 mm x 89 mm pressure treated lumber.

The length of vertical members, footings, and cross members shall not be less than that as calculated for the appropriate sign board indicated by the contract drawings, as explained by Section 580.02 "Classification of Signpost Installations" and as illustrated in Section 1294 "Sign Post Installation Details Type E", and Section 1299 "Sub-Grade Widening for Types C, D, E, F and G Signpost Installations".

Cross bracing shall consist of four pieces of 38 mm x 89 mm pressure treated lumber of sufficient length to provide cross bracing of the installation of the required size.

Nuts, bolts, and washers for connecting cross members shall be galvanized. The bolt shall be of length 150 mm and be of diameter not less than 15 mm or greater than 25 mm.

580.03.06 Additional Material Requirements For Type F And Type G Installations

Vertical members shall be W250x49 Structural Steel sections. Footings for each installation shall consist of reinforced concrete complete with anchor bolts as shown on the contract drawings. Neoprene gaskets shall be used to isolate the aluminum panels from the vertical members.

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The length of vertical members shall not be less than that as calculated for the appropriate sign board indicated by the contract drawings, as explained by Section 580.02 "Classification of Signpost Installations" and as illustrated in Section 1295 "Sign Post Installation Details Type F", Section 1296 "Signpost Installation Details Type G", and Section 1299 "Sub-Grade Widening For Types C, D, E, F and G Signpost Installations".

580.03.07 Materials Used For The Installation Of Signs

Signs will be made by the Department of Works, Services and Transportation and must be picked up by the Contractor.

Signs will be made available to the Contractor at the nearest main Depot, (i.e. White Hills Depot, Clareville Depot, Grand Falls Depot, Deer Lake Depot, or Goose Bay Depot).

Signs will be placed on wooden signposts with 80 mm x 10 mm lag bolts and washers in accordance with Section 1290 "Sign Post Installation Details Type A", Section 1291 "Sign Post Installation Details Type B", Section 1292 "Sign Post Installation

Details Type C", Section 1293 "Sign Post Installation Details Type D", and Section 1294 "Sign Post Installation Details Type E".

Signs will be placed on steel posts with 6mm x 100mm brackets. Bolts are to be stainless steel. See Section 1295 "Sign Post Installation Details Type F", and Section 1296 "Sign Post Installation Details Type G".

580.04 ASSEMBLY

Should any piece of lumber become split or cracked during nailing or installing the sign, then the Contractor shall replace the damaged piece with sound lumber at his own expense. For aluminum installations, posts or panels which become damaged in any manner shall be replaced by the Contractor at his own expense.

580.04.01 Assembly Of Type A And Type B

The footings shall be secured to the vertical member at the spacing shown on Section 1290 "Sign Post Installation Details Type A", and Section 1291 "Sign Post Installation Details Type B".

Each footing shall be nailed near its centre to the vertical member, by means of two nails as shown on Section 1290 "Sign Post Installation Details Type A", and Section 1291 "Sign Post Installation Details Type B".

580.04.02 Assembly Of Type C

The footings, cross bracing, and vertical members shall be assembled and secured at the spacing shown on the drawing, Section 1292 "Sign Post Installation Details Type C".

Each piece of footing and cross bracing shall be secured to the vertical members with four nails, that is, with two nails at each joint.

580.04.03 Assembly Of Type D

The footings, cross bracing, cross members and vertical members shall be assembled and secured at the spacing shown on the drawings, Section 1293 "Sign Post Installation Details Type D" and Section 1299 "Sub-grade Widening for Types C, D, E, F and G Signpost Installations".

Each joint shall be secured with a nut, bolt, and washer. The head of the bolt shall be placed at the front of the installation. The head shall be counter sunk so that the top of the bolt is flush with the front of the installation.

Each piece of footing and cross bracing shall be secured to the vertical members with four nails, that is, with two nails at each joint.

580.04.04 Assembly Of Type E

The footings, cross bracing, cross members and vertical members shall be assembled and secured at the spacing shown on the drawings, Section 1294 "Sign Post Installation Details Type E", and Section 1299 "Sub-grade Widening for Types C, D, E, F and G Sign Post Installations".

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Each joint shall be secured with a nut, bolt, and washer. The head of the bolt shall be placed at the front of the installation. The head shall be counter sunk so that the top of the bolt is flush with the front of the installation.

Each piece of footing and cross bracing shall be secured to the vertical members with four nails, that is, with two nails at each joint.

580.04.05 Assembly of Type F and Type G

The footings shall be constructed of reinforced concrete as shown on Form 1295 or 1296 as the case may be.

All concrete is to be 35MPa and shall conform to the requirements of Section 904 "Concrete Structures" for substructures. However, the slump must be 60mm \pm 20mm. Reinforcing steel shall be hard grade, YP400MPa. The top of the footing is to be steel float finished dead level.

The foundation backfill material shall be compacted to 95% of the maximum standard dry density (ASTM D698-78).

Prior to placing the post, bottom nuts are to be placed and levelled. The post is then to be set and the top nuts tightened. Ensure that the post is true and plumb. Hand pack non-shrink grout under base plate and trowel exposed edges to a smooth bevel.

580.05 INSTALLATION

The Engineer will stake the locations where signpost installations are to be installed and designate the sign number of the signpost installation that is required for each location.

The Contractor shall place signpost installations at these locations only of the required type and size for the sign as noted on the drawings.

The Contractor shall excavate holes for the footings, such that when installed the installation is at least the required minimum depth in the ground.

Signpost installations shall be placed with the vertical axis plumb, and with at least the required minimum depth in the ground. The vertical post edge nearest the road shall be 2500 mm from the edge of the shoulder, as illustrated in drawings, Section 1298 "Sub-grade Widening for Type A and Type B Sign Post Installations" and Section 1299 "Sub-grade Widening for Types C, D, E, F and G Sign Post Installations".

Footings shall be backfilled with selected fill which meets with the Engineer's approval. Backfill material shall not contain stones larger than 150 mm in any one dimension.

Backfill material shall be placed in layers of thickness not greater than 150 mm. Each layer shall be thoroughly compacted before the successive layer is placed. Dry granular backfill shall be moistened before tamping.

Backfill material around the signpost installations shall be brought up level with the surrounding ground and surplus excavated material together with surplus backfill material shall be disposed of on the sides of fills, or as directed by the Engineer.

The Contractor shall be responsible for placing each sign on the correct posts, and at the location as set by the Engineer, taking care to ensure that each sign is placed undamaged, horizontally levelled, and attached to the posts and cross members with 80 mm x 10 mm galvanized lag bolts and galvanized washers. Nails cannot be substituted for this job.

Sign board size, sign post type, and the location of each will be specified on drawings as set by the Engineer.

580.05.01 Additional Installation Requirements For Type A and Type B

Type A and Type B sign post installations shall be placed so that at least 1250 mm of the vertical member is in the ground. They shall be installed so that the face of the post that is to take the sign is perpendicular to the direction of traffic, or as directed by the Engineer.

580.05.02 Additional Installation Requirements For Type C, Type D, Type E, Type F And Type G

Type C and Type D sign post installations shall be placed so that both vertical members are at least 1500 mm in the ground.

Type E installation shall be placed so that the three vertical members are at least 2500 mm in the ground.

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Type F and Type G installations shall be placed as shown on the contract drawings.

Special care should be taken with the placing of the above sign post installations so as to minimize specular glare.

On straight stretches of roadway, Type C, Type D, Type E, Type F and Type G sign post installations shall be set with the horizontal axis at an angle of 93 degrees with the traffic lane which the proposed sign will serve, or as directed by the Engineer.

On the horizontal curves, these installations shall be set with the horizontal axis at an angle of 93 degrees with a straight line brackets between the sign and the point at which the sign is to be read, or as directed by the Engineer.

580.05.03 Additional Installation Instructions For The Sign Board

On Type A and Type B sign posts, the sign board will be mounted flush with the top of the sign post.

On Type C and Type D signposts, the sign board will be mounted with the top of the sign board, 100 mm above the signpost.

On Type A and Type B signposts, the top and bottom lag bolts must be placed 100 mm from the top and bottom edges of the sign board, **EXCEPT** for those pre-drilled sign boards that are normally supplied to the Contractor. See also Section 1290 "Sign Post Installation Details Type A", and Section 1291 "Sign Post Installation Details Type B".

On Type C, Type D and Type E signposts, lag bolts must be placed 250 mm down from the top edge of the sign board and follow down the sign board at a maximum spacing of 600 mm apart with the lowest lag bolt placed approximately 100 mm above the bottom edge of the sign board (for each post). See also Section 1292 "Sign Post Installation Details Type C", Section 1293 "Sign Post Installation Details Type D", and Section 1294 "Sign Post Installation Details Type E".

On Type C, Type D, and Type E signposts, lag bolts must be placed 300 mm from each outside edge of the sign board and spaced a maximum of 600 mm apart (for each cross member). See also Section 1292 "Sign Post Installation Details Type C", Section 1293 "Sign Post Installation Details Type D", and Section 1294 "Sign Post Installation Details Type E".

The Contractor is advised that care must be taken when installing the sign board to see that all lag bolts are seated into the frame and without the washer indenting the signs reflective sheeting. Care must be taken to see that damage to the sign while installing it to the post is minimal.

For Type F and Type G signposts, all aluminum sign panels must be bolted together with 3/8" x 1" stainless steel stitch bolts and washers (supplied by Department) at a maximum spacing of 600 mm. The entire aluminum sign must be attached to the steel posts with brackets at a spacing not exceeding 900 mm with a bracket band at the extreme top and bottom panels of the sign. See Section 1295 "Sign Post Installation Details Type F", and Section 1296 "Sign Post Installation Details Type G".

For signs with tabs in the upper corners, the Contractor is to supply and install 2 pcs of aluminum T-Bar, 75mm x 100mm x 6mm thick x 1600mm long with 10-9.5mm x 25mm stainless steel bolts with 15 x 25 x 5 rectangular heads and nuts to brace the tabs to the back of the sign.

580.06 MEASUREMENT FOR PAYMENT

Measurement for payment will be by means of the number of each type of signpost installation placed at the required locations.

580.07 BASIS OF PAYMENT

Payment at the contract price for sign and signpost installation of a particular type shall be compensation in full for all labour, handling, materials, and equipment-use to: supply all materials, handling of signs from Department Depots, assemble the installation, excavate a hole for the footings, install the signposts, backfill the hole, compact the backfill, install the sign board and dispose of all surplus materials, all in accordance with this specification. Concrete footings, reinforcing, anchor bolts, neoprene gaskets, base plates, posts, brackets, and hardware to install the signs for Type F and Type G installations are also included in the contract price for these items.

Should excavation of solid rock be required to complete the installation of a signpost, payment for the rock excavation will be made according to Section 403, Excavation for Foundations, Solid Rock.

FORM 590



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 590 WOOD PRESERVATION

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590.01 SCOPE

This specification covers the requirements for the preservation treatment of any wood or wood products as may be required in the construction of Departmental projects.

The specification covers the particular requirements for the pressure impregnation of woods with chemical preservatives and other compounds and the specific requirements for the handling, storage, and placement of treated materials.

590.02 GENERAL

All preservation treatments, unless otherwise specified, shall be applied through the use of approved pressure impregnation processes by licensed operators as issued by the appropriate governing authorities.

All operations associated with treatment (before, during, and after treatment) shall be carried out in complete accordance with the Canadian Standards Association (CSA), Standard 080-M89, Wood Preservation, and with the American Wood Preservers Association (AWPA) Standards. These standards are complimentary and as such, the CSA standard or the AWPA standard may be considered incomplete if read separately.

590.03 MATERIALS

All materials to be pressure treated with chemical preservatives shall be sound, of good quality, and of satisfactory species and grade as required in the plans and Supplementary General Conditions.

All species shall be treated with specified chemical preservatives to the required tolerances or the minimum acceptable tolerances as outlined in the CSA Standard "080-M89 Wood Preservation" and the "AWPA Standards".

These standards cannot give complete instructions for all conditions and all uses. The net retentions required shall be governed by the severity of the service conditions and by a number of other considerations, such as, service life desired, cost of replacement, climate, ground

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contact, exposure to weather, exposure to insect attack, size of material and depth of sapwood. The specified net retentions therefore, may be greater than indicated in the applicable standards and the supplementary specifications shall take precedence.

590.04 PREPARATION AND HANDLING

All materials to be pressure treated with chemical preservatives shall be prepared in a manner as required by the particular treatment process to be undertaken and shall be in accordance with appropriate sections of the CSA and AWP Standards.

All pressure preserved materials shall be transported, stored, stacked, and handled or otherwise used in a manner that will avoid damage or field fabrication causing alteration of the original pressure preserved surface.

In particular, the use of cant hooks, peavies, pickaroons, and end hooks shall not be permitted on the side surface of treated materials. The handling of pressure preserved piles, poles, ties, lumber or timber with such pointed tools shall be confined to end grain only.

Any pressure treated materials damaged through improper handling or misuse by the Contractor, shall be repaired or replaced at cost to the Contractor under the direction of the Engineer.

Insofar as practicable, all adzing, boring, chamfering, framing, graining, incising, surfacing, or trimming shall be undertaken prior to treatment.

590.05 FIELD TREATMENT

590.05.01 Material Requirements

Any unavoidable damage or necessary field fabrication shall be field treated in an approved manner with appropriate preservatives.

Preservatives for field treatment shall be at the same type and chemical composition as those used in their original treatment and shall be obtained from the supplier of the pressure preserved material or other licensed authority and shall be applied in the following manner.

590.05.02 Requirements for Field Application of Creosote and Creosote Mixtures

Creosote for field treatment of material originally treated with creosote or any creosote solution, shall meet the requirements of Commodity Standards P1 and P7 of CSA Standard -080, with the temperature of the solution while being applied, maintained at 65°C to 95°C. Where particularly heavy coatings are required, a suitable plastic compound shall be prepared by mixing 10 to 20 percent of creosote with 80 to 90 percent of pitch.

590.05.03 Requirements of Field Application of Oil-Borne Preservatives

Pentachlorophenol used for field treatment of material originally treated with this preservative shall consist of a solution prepared with solvent conforming to Commodity Standard P9 of CSA Standard 080. The toxicant concentration shall be a minimum of 5 percent of the solution weight. The Contractor shall prepare material for field treatment and field treatment with these preservatives shall be as directed by the manufacturers of the preservative or as directed by the Engineer.

590.05.04 Requirement of Field Application of Water-Borne Preservatives

The concentration of water-borne preservatives shall be 3 to 5 times greater than the concentration of the original treating solution.

590.05.05 Requirements for Application of Field Treatment

All cuts, holes, and injuries, including all abrasions and unused nail and spike holes and other damage to the surface of treated material shall be field protected by liberal brushing, spraying, dipping, soaking, or coating of preservatives.

Any procedures for field application of preservative shall be as the manufacturers recommend and as certified by the Engineer.

Any cuts, damages, and other like damages shall be cleaned of all deleterious substances and thoroughly saturated with two coats of field preservative.

All holes, including horizontal holes bored in pressure preserved material shall be poured full of appropriate preservative. The use of pressure equipment in the application of preservatives to boreholes is recommended.

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All bolt holes having a diameter equal to or greater than the diameter of the bolt shall be treated with preservative. Bolt holes having a diameter of 15 mm less than the bolt diameter shall not require application.

All unused bore holes and spike holes shall be poured full of preservatives and plugged with tight-fitting treated plugs.

Where the on-site application of wood preservative is necessary, the Contractor shall where practical, apply the wood preservative at a location at least 15 m from the nearest watercourse or waterbody. The application shall in all cases be carried out carefully, so as to prevent spillage or leakage.

The Contractor shall be aware of Section 140.03.03 "Spill Reporting and the Required Procedures".

590.06 SPECIFIC REQUIREMENTS FOR FIELD TREATMENT OF PILES

590.06.01 General Requirements

Immediately after making final cut-off, the cut area should be given two applications of preservative followed by a heavy application of coal-tar pitch, or other sealer. Piles shall be cut square, except in the case of piles to be capped with masonry.

Piles which will have the cut-off surface exposed in the structure shall be further protected by the application of two thickness of tar saturated fabric which cover the cut-off and overlap the side of the pile at least 50 mm. The overlap should be folded down along the side and glued in place with the sealer used. The fabric should then be coated with one coat of sealer.

In addition, under no circumstances shall treated piles be chopped or sawn to permit installation of sway bracing or other framing members. To avoid the necessity of cutting, piles shall, as far as possible, be selected of uniform size for each bent. Treated filler blocks shall be used when necessary to fill spaces between piles or caps and sway bracing.

590.06.02 Alternative Procedures

The Engineer may, if it is determined to be necessary (based upon insect or decay hazards or other economic or environmental considerations) require the Contractor to provide additional protection or implement special procedures as the case may be.

The application of preservative to pile cut-off may be undertaken using procedures as follows:

a. Steel Ring

A 2.6 mm sheet metal ring 100 mm in height and of a diameter slightly less than that of the pile at the point of cut-off should be driven into the pile so that the untreated center of the cut-off is enclosed by the ring. The ring should be driven into the wood until it forms an airtight seal. The space enclosed by the ring should be filled to a depth of at least 50 mm above with preservatives chosen for field treatment. Treatment should continue until the flow of preservative liquid into the end grain of the pile ceases. The ring can be removed for reuse.

b. Jacket Ring

A strip of roofing felt or thin metal tightly bonded to the pile at the cut-off point to form a cup extending 100 mm from the end of the pile may be used in place of a more rigid ring as above. The penetration procedure and reuse of the material are as indicated above.

590.07 METHOD OF PAYMENT

No separate payment shall be made for the preservative treatment of any wood or wood products to be incorporated into department projects.

FORM 610



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 610 RIP RAP TREATMENT

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(d) Rip Rap - Random

610.02 SCOPE

This specification covers the requirements for the various types of rip rap treatment listed above. The work consists of constructing a protective covering of approved stone, with or without mortar or sod as required on an earth bed; at the ends of culverts, on the sides of slopes or in the beds of channels or at other places as directed by the Engineer. The work also includes such fine grading and tamping of slopes to be rip rapped and backfilling and tamping of foundation trenches, as may be required.

610.03 MATERIALS

Rip rap shall consist of clean, hard, durable rock, having a density not less than 2.6 t/m³. The rock material, if subjected to the Los Angeles Abrasion Test (ASTM C131-81), shall have a loss not greater than 35%. When tested for soundness, five cycles of magnesium sulphate, ASTM C88-76, the rock material shall have a loss not greater than 15%.

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610.03.01 Rock

Stones for use in rip rap shall consist of clean, hard, durable rock, free of cracks. Rock subject to marked deterioration by water or weather will not be accepted. Only those stones approved by the Engineer shall be used.

The largest rocks procurable shall be supplied and in no case shall any fragment measure less than 0.0035 cubic metres in volume. In hand laid dry wall rip rap, spalls shall be supplied to fill open joints. Field stones or boulders may be used when approved by the Engineer.

610.03.02 Sod

Sod shall consist of a dense well rooted growth of permanent and desirable grasses. When sod is lifted it shall be covered with grass recently mowed to a length not more than 75 mm. Sod shall be in widths not less than 300 mm nor more than 450 mm, in thickness not less than the depth of the fibrous roots and in no case less than 25 mm.

All sod shall be taken from good loamy soil. It shall be well permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay, and contain sufficient moisture to maintain its vitality during transportation and placing.

610.03.03 Grout

Grout shall consist of a cement mortar composed of one part Portland Cement and three parts fine aggregate.

610.04 EXCAVATION

Should the Engineer require that excavation be carried out to prepare a foundation for the rip rap, then the work shall be carried out in accordance with Section 403 "Excavation for Foundation".

(a) Rip Rap - Hand Laid Dry Wall

On slopes to be rip rapped the slopes shall be fine graded to a uniform surface. Depressions shall be filled and thoroughly compacted.

(b) Rip Rap - Hand Laid With Sod

Same as for (a) above.

(c) Rip Rap - Grouted

Same as for (a) above.

(d) Rip Rap - Random

Where directed by the Engineer, excavation for foundation shall be performed to provide a shelf or ledge to retain the rock so dumped as permitted under the paragraph "Placing Random Rip Rap".

610.05 PLACING

Rip rap shall be placed to the grades and within the lines staked by the Engineer.

(a) Rip Rap - Hand Laid Dry Wall

Unless laid to form a flat apron, the rip rap shall commence in a trench below the toe of the slope. Stones shall be placed by derrick or by hand. Stones shall be set normal to the slope, and placed so that the largest dimension is perpendicular to the face of the wall, unless such dimension is greater than the specified thickness of the wall.

The required thickness of rip rap is dependent on the proposed height and slope of the rip rap and on the expected force of the stream flow.

The Contractor shall construct the rip rap to the thickness required by the Engineer.

The largest stones shall be placed in the bottom courses and for use as headers through subsequent courses. No shaping of stones will be required; but the Contractor shall build to reasonable semblance of courses with stones laid closely and voids chinked with spalls.

FORM 610

Stones shall be placed in the wall in such a way that the rear of each stone shall be embedded into the slope of the embankment.

On the completion of laying of rip rap operations any open foundation trenches bordering the rip rap shall be backfilled and tamped.

(b) Rip Rap - Hand Laid With Sod

The placing of stones and the backfilling and tamping of trenches shall be as required under (a) above.

However, as the placing of stones proceeds sod shall be placed so that sod separates the stones from each other, both horizontally and vertically. The sod shall be placed so that there are no voids between stones.

Sod shall not be placed upside down.

The sodding shall be trimmed so that the exposed edges of the sods are flush with the exposed face of the rip rap.

(c) Rip Rap - Grouted

The placing of stones shall be as required under (a) above. Before applying mortar the surfaces of the stones shall be amply wetted. The spaces between the stones shall be filled with mortar, starting from the bottom and working to the top. The mortar shall be worked with suitable tools to completely fill all voids except that the outer faces of the stones shall be exposed. Excess mortar shall be removed with a stiff brush. Grouted rip rap shall be cured in accordance with the requirements for curing concrete sidewalk as set forth in Section 570 "Installation of Concrete Sidewalk".

After the mortar has set any foundation trenches bordering the rip rap shall be backfilled and tamped.

(d) Rip Rap - Random

Rock material may be placed by dumping it into position over the surface to be rip rapped.

The Engineer will indicate whether the larger stones should be placed near the bottom of the slope, or near the top of the treated area to protect against scour. The Contractor shall make a reasonable endeavour to dump the larger stones where required. Placing shall be done in such a manner that the surface of the finished rip rap shall have a uniform appearance.

610.06 MEASUREMENT FOR PAYMENT

Measurement for Payment for rip rap will only include measurement of materials which meet the specifications for the type of rip rap treatment in question. Materials placed outside of the limits as staked by the Engineer will not be included in measurement for payment.

610.06.01 Measurement for Payment by Volume

For rip rap for which the contract unit price is stated in terms of the price per cubic metre, then such rip rap shall be measured for payment in terms of the net nominal volume of the rip rap structure comprising rip rap of the type in question. This net nominal volume shall be computed in cubic metres rounded to one decimal place.

The net nominal volume of the rip rap structure shall be calculated as the product of: the net surface area of the rip rap structure, times the mean thickness of the rip rap structure.

The net surface area of the rip rap structure shall be defined as the net area given by mean length of the rip rap structure, times the mean width of the rip rap structure; less the area of such objects as culvert ends around which the rip rap is placed.

610.06.02 Measurement for Payment by Weight

For rip rap for which the contract unit price is stated in terms of the price per tonne, then only the stones to be used in the rip rap treatment shall be weighed on scales. The weight shall be computed in tonnes rounded to one decimal place.

The scales shall be provided by the Contractor and they shall conform with the requirements of Section 501 "Weighing of Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only loads certified by the Department Road Checker as being placed in the works shall be included in measurement for payment.

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610.07 BASIS OF PAYMENT

Payment at the Contract Unit Price per cubic metre, or per tonne, for the type of rip rap specified shall be compensation for all labour, materials and equipment-use to supply stones and sod or mortar as required, haul the materials to the site, provide such necessary dewatering as may be required, trim and tamp ground that is to receive rip rap treatment, construct the required rip rap treatment according to these specifications, cure mortar if used, backfill and tamp any open foundation trenches, together with the provision for weighing (if appropriate).

Excavation for foundation shall be paid for in accordance with Section 403 "Excavation for Foundations", but the additional requirements for the fine grading and the tamping of depressions in slopes to be rip rapped, together with the backfilling and tamping of any foundation trenches, shall be considered compensated for in the contract price for rip rap treatment.

The occasional manual handling of rocks or stones which may occur during placing Random Rip Rap, shall in no manner be construed as transforming the classification of Random Rip Rap to that of Hand Laid Dry Wall Rip Rap.

FORM 615



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 615 ARMOUR STONE

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615.01 SCOPE

This specification covers the requirements for the supply of armour stone of various minimum sizes and minimum weights, together with the preparation of a foundation seat for the base of the armour stone treatment and the placing of the armour stones to a thickness not less than that stated on the Unit Price Table for the type of armour stone under construction.

615.02 MATERIALS

Armour stone shall consist of clean, hard, durable rock having a density not less than 2.6 t/m³. The rock material if subjected to the Los Angeles Abrasion Test (ASTM C131-81) shall have a loss not greater than 35%. When tested for soundness, five cycles of magnesium sulphate, ASTM C88-76, the rock material shall have a loss not greater than 15%.

Armour stones shall be of an angular shape, and be of a uniform gradation. The least dimension of any stone shall not be less than one quarter of the greatest dimension.

Individual armour stones shall be of a weight, or of a volume that is not less than that specified in the contract item in the Unit Price Table.

Armour stones shall be supplied by the Contractor.

615.03 PLACING

Armour stones shall be placed within the limits required by the Engineer.

The Contractor shall prepare a foundation for the armour stone by excavating a seat in the existing ground.

Excavation shall be by means of a backhoe, or a clam as required, to carry out the excavation for the seat at the required location and to sufficient depth to provide a proper footing for the armour stone.

Stones shall be placed by a crane, or similar equipment, starting at the bottom of the slope and working upwards.

No pushing or dumping of the stones by bulldozers or other equipment will be allowed.

The Contractor shall choose the stones and place them in such a way that the whole structure will be bound and consolidated to as great an extent as the nature of the rock will allow. Placing shall be done in such a manner that the surface of the armour stone treated slope shall have a uniform appearance. The thickness of the treated slope shall not be less than that specified in the contract item on the Unit Price Table.

Care shall be taken by the Contractor to ensure that no stones are placed outside of the lines as staked by the Engineer.

FORM 615

If any armour stones are placed outside of the area to be treated or are washed out of place during construction, then they shall be removed or replaced by the Contractor at his own expense.

615.04 MEASUREMENT FOR PAYMENT

Stones placed outside of the limits required by the Engineer will not be included in measurement for payment.

615.04.01 Measurement for Payment by Volume

For armour stone for which the contract unit price is stated in terms of the price per cubic metre, then such armour stone shall be measured for payment in terms of the net nominal volume of the armour stone treated slope comprising armour stone of the size in question. This net nominal volume shall be computed in cubic metres rounded to one decimal place.

The net nominal volume of the armour stone treated slope shall be calculated as the product of: the net surface area of the armour stone treated slope, times the nominal thickness of the armour stone treated slope, as specified in the contract item.

The net surface area of the armour stone treated slope shall be defined as the net area given by the mean length of the armour stone treated slope, times the mean width of the armour stone treated slope, measured along the face of the slope; less the area of objects around which the armour stone is placed.

615.04.02 Measurement for Payment by Weight

For armour stone for which the contract unit price is stated in terms of the price per tonne, then such armour stone shall be measured for payment by weighing the stones which are to comprise the treated slope. The weight shall be computed in tonnes rounded to one decimal place. The armour stone shall be weighed on scales provided by the Contractor. The scales shall conform to the requirements of Section 501 "Weighing Materials in Trucks". The Department will supply scale tickets, and the Department Scale Checker will issue the tickets. Only armour stones certified by the Department rock Checker as being placed within the limits, as staked by the Engineer, will be included in measurement for payment.

615.05 BASIS OF PAYMENT

Payment at the contract unit price per cubic metre, or per tonne, for the size of armour stone specified, shall be compensation in full for all labour, materials, and equipment-use: to supply the required armour stones, to excavate a foundation seat for the bottom armour stones, to provide all haulage to transport the armour stones from the source to the place where the stones are to be placed, and to place the armour stones, together with the provision for weighing (if applicable).

FORM 631



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 631

SEEDING

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631.01 SCOPE

This specification covers the requirements for surface preparation, the supply and spreading of topsoil and the supply and application of lime, fertilizer and grass seed, together with the provision of maintenance of the seeded areas for a period of two months.

631.02 MATERIALS

The following materials shall be supplied by the Contractor and shall conform to the requirements as stated.

631.02.01 Topsoil

Topsoil shall be fertile loamy material of a quantity acceptable to the Engineer. It shall be free from roots, vegetation or other debris of such size and quantity as would, in the opinion of the Engineer, prevent proper application of the topsoil, and free from stones and clods over 50 mm in greatest diameter. Topsoil badly infested by seeds and noxious weeds will not be accepted.

The topsoil may only be taken from a source of supply approved by the Engineer.

Soil removed as part of the grubbing operations may be used if the material meets the requirements of this section.

Contractors should note that legislation prohibits the removal of topsoil from areas zoned by Government for agricultural use. Information regarding the location of these agricultural zones may be obtained from the appropriate Government Department.

631.02.02 Lime

Lime shall be agricultural quality lime free from lumps.

631.02.03 Fertilizer

Fertilizer shall be free from lumps and have the plant food ratio of 10 nitrogen to 20 phosphorus to 20 potash plus 2% F.T.E.

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631.02.04 Grass Seed

Grass seed shall consist of a mixture 45% Kentucky Blue, 10% Wild White Clover, 10% Italian Rye Grasses, and 35% Creeping Red Fescue.

631.02.05 Water

Water used in the work shall be free of any impurities which would inhibit germination or otherwise adversely affect growth.

631.03 PREPARATION OF SURFACE

Seeding shall be carried out only within the limits as staked by the Engineer.

Surfaces that are to be treated with seeding shall first be trimmed to restore the ground to the condition it was in prior to any erosion which may have taken place. This work shall consist of such dozer and hand work that is necessary to restore the ground to the lines and slopes as existed on completion of grading operations.

At the edges of the area to be treated with seeding, the ground shall be hand excavated to such depth that will allow for the placing of 70 mm of topsoil, such that after the topsoil is placed the ground will be flush over the joint so as to allow the free flow of water across the joint, and also so as to present a neat appearance.

All areas to be seeded shall be fine graded to a uniform surface and the surface materials shall be loosened to a depth of 25 mm. These areas shall be so maintained until the topsoil is placed.

631.04 PLACING TOPSOIL

After completion of preparation of surface operations, topsoil shall be uniformly spread over the entire area to be seeded. The topsoil shall be placed to a depth not less than 70 mm. All clods or lumps shall be pulverized and any roots or foreign matter shall be raked up and removed from the site.

631.05 APPLICATION OF LIME, FERTILIZER AND GRASS SEEDS

On completion of placing topsoil operations; lime, fertilizer and grass seed shall be evenly spread over the surface to be seeded using approved spreaders. They shall not be mixed before application. Lime and fertilizer shall not be spread after the sowing.

Spreading shall only be carried out on calm days so as to avoid uneven application of the materials and segregation of the grass seed mixture.

It is preferable to seed in early summer or the last two weeks of August.

Should rainfall be insufficient, during the period of sowing and initial grass growth, water shall be applied immediately before and after seeding and subsequently thereafter during the maintenance period. Watering when carried out shall be done in such a manner as not to cause any erosion.

No seeding shall take place after 20th September.

Lime shall be applied in such quantities as to obtain a pH value of 6.5 for the topsoil. This will often be obtained by applying the lime at the rate of 4500 kilograms per hectare.

Fertilizer shall be applied at the rate of 1100 kilograms per hectare.

The grass seed mixture shall be applied at the rate of 85 kilograms per hectare.

The surface shall be lightly raked to a depth of 10 mm immediately after seeding.

631.06 MAINTENANCE

The Contractor shall be responsible for maintaining seeded areas to ensure proper and adequate growth of the grass during a period of two months following sowing.

Should the treated area require watering in the Engineer's opinion, then the Contractor shall thoroughly water the seeded area taking care not to cause any erosion.

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During the maintenance period, any defect caused by defects in materials, workmanship or damages caused by watering or the weather shall be re-seeded with grass seed at the Contractor's expense.

631.07 MEASUREMENT FOR PAYMENT

The slope area actually seeded, from within the limits as staked by the Engineer, will be measured in square metres, rounded to the nearest whole number.

631.08 BASIS OF PAYMENT

Payment at the contract price for seeding shall be compensation for all labour, materials and equipment-use for: the preparation of the ground to be treated with seeding, the supply and placing of topsoil, lime, fertilizer and grass seed and the raking of the freshly seeded ground, together with such watering and maintenance as may be required over the two month maintenance period.

FORM 632



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 632 HYDROSEEDING

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632.01 SCOPE

This section covers the requirements for the supply and application of fertilizer, grass seed and mulch by hydroseeding and hydromulching, together with the provision of maintenance during a one year warranty period provided by the Contractor.

The supply and application of lime is covered separately in Section 635 "Lime for Hydroseeding".

632.02 MATERIALS

The following materials shall be supplied by the Contractor and shall conform to the requirements as stated:

632.02.01 Grass Seed

Grass seed shall meet the requirements of the Seeds Act for Canada No. 1 seed, and shall be of the following varieties and respective percentages:

BIRDSFOOT TREFOIL, VARIETY LEO	60%
WILD WHITE CLOVER	30%
CREeping RED FESCUE, VARIETY BOREAL	10%

The White Clover and Birdsfoot Trefoil seed must be inoculated with the following bacterial cultures at the specified rates in order to produce nodules. The inoculum is added to the hydroseed tank with the seed.

WHITE CLOVER INOCULUM	RATE: 100 GRAMS PER KG. OF WHITE CLOVER SEED
BIRDSFOOT TREFOIL INOCULUM:	BIRDSFOOT TREFOIL INOCULUM:

632.02.02 Fertilizer

Fertilizer shall be granular, non-burning, free flowing and free of lumps.

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The fertilizer to be placed in the hydroseeding mixture shall have a plant food ratio of 10 nitrogen, 20 phosphorus and 20 potash plus 2% Fritted

Trace Elements or 12 nitrogen, 24 phosphorus, 24 potash plus 2% Fritted Trace Elements. The fertilizer mixture shall be applied at the rate of 400 kg/ha. The fertilizer to be spread the following spring during the maintenance period shall be 5-10-30, applied at the rate of 300 kg/ha, or approved equivalent.

632.02.03 Mulch

The mulch shall be of a type consisting of natural sundried straw or wood fibres.

Straw fibres shall include; oat, barley, alfalfa or wheat fibres and shall be free from any weeds or other foreign matter which may be detrimental to plant life. Any straw fibre combination shall be maintained in a dry condition to allow even distribution when processed through a blower. The addition of other vegetative material consisting of hay, chopped corn stalks or other similar substances may be used with prior approval of the Engineer.

Wood fibres shall include any wood or wood cellulose fibres and shall be free from any germination or growth inhibiting components.

Any fibres to be included in a mulch mixture shall be processed in lengths of 20 mm - 40 mm and supplied air dry in packages not exceeding 50 kg in weight for proper storage and handling.

The mulch shall be capable of dispersing in water to form a homogeneous slurry and remain in such a state when agitated or mixed with other additives.

When applied, the mulch shall be capable of forming an absorptive mat, which will allow moisture to percolate into the underlying soil.

632.02.04 Binder

The binder must be capable of joining seeds, mulch and soil particles together on slopes and erodible surfaces until plant growth has been established. The binder must not form an impervious seal which would prevent the penetration of moisture to the underlying soil.

The binder shall be supplied as a water-soluble powder composed of polymerised and organic substances and must be absolutely non-toxic.

632.02.05 Water

Water used in hydroseeding and hydromulching shall be free of any impurities which would inhibit germination or otherwise adversely affect growth.

632.03 HYDROSEEDING OPERATIONS

The Engineer shall designate the boundaries of areas for hydroseeding and mulching treatment. These areas will usually include a 300 mm wide overlap over adjoining vegetation so as to eventually provide a continuous cover of vegetation.

No area shall be hydroseeded until surface preparation has been completed to the approval of the Engineer, and the lime applied.

Hydroseeding shall be carried out as soon as possible after completion of the surface preparation, in order to prevent erosion by wind and water.

Contractor should wait for several days after the application of lime before hydroseeding.

The hydroseeding procedure to be applied to designated areas shall be undertaken in one operation. The operation shall consist of the distribution of a slurry composed of: the required seed mixture, the fertilizer, mulch, and binder.

The rate of application of the ingredients of hydroseeding slurry shall be as follows:

SEED MIXTURE	80 kg/ha
FERTILIZER	400 kg/ha
BINDER	20kg/ha
MULCH	1600kg/ha
INOCULUM	IN ACCORDANCE WITH SECTION 632.02.01

FORM 632

The Contractor shall measure the quantities of each of the materials to be charged into the seeder, either by mass or by a system of mass-calibrated volume measurements approved by the Engineer and the Contractor shall provide all equipment required for this purpose.

The ingredients required for the hydroseeding operation shall be thoroughly mixed with water in a hydroseeding tank.

In order to prevent all of one type of seed being planted on one part of the job, and all of another type of seed being planted on another part of the job, it is imperative that the hydroseeding slurry be continuously agitated during the hydroseeding operation to ensure that a homogeneous slurry is spread.

The distribution of the slurry shall be by means of an approved hydroseeder and shall be applied uniformly and in such a manner as to prevent puddling and movement of the soil surface.

Work shall proceed only in calm weather and on ground free of frost, snow, ice or standing water and when, in the opinion of the Engineer, weather and seasonal conditions are suitable. Hydroseeding shall not be carried out during periods of rainfall.

632.04 PROTECTION OF ENVIRONMENT

The Contractor shall take all reasonable care to prevent the contamination by his operations, of structures, signs, guide rails, fences, utilities and all such installations and, where such contamination occurs, he shall remove it to the satisfaction of, and by means approved by the Engineer.

The Contractor shall take whatever precautions may be necessary and shall ensure that fertilizer in solution shall not come in contact with the foliage of any trees, shrubs or other susceptible vegetation. Should the Contractor fail to meet this requirement, he shall immediately spray the affected vegetation with water, as required by the Engineer, to remove such contamination.

Mechanical damage to trees and shrubs shall, at the Contractor's expense, be repaired by trimming and painting or replacement, as required.

Such action as is herein required shall not relieve the Contractor of further responsibility should it not effectively remedy the damage, or of his liability as set out elsewhere within the contract.

632.05 MAINTENANCE

The Contractor shall be responsible for maintaining hydroseeded areas to ensure proper and adequate growth of the vegetation during the warranty period. The Contractor shall also be responsible for an additional application of fertilizer the following spring. This application shall be by a method approved by the Department. The fertilizer shall be 5-10-30 and shall be applied at a rate of 300 kg/ha. No additional payment will be made for maintenance or the extra application of fertilizer.

632.06 CONTRACTOR'S WARRANTY PERIOD

All areas hydroseeded under this contract shall have a warranty period of one year starting from the date of initial acceptance. This warranty shall cover any defects in materials and workmanship, and damages caused by the elements of weather. During this period, any defect brought to the attention of the Contractor by the Engineer shall be fixed, repaired or made good to the satisfaction of the Engineer and at no additional cost to the Department.

632.07 MEASUREMENT FOR PAYMENT

The slope area actually hydroseeded, from within the limits as staked by the Engineer, will be measured in square metres, rounded to the nearest whole number.

632.08 BASIS OF PAYMENT

Payment of the contract price for hydroseeding shall be compensation in full for all labour, materials and equipment-use for: supplying the inoculated seed mixture as specified; supplying the fertilizer, binder and mulch; carrying-out the hydroseeding operation; and supplying and placing the fertilizer in the following spring; together with a one year warranty period, during which time the Contractor shall be responsible for making good any defect to the growth of the vegetation.

Full payment shall not be made until the final acceptance of the work on satisfactory completion at the end of the warranty period. A holdback in the amount of 15% of the total payment for hydroseeding shall be retained for the warranty period.



SECTION 634
SOIL FOR HYDROSEEDING

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634.01 SCOPE

This section covers the requirements for the supply and application of soil to areas to be hydroseeded. Included in the work is the preparation of the surface by the removal of rocks and debris.

It should be noted that some areas to be hydroseeded will not require the application of soil for hydroseeding.

634.02 MATERIALS

Soil for Hydroseeding shall be supplied by the Contractor. The soil for Hydroseeding shall consist of either Organic Loam or alternatively a Silty Other Material and Peat Mixture.

634.02.01 Organic Loam

Organic Loam shall be free from weeds, large stones and debris. The Organic Loam shall meet the following gradation: maximum size of particles 100 mm, max of 10% by weight larger than 50 mm. To meet this gradation it may be necessary that the material be screened.

Only organic loam approved by the Engineer shall be used in the work.

634.02.02 Silty Other Material and Peat Mixture

Silty Other Material shall consist of very poorly drained granular material having a high silt content. The maximum size of particles shall be no greater than 100 mm, and no more than 10% by weight shall be larger than 50 mm. To meet this gradation, it may be necessary that the material be screened. Only Silty Other Material deemed acceptable by the Engineer shall be used in the work.

Peat shall be bog material free of pieces of wood, roots and any deleterious material. Only peat deemed acceptable by the Engineer shall be used in the work.

The silty Other Material and peat shall be thoroughly mixed together. The mixture shall contain no less than 25% peat and no more than 50% peat. Mixing may be by either; placing the silty O.M. and peat in layers and mixing in place by the use of equipment, or by pre-mixing.

634.03 PREPARATION OF SURFACE

The Contractor shall grade and clean-up areas over which soil for Hydroseeding is to be placed prior to placing the soil for Hydroseeding. Materials such as; rock, boulders, debris and other material, which it is necessary to remove in order to prepare the ground, shall be removed

FORM 634

and disposed of. This shall apply to all areas to be treated with soil for Hydroseeding regardless as to the source of the materials. The Contractor may elect to bury this waste on site if this meets with the approval of the Engineer.

634.04 TRANSPORTATION

The Contractor shall transport the materials from the source to the job site, where they shall be applied to the designated areas.

634.05 PLACEMENT

The area requiring the soil will be designated by the Engineer. Prior to spreading the soil, the Contractor is to grade the area to neat and slightly contours and to provide positive drainage.

The soil is to be spread over the designated areas to the depth of 100 mm.

The Contractor shall ensure that soil does not contaminate streams or water bodies.

634.06 MEASUREMENT FOR PAYMENT

Measurement for payment will be the product of the length by width of the area treated with a nominal 10cm of topsoil inside the limits staked by the Engineer. The area of topsoil will be computed in square meters to the nearest whole number.

634.07 BASIS OF PAYMENT

Payment at the contract price for soil for hydroseeding shall be compensation in full for all labour, materials, equipment-use and any other expenses to: collect debris and rocks from areas to be treated with soil, provide all haulage expenses to transport the debris and rocks to a disposal site provided by the Contractor at his own expense, dispose of the debris and rocks, provide sources of the required materials, obtain all required permits and approval, provide and transport samples to the Department's Soils Laboratory in St. John's, screen materials if required, construct and maintain access road to the sources of materials, provide all haulage of materials from the source to where the material is to be placed, mix the silty other material and peat mixture if this alternative is used, place the soil for hydroseeding to the required thickness of 10cm, pay any royalties for the materials, clean up and provide such other restoration to the sources of the materials as may be required, together with any other work necessary to complete the contract item.

FORM 635



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 635 LIME FOR HYDROSEEDING

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635.01 SCOPE

This section deals with the supply and application of lime prior to hydroseeding operations, including the work of preparing the surface to be limed. Preparing the surface involves grading and trimming the surface together with the removal of rocks and debris.

635.02 MATERIALS

Lime shall be agricultural quality lime. The lime shall be free flowing and free of lumps. The Contractor shall supply the lime.

635.03 PREPARATION OF SURFACE

Surfaces that are to be treated with lime shall first be shaped up and graded to prepare the surface for hydroseeding. This work shall consist of such dozer and hand work necessary to restore the ground to the smooth grades that existed prior to erosion, and to remove and dispose of all: other material, rock, boulders and debris, that it is necessary to remove in order to prepare the surface for hydroseeding.

This shall apply to all areas to be hydroseeded regardless as to the source of the material. The Contractor may elect to bury this waste on site where feasible and with the Engineer's approval.

For areas over which Soil for Hydroseeding is required, the placing and trimming of the Soil for Hydroseeding shall be completed before the application of lime may begin.

635.04 LIMING OPERATIONS

The Engineer shall designate the boundaries of areas for lime treatment. These areas will usually include a 300 mm wide overlap over adjoining vegetation so as to eventually provide a continuous cover of vegetation.

No area shall be limed until surface preparation has been completed to the approval of the Engineer.

The lime shall be applied at the even rate of 0.7 kg/m² (7.0 t/ha), or at such other rate, or rates, as the Engineer may designate. The lime shall be applied using the hydroseeding equipment. Spreading by hand will not be allowed.

The lime shall be applied before hydroseeding, in a separate operation from the hydroseeding application.

635.05 PROTECTION OF ENVIRONMENT

The Contractor shall ensure that lime does not contaminate streams or brooks.

FORM 635

Lime has been found to cause corrosion of galvanized metal in guide rail. The Contractor shall take all reasonable care to prevent the contamination of: structures, signs, guide rails, fences, utilities and all such installations. Should contamination by lime occur, then the Contractor shall remove the contaminating lime, to the satisfaction of, and by means approved of by the Engineer.

635.06 MEASUREMENT FOR PAYMENT

Measurement for payment shall be by means of the weight of lime used measured in tonnes rounded to one decimal place.

Where the lime arrives in pre-weighed bags, the weight shall be determined by counting the bags of lime used.

Where the lime arrives in loose form, then the lime shall be weighed at the Contractor's expense.

635.07 BASIS OF PAYMENT

Payment at the contract price for Lime for Hydroseeding shall be compensation in full for all labour, materials and use of equipment to: trim and prepare the surface to be limed, collect debris and rocks, provide all haulage expenses to transport the debris and rocks to a disposal site provided by the Contractor at his own expense, dispose of the debris and rocks, supply the lime, weigh the lime if in loose form, and apply the lime in conformity with this specification.

FORM 640



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 640

SUPPLY AND INSTALLATION OF GUIDE RAIL

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640.01 SCOPE

This specification covers the requirements for the supply and installation of various guide rail installation types together with the accompanying posts. Unless the type of guide rail installation is specified otherwise in the unit price table, the type of guide rail shall be the standard type shown on Form 1280 "Guide Rail Standard Installation".

640.02 ENVIRONMENTAL REQUIREMENTS

Guide rail posts located in Protected Water Supply areas shall only be chromated copper arsenate (CCA) treated type.

640.03 MATERIALS

Guide rail parts furnished under these specifications shall be interchangeable with similar parts, regardless of their source of manufacture.

640.03.01 Rail Sections

The rail elements shall consist of a corrugated steel W-beam with corrugations symmetrical about the horizontal axis and such that the edges and centre of the rail element may contact each post.

The individual rail elements shall be of the Standard Type (W-beam) consisting of 2.75 mm thick (12 gauge) rail of length not less than 4 125 mm, having post bolt slots 3 810 mm apart centre to centre; unless indicated elsewhere on a drawing or supplementary general condition in which case one additional post bolt slot will be placed at mid-span.

The rail metal shall be open hearth oxygen furnace or electric furnace steel having an elongation of not less than 12 per cent in 50 mm and shall withstand a cold bend, without cracking, of 180° around a mandrel of a diameter equal to 2½ times the thickness of the plate.

FORM 640

The rail elements shall be hot-dip galvanized before or after fabrication. In accordance with the specifications of ASTM Designation A-515 (Class 2½ oz) or A123.

Rail element joints shall be capable of withstanding a tensile load of not less than 350 kN without failure. The rail element shall not deflect more than 140 mm when tested as a simple beam with the traffic face up and with an 8.9 kN load applied at the centre of a 3 650 mm span through a 76 mm wide flat bearing.

Workmanship shall be equivalent to good commercial practice and all edges, bolt holes and surfaces shall be free of torn metal, burns, sharp edges and protrusions.

Rail sections shall be supplied by the Contractor.

Two certified copies of mill test reports of each batch from which the rail element is formed, shall be furnished to the Engineer, if so required.

640.03.02 Buried End Sections

Buried end sections shall be manufactured to meet the dimensions as shown on the drawings Section 1279 "Typical Guide Rail Installation Types" and Section 1280 "Guide Rail Standard Installation". The sections shall be shop fabricated from rail sections conforming to the requirements of Section 640.03.01. No punching, cutting or welding will be permitted in the field.

The weld shall be cleaned, pre-treated and coated with cold galvanizing compound as outlined.

Where corrugated steel beam is cut with a saw, drilled, or welded, the beam shall be thoroughly cleaned with a wire brush to remove scale, rust, slag residue, weld splatter, etc. and wiped clean. The cleaned surface shall receive at least one application of metal conditioner to de-oxidize, de-grease and phosphatize the metal surface to be treated if the surface is oily. Pre-mixed, ready-to-apply, liquid-zinc compound shall be applied to the prepared, clean, dry metal surface. The cold-galvanizing compound must be of a type that imparts cathodic action against corrosion. The cold-galvanizing compound shall have a minimum 50 mm overlap of the surrounding undamaged galvanized metal.

Both metal conditioner and cold-galvanizing compound must be approved by Underwriters Laboratories Inc. for component coatings -organic and meet or exceed Canadian Government Specifications 1-GP-181A. All materials must be applied in accordance with the manufacturer's instructions.

The Contractor shall supply the angled sections.

640.03.03 Rail Terminal Sections

Rail terminal sections shall be of the standard type, as illustrated on the drawing Sections 1279 "Typical Guide Rail Installation Types" and Section 1280 "Guide Rail Standard Installation". The metal and galvanizing shall be of the same thickness and quality as is stipulated for the rail sections in Section 640.02.01. The Contractor shall supply the terminal sections.

640.03.04 Bolts, Nuts, Washers and Spikes

All bolts, nuts and washers shall conform to the specifications of ASTM Designation A-307 or A-325, except that rail splice bolts shall be button headed.

Post bolts and splice bolts shall have shoulders of such shape and size that they fit into the bolt slots in the rails and thus prevent the bolt from turning.

Post bolts shall be 16 mm diameter and 200 mm long for use with standard 150 mm x 150 mm posts, or 16 mm diameter and 250 mm long for use with 200 mm x 200 mm posts.

Post bolt washers for the back of posts shall be 45 mm in diameter and 4 mm thick.

Bolts for anchors shall be 16 mm diameter and 350 mm long for use with standard 150 mm x 150 mm posts and anchors, or 16 mm diameter and 450 mm long for use with 200 mm x 200 mm posts and anchors. Washers shall be 45 mm round and 4 mm thick.

Spikes for anchors shall be 125 mm galvanized spikes.

Bolts, nuts, washers and other fittings shall be hot-dip galvanized in accordance with the specification of ASTM Designation A-153.

FORM 640

The Contractor shall supply the bolts, nuts, washers and spikes.

640.03.05 Signal Reflectors

Silver signal reflectors and yellow signal reflectors shall be of size 75 mm x 100 mm. The Department will supply both types of signal reflector free to the Contractor at the following district depots: White Hills in St. John's, Clarendville, Grand Falls, Deer Lake and Goose Bay.

640.03.06 Nails for Reflectors

Nails for securing signal reflectors, shall be supplied by the Contractor and shall consist of 30 mm galvanized flat head nails.

640.03.07 Posts and Anchors

Timber for posts and anchors shall be sound, well seasoned structural grade lumber. Only birch wood will be acceptable for 150 x 150 guide rail posts. Hemlock or other approved species will be acceptable for 200 x 200 guide rail posts.

Posts shall have minimum dimensions of 150 mm x 150 mm x 2400 mm, except in the particular case of posts to be used in tender items worded "Guide Rail with Additional Posts", as shown in Form 1282, in which case posts shall have minimum dimensions of 200 mm x 200 mm x 2400 mm.

Anchors shall consist of either one piece of guide rail post cut 450 mm long, or two pieces of 38 mm x 140 mm x 450 mm lumber.

Posts and anchors shall be pressure treated with an acceptable wood preservative.

The minimum required depth of penetration of wood preservative shall be 13mm. To determine penetration, a borer core shall be taken from 20 pieces in each charge. If 80% of the borings meet the penetration requirements, the charge shall be accepted.

The minimum retention of preservative shall be as follows:

PRESERVATIVE	MINIMUM RETENTION	METHOD OF DETERMINATION
PENTACHLOROPHENOL	6.4 kg/m ³	BY ASSAY
CHROMATED COPPER ARSENATE	6.4 kg/m ³	BY ASSAY
OTHER	IN ACCORDANCE WITH CSA 080-M 89	

Incising will normally be required. However, this requirement will be waived if specifications for both penetration and retention are satisfied.

If requested by the Engineer, the Contractor shall provide penetration and retention test reports for the guide posts and guide rail posts supplied for the project.

The Contractor shall supply all the required wood preservative treated posts and anchors.

640.03.08 Wood Preservative

Wood preservative for use in treating field cut ends of posts shall be of the same type and chemical composition as that used in the original treatment.

The Contractor shall supply the wood preservative.

640.04 INSTALLATION

Galvanized materials shall be loaded, hauled and handled in such manner that galvanizing will not be damaged. All bare, abraded, and damaged surfaces shall be cleaned, pre-treated if required and coated with cold galvanizing compound as outlined above.

FORM 640

Guide rail shall be placed to the lengths, lines and grades set by the Engineer. Except where directed otherwise by the Engineer, the guide rail shall be installed in accordance with the requirement of the drawings: Form 1279 "Typical Guide Rail Installation Types", Form 1280 "Guide Rail Standard Installation", or Form 1282 "Guide Rail with Additional Posts", as the case may be.

A buried end section shall be placed at each end of a run of guide rail unless directed otherwise by the Engineer.

On divided highways, a buried end section shall be placed at the approach end of a run of guide rail and a terminal section shall be placed at the other end unless directed otherwise by the engineer.

The end post of a buried end section shall have an anchor secured to the bottom of the post.

Where a 150 mm x 150 mm x 450 mm timber anchor is used, it shall be secured to the post by means of a galvanized nut and 16 mm diameter bolt 350 mm long together with two 45 mm round 4 mm thick galvanized washers.

Where a double 38 mm x 140 mm x 450 mm lumber anchor is used, it shall be secured to the post by means of four 125 mm galvanized spikes.

Field boring and cutting to length of anchors will be permitted, provided that the hole is treated with two coats of wood preservative before driving the bolts and provided that the cut end is treated with two coats of wood preservative before burying.

The Contractor shall excavate holes for the posts such that when placed in the holes the bottom of the posts are at least 1200 mm below the ground surface.

Posts shall be set plumb and to the established lines and grades and shall be placed at 3810 mm intervals, unless directed by the Engineer.

The posts shall be firmly backfilled with selected material, free of large rock, placed in layers of thickness not greater than 100 mm. Each layer shall be thoroughly compacted before the next layer is placed. Should the backfill be dry then each layer shall be moistened before tamping.

All backfill shall be compacted to 95% of Standard Proctor Density (ASTM D698-78).

All surplus excavated material shall be disposed of along the sides of fill, or in other locations as directed by the Engineer.

The rails shall be secured to even lines such that the centre of the rail is 500 mm above the edge of pavement.

The Contractor shall bore holes in the posts for the post bolts and treat the holes with two coats of wood preservative before driving the bolts.

Rail elements and terminal sections shall be lapped so that the exposed ends will not face approaching traffic.

The bolted connections of the rail element to the post shall be capable of withstanding a 22.5 kN pull at right angles to the lines of the railing.

When the attachment of the rail elements to the posts has been completed, the tops of the posts shall be cut to a point 75 mm above the top of the rail as shown by Section 1279 "Typical Guide Rail Installation Types" and Section 1280 "Guide Rail Standard Installation". The tops of the posts shall be treated with two coats of wood preservative after cutting.

Signal reflectors shall be attached to posts at terminal sections, posts at the buried end sections, and to every fourth post in a length of guide rail. Silver reflectors shall be placed facing oncoming traffic and yellow reflectors shall be placed on the opposite side of the post except for divided highway. On divided highways, silver reflectors shall be placed facing oncoming traffic on the outside shoulder and yellow reflectors shall be placed facing on coming traffic on the median shoulder.

The Contractor shall drill nail holes in the reflectors, bend the reflectors to the required shape and secure the reflectors with 30 mm galvanized flat head nails as shown as shown on drawing Section 1281 "Signal Reflectors on Guide Rail Post".

640.05 MEASUREMENT FOR PAYMENT

Measurement for payment for the supply and installation of Standard Type Guide Rail, Guide Rail with Additional Posts, or Type "A" Guide Rail, as the case may be, shall be the length of that type of guide rail placed within the limits designated by the Engineer, measured in metres, rounded to one decimal place, measured end to end along the face of the railing and terminal section.

FORM 640

Measurement for payment for the supply and installation of Type "B" Guide Rail shall be the length of rail and terminal sections placed within the limits designated by the Engineer, measured in metres, rounded to one decimal place, measured end to end along one side only.

Where the guide rail structure is a composite of more than one type of guide rail installation, then measurement for payment shall be by the length of each type of guide rail installation making up the composite.

Measurement for payment for buried end sections will be by means of the number of buried end sections placed as directed by the Engineer.

640.06 BASIS OF PAYMENT

Payment at the contract price for the Supply and Installation of Guide Rail of a particular type shall be compensation in full for all labour, materials and equipment-use to: excavate post holes, supply and install all posts, anchors, rail sections, rail terminal sections, bolts, nuts, washers, spikes and nails, bend rail sections where required to a uniform radius, backfill post holes, compact backfill, dispose of surplus excavation material, trim posts, supply and apply wood preservative, install reflectors, clean, pre-treat, and coat steel rail with cold galvanizing compound where so required, all in accordance with this specification.

Payment at the contract price for the Supply and Installation of buried end sections shall be compensation in full for all labour, materials and equipment-use to: excavate post holes, supply and install posts, anchors, buried end sections, bolts, nuts, washers, spikes and nails, backfill post holes, compact backfill, dispose of surplus excavation material, trim posts, supply and apply wood preservative, install reflectors, clean, pre-treat, and coat steel rail with cold galvanizing compound where so required, all in accordance with this specification.

**SECTION 643****SALVAGE AND REINSTALLATION OF GUIDE RAIL****INDEX****643.01 SCOPE****643.02 ENVIRONMENTAL REQUIREMENTS****643.03 MATERIALS****643.03.01 Rail Sections and Rail Terminal Sections****643.03.02 Bolts, Nuts, Washers and Spikes****643.03.03 Signal Reflectors****643.03.04 Nails for Reflectors****643.03.05 New Posts and Anchors****643.03.06 Re-usable Posts and Anchors****643.03.07 Wood Preservative****643.04 DISMANTLING OF EXISTING GUIDE RAIL****643.05 REMOVAL AND SALVAGE OF EXISTING POSTS****643.06 BACKFILLING POST HOLES****643.07 INSTALLATION****643.08 MEASUREMENT FOR PAYMENT****643.09 BASIS OF PAYMENT****643.09.01 Basis of Payment for Salvage and Reinstallation of Guide Rail with New Posts****643.09.02 Basis of Payment for Salvage and Reinstallation of Guide Rail with Salvaged Posts****643.01 SCOPE**

This specification covers the requirements for the salvage of existing guide rail, including buried ends, terminal ends and hardware, and posts from one location, and the reinstallation of the guide rail at another location using either the salvaged rail, including buried ends, terminal ends and hardware and posts, or the salvaged rail including buried ends, terminal ends and hardware, and new posts.

643.02 ENVIRONMENTAL REQUIREMENTS

Guiderail posts located in Protected Water Supply areas shall only be chromated copper arsenate treated type.

643.03 MATERIALS**643.03.01 Rail Sections and Rail Terminal Sections**

Only salvaged rail sections, angled rail sections and rail terminal sections deemed acceptable by the Engineer shall be used in the re-assembly.

643.03.02 Bolts, Nuts, Washers and Spikes

All bolts, nuts and washers shall conform to the specifications of A.S.T.M. Designation A-307 or A-325, except that rail splice bolts shall be button headed.

FORM 643

Post bolts and splice bolts shall have shoulders of such shape and size that they fit into the bolt slots in the rails and thus prevent the bolt from turning.

Post bolts shall be 16mm diameter and 200mm long unless otherwise required. Post bolt washers for the back of the post shall be 45mm round and 4mm thick.

Bolts for anchors shall be 16mm diameter and 350mm long unless otherwise required and washers shall be 45mm round and 4mm thick.

Spikes for anchors shall be 125mm galvanized spikes.

Bolts, nuts washers and other fittings shall be hot-dip galvanized in accordance with the specification of A.S.T.M. Designation A-153.

The Contractor shall supply the bolts, nuts washers and spikes.

However, should any of the salvaged bolts, nuts and washers be suitable for re-use, then the Contractor may use these.

643.03.03 Signal Reflectors

Silver signal reflectors and yellow signal reflectors shall be of size 75mm x 100mm. The Department will supply both types of signal reflector free to the Contractor at the following district depots: White Hills in St. John's, Clarendville, Grand Falls, Deer Lake and Goose Bay.

643.03.04 Nails for Reflectors

Nails for securing signal reflectors, shall be supplied by the Contractor and shall consist of 30mm galvanized flat head nails.

643.03.05 New Posts and Anchors

Timber for new posts and anchors shall be sound, well seasoned structural grade lumber.

Only birch wood will be acceptable for new 150 x 150 guide rail posts. Hemlock or other approved species will be acceptable for 200 x 200 guide rail posts.

Posts shall have minimum dimensions of 150mm x 150mm x 2400mm, except in the particular case of posts to be used in Tender Items worded "Guided Rail with Additional Posts", as shown in Form 1282, in which case posts shall have minimum dimensions of 200mm x 200mm x 2400mm.

Anchors shall consist of either one piece of 150mm x 150mm x 450mm timber, or two pieces of 38mm x 140mm x 450mm lumber.

Posts and anchors shall be pressure treated with an acceptable wood preservative.

The minimum required depth of penetration of wood preservative shall be 13mm. To determine penetration, a borer core shall be taken from 20 pieces in each charge. If 80% of the borings meet the penetration requirements, the charge shall be accepted.

The minimum retention of preservative shall be as follows:

PRESERVATIVE	MINIMUM RETENTION	METHOD OF DETERMINATION
PENTACHLOROPHENOL	6.4 kg/m ³	BY ASSAY
CHROMATED COPPER ARSENATE	6.4 kg/m ³	BY ASSAY
OTHER	IN ACCORDANCE WITH CSA 080-M 89	

Incising will normally be required. However, this requirement will be waived if specifications for both penetration and retention are satisfied.

If requested by the Engineer, the Contractor shall provide penetration and retention test reports for the guide posts and guide rail posts supplied for the project.

Where the contract item is given as "Salvage and Reinstallation of Guide Rail with New Posts" then, the Contractor shall supply all the required wood preservative treated new posts and anchors.

643.03.06 Re-usable Posts and Anchors

Only salvaged posts and anchors deemed acceptable by the Engineer shall be used in the re-assembly, and then only if the contract item is given as, "Salvage and Reinstallation of Guide Rail with Salvaged Posts". Where the contract item is given as, "Salvage and Reinstallation of Guide Rail with New Posts" then, salvaged posts shall not be used.

643.03.07 Wood Preservative

Wood preservative for use in treating field cut ends of posts shall be of the same type and chemical composition as that used in the original treatment.

The Contractor shall supply the wood preservative.

643.04 DISMANTLING OF EXISTING GUIDE RAIL

The Contractor shall exercise care in dismantling and removing rails and terminal sections so that they are not damaged and remain suitable for re-use. The rails and terminal sections shall be transported to, and stored at, a secure storage site provided by the Contractor at this own expense, pending their re-assembly at a new location.

Should any material, designated for reinstallation, be damaged or lost by the Contractor, then the Contractor shall be charged with the costs of replacement with equivalent new material. Damaged material shall become the property of the Contractor and shall be disposed of.

643.05 REMOVAL AND SALVAGE OF EXISTING POSTS

The Contractor shall exercise care in excavating posts so that they are not damaged and remain suitable for re-use.

Where the contract item is given as, "Salvage and Reinstallation of Guide Rail with New Posts" then, the salvaged posts shall be transported to, and stored at, the nearest Department Depot.

However, should the contract item be given as, "Salvage and Reinstallation of Guide Rail with Salvaged Posts" then, the posts shall be transported to and stored at, a secure storage site provided by the Contractor at his own expense pending their re-use at a new location.

Should any post designated for salvage, be damaged or lost by the Contractor, then the Contractor shall be charged with the cost of replacement. Damaged posts shall become the property of the Contractor and shall be disposed of.

643.06 BACKFILLING POST HOLES

The Contractor shall backfill to the required grade using the excavated materials if suitable. Should the excavated material be unsuitable, or should there be insufficient suitable backfill material from the excavation, then the Engineer will direct that material from a cut or from a borrow area will be used to complete the backfilling.

Backfilling shall be placed in layers not exceeding 200mm in thickness loose measurement. Each layer shall then be compacted to the required compaction before a further layer is placed.

Backfill consisting of other material or other material borrow shall be compacted to not less than 95% of the Standard Proctor Density (ASTM D698-78).

In rock backfill material where Standard Proctor tests cannot be carried out, compaction shall be continued until a compaction is achieved that is equivalent to that obtained in a fill when there is no visible movement of fill under a vibrating vibratory compactor with vibratory roller of length not less than one decimal five metres.

The backfilled hole or trench shall be levelled and trimmed to provide slightly contours and adequate drainage.

643.07 INSTALLATION

The rail sections, buried end sections, terminal sections and posts shall be transported to the location where they are required.

FORM 643

Guide rail shall be placed to the lengths, lines and grades set by the Engineer. The guide rail shall be installed in accordance with the requirements of the drawing Section 1279 "Typical Guide Rail Installation Types", and Section 1280 "Guide Rail Standard Installation", except where directed otherwise by the Engineer.

An angled rail section shall be placed at each end of a run of guide rail unless directed otherwise by the Engineer.

The end post at an angled rail section shall have an anchor secured to the bottom of the post.

Where a 150mm x 150mm x 450mm timber anchor is used it shall be secured to the post by means of a galvanized nut and 16mm diameter bolt 350mm long together with two 45mm round 4mm thick galvanized washers.

Where a double 38mm x 140mm x 450mm lumber anchor is used it shall be secured to the post by means of four 125mm galvanized spikes.

Field boring and cutting to length of anchors will be permitted, provided that the hole is treated with two coats of wood preservative before driving the bolts and provided that the cut end is treated with two coats of wood preservative before burying.

Where the contract item is given as, "Salvage and Reinstallation of Guide Rail with Salvaged Posts" then, posts with the original anchors may be used provided that the anchor is sound. Should the anchor have been damaged during salvage then the Contractor shall replace the anchor on the post using new materials.

The Contractor shall excavate holes for the posts such that when placed in the holes the bottom of the posts are at least 1200mm below the ground surface.

Posts shall be set plumb and to the established lines and grades and shall be placed at 3810mm intervals, unless directed otherwise by the Engineer.

The posts shall be firmly backfilled with selected material, free of large rock, placed in layers of thickness not greater than 100mm. Each layer shall be thoroughly compacted before the next layer is placed. Should the backfill be dry then each layer shall be moistened before tamping.

All backfill shall be compacted to 95% of Standard Proctor Density (ASTM D698-78).

All surplus excavated material shall be disposed of along the sides of fill, or in other locations as directed by the Engineer.

The rails shall be secured to even lines such that the centre of the rail is 500mm above the edge of pavement.

The Contractor shall bore holes in the posts for the post bolts and treat the holes with two coats of wood preservative before driving the bolts.

Rail elements and terminal sections shall be lapped so that the exposed ends will not face approaching traffic.

The bolted connections of the rail element to the post shall be capable of withstanding a 22.5 kN pull at right angles to the lines of the railing.

When the attachment of the rail elements to the posts has been completed, the tops of the posts shall be cut to a point 75mm above the top of the rail as shown by Section 1279 "Typical Guide Rail Installation Types" and Section 1280 "Guide Rail Standard Installation". The tops of the posts shall be treated with two coats of wood preservative after cutting.

Signal reflectors shall be attached to posts at terminal sections, posts at the buried end sections, and to every post in a length of guide rail. Silver reflectors shall be placed facing oncoming traffic and yellow reflectors shall be placed on the opposite side except for divided highway. On divided highways, silver reflectors will be placed facing oncoming traffic on the outside shoulder and yellow reflectors will be placed facing traffic on the median shoulder.

The Contractor shall drill nail holes in the reflectors, bend the reflectors to the required shape and secure the reflectors with 30mm galvanized flat head nails as shown on drawing Section 1281 "Signal Reflectors on Guide Rail Post".

When reinstalling salvaged posts, the original reflectors shall be removed and new reflectors shall be attached.

643.08 MEASUREMENT FOR PAYMENT

Measurement for payment for the Salvage and Reinstallation of Guide Rail shall be the length of the reinstalled guide rail placed within the limits designated by the Engineer, measured in metres, rounded to one decimal place, measured end to end along the face of the railing and terminal sections.

643.09 BASIS OF PAYMENT**643.09.01 Basis of Payment for Salvage and Reinstallation of Guide Rail with New Posts**

Payment at the contract price for Salvage and Reinstallation of Guide Rail with New Posts, shall be compensation in full for all labour, materials and use of equipment to: dismantle the rail sections, transport the rail sections and terminal sections to a secure storage site provided by the Contractor at his own expense, store the rail sections, excavate and salvage the guide rail posts and transport them to the nearest Department Depot, backfill and compact the excavation, excavate holes for posts at the required new location, supply new preserved wood posts and anchors, transport the stored rail sections and rail terminal sections from the storage site to the place of installation, supply the bolts, nuts, washers and spikes, assemble and secure the anchors to the posts, assemble the guide rail to the required lines and grade, backfill post holes, compact backfill, dispose of surplus excavation material, trim posts, supply and apply wood preservative to cut ends and drill holes, and install reflectors.

643.09.02 Basis of Payment for Salvage and Reinstallation of Guide Rail with Salvaged Posts

Payment at the contract price for Salvage and Reinstallation of Guide Rail with Salvaged Posts, shall be compensation in full for all labour, materials and use of equipment to: dismantle the rail sections, excavate and salvage the guide rail posts, transport the rail parts and posts to a secure storage site provided by the Contractor at his own expense, store the rail parts and posts, backfill and compact the excavation, excavate holes for posts at the required new location, transport the stored rail parts and posts from the storage site to the place of installation, supply the bolts, nuts, washers and spikes, supply assemble, and secure new anchors where the original anchors are damaged, assemble the guide rail to the required lines and grade, backfill post holes, compact backfill, dispose of surplus excavation material, trim posts, supply and apply wood preservative to cut ends and drill holes, remove original reflectors, and install new reflectors.

FORM 645



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 645

SUPPLY AND INSTALLATION OF WOODEN GUIDE POSTS

INDEX

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645.01 SCOPE

This specification covers the requirements for the supply and installation of wooden guide posts.

645.02 ENVIRONMENTAL REQUIREMENTS

Guide posts located in Protected Water Supply areas shall only be chromated copper arsenate treated type.

645.03 MATERIALS

Wooden guide posts shall consist of a post with an anchor attached to the base as shown on the drawing Section 1285 "Wooden Guide Post".

Lumber for posts and anchors shall be sound, well seasoned structural grade lumber free from cracks and warp.

Only birch wood will be acceptable for the guide posts.

Posts shall be of 150mm x 150mm lumber. The length shall be approximately 2400mm.

Anchors shall consist of two pieces of 38mm x 89mm lumber each of length 450mm.

Posts and anchors shall be pressure treated with an acceptable wood preservative.

The minimum required depth of penetration of wood preservative shall be 13mm. To determine penetration, a borer core shall be taken from 20 pieces in each charge. If 80% of the borings meet the penetration requirements, the charge shall be accepted.

The minimum retention of preservative shall be as follows:

PRESERVATIVE	MINIMUM RETENTION	METHOD OF DETERMINATION
PENTACHLOROPHENOL	6.4 KG/M ³	BY ASSAY
CHROMATED COPPER ARSENATE	6.4 KG/M ³	BY ASSAY
OTHER	IN ACCORDANCE WITH CSA 080-M 89	

Incising will normally be required. However, this requirement will be waived if specifications for both penetration and retention are satisfied.

If requested by the Engineer, the Contractor shall provide penetration and retention test reports for the guide posts and guide rail posts supplied for the project.

Nails for attaching anchor pieces to the post shall consist of 100mm galvanized nails.

FORM 645

Nails to secure Department supplied reflectors, shall be 30mm galvanized flat head nails.

All materials, with the exception of the reflectors, shall be supplied by the Contractor. The Department will supply the silver signal reflectors and the yellow signal reflectors which will both be of size 75mm x 100mm.

645.04 ASSEMBLY AND INSTALLATION

Anchors shall be attached to the posts as shown on drawing Section 1285 "Wooden Guide Post". Each piece of 28mm x 89mm x 450mm lumber shall be nailed near its centre to the post so that the lower edge of the anchor is 30mm above the bottom of the post. Each piece shall be secured by means of two galvanized nails of length 100mm.

Should any piece of lumber become split or cracked during nailing, then the Contractor shall, at his own expense, replace the damaged piece with sound lumber.

Guide posts shall be placed at the locations as set by the Engineer. The Contractor shall excavate holes for the posts such that when placed in the holes the bottom of the posts are at least 1200mm below the ground surface.

The posts shall be set plumb, and firmly backfilled with selected material, free of large rock, placed in layers of thickness not greater than 150mm. Each layer shall be thoroughly compacted before the next layer is placed. Should the backfill material be dry, then each layer shall be moistened before tamping.

All surplus excavated material shall be disposed of along the sides of fill, or in other locations as directed by the Engineer.

The tops of the posts shall be cut to a point 1000mm above the edge of the pavement, as shown on drawing Section 1285 "Wooden Guide Post", or cut otherwise as directed by the Engineer.

The tops of the posts shall be treated with 2 applications of wood preservative as in Section 590, "Wood Preservation".

Signal reflectors shall be attached to the top of the guide posts, as shown on drawing Section 1285, "Wooden Guide Post".

The Contractor shall drill nail holes in the reflectors, bend the reflectors to the required shape and then secure the reflectors with 30mm galvanized flat head nails so that silver reflectors are placed facing on-coming traffic and yellow reflectors are placed on the opposite side except on divided highway. On divided highways, silver reflectors are to be placed facing oncoming traffic on the outside shoulder and yellow reflectors are to be placed facing oncoming traffic on the median shoulder.

645.05 MEASUREMENT FOR PAYMENT

Measurement for Payment will be by means of the number of completed new wooden guide posts placed at the required locations.

645.06 BASIS OF PAYMENT

Payment at the contract price for the Supply and Installation of Wooden Guide Posts shall be compensation in full for all labour, materials and equipment-use to: supply the posts, anchor, nails, and wood preservative, assemble the guide posts, excavate the post hole, install the post, backfill the hole, tamp the backfill, dispose of all surplus materials, trim the post, apply wood preservative to top of post and install the reflectors all in accordance with this specification.

FORM 705



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 705

LOCATION AND PLACEMENT OF SIGNS

INDEX

705.01 GENERAL

705.02 ADVANCE SIGNING

705.03 APPROACH SIGNING

705.04 BASIS OF PAYMENT

705.01 GENERAL

Three categories of signing are distinguished with regard to location of devices relative to work sites, namely, **Advance**, **Approach**, and **At Site**.

The work site as used in this Division is defined by the beginning of tapers or the work itself when delineation is not used.

705.02 ADVANCE SIGNING

This category includes all the signs used to give advance notice to road users of an activity or road obstruction ahead. Advance signs will be accompanied by a tab indicating the distance to the beginning of the work site.

These signs are normally required only when the work fully or partially closes a traffic lane. The distance between the first sign of this category and the work site shall be:

- a) On TCH or equivalent 450-1000m
- b) On rural roads other than TCH or equivalent 250-500m
- c) On urban streets 150-300m

In cases of shoulder work where advance signing may be desirable, the above mentioned distance may be reduced by one-half.

705.03 APPROACH SIGNING

This category includes the warning and regulatory signs placed in the immediate approach to the work site. They shall inform the road users of the nature of the activity or obstruction and indicate any required action. All the signs shall be placed in accordance with the following distance criteria:

1. The maximum distance between the last sign in the advance sequence and the first sign of the approach sequence shall be 700m.
2. The distance between two consecutive signs in the sequence is a function of the maximum regulatory speed limit and shall be:

50 KM/H OR LESS	50 M
60-70 KM/H	100 M
80 KM/H	150 M
90 KM/H AND TCH	150 M

3. Buffer zone distance from the last sign in the approach signing to the work site shall be as follows:

50 KM/H OR LESS	15 M
60-70 KM/H	50 M
80 KM/H	50 M
90 KM/H AND TCH	50 M

705.04 BASIS OF PAYMENT

All costs associated with temporary condition signing to standards as outlined in this Section shall be the responsibility of the Contractor. Cost of the signs, handling, installation, materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services and Transportation.

FORM 708



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 708 DELINEATION DEVICES

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708.01	APPLICATION
708.02	LOCATION OF DELINEATION DEVICES
708.03	SPACING OF DELINEATORS
708.04	DESIGN AND COLOUR
708.05	FORMS OF DELINEATORS
708.06	BASIS OF PAYMENT

708.01 APPLICATION

Delineation devices shall be used to channelize traffic when the traffic flow is impeded as a result of obstructions, work areas or a narrowing of the roadway. They form part of the general category called Traffic Control Devices and shall be used as a supplement to signs and barricades.

Where the temporary condition will exist during the hours of darkness, delineation shall be achieved by the use of construction markers, chevron markers, barricades, drums, traffic cones, flashing arrow light units, delineator posts, traffic candles or similar devices. In all cases, markers and barricades used to achieve delineation during the hours of darkness shall be retro-reflectorized using high intensity grade sheeting to show the same colour and shape by night as by day. Fluorescent paint shall NOT be used as a reflectorized substitute.

Delineator posts may be used to a maximum of 5 days, not extending over the weekend period. Extended use is possible only with the approval of the Director of Maintenance.

Traffic cones may be used where the temporary condition will exist during daylight hours only and where the roadway will be in its normal operating condition throughout the hours of darkness.

708.02 LOCATION OF DELINEATION DEVICES

Any construction or maintenance activity on or adjacent to a roadway, which requires that the normal roadway be reduced in effective width, shall be marked by delineators along the approaches to the work site. Delineation devices shall also be placed alongside the obstruction in order to guide the road user.

Any construction or maintenance activity on or within 1 m of a roadway shall be marked by delineators along the work site and the approaches to the work site or obstruction. The angle at which the delineators are placed across the closed portion of the road is called the taper and should vary according to the maximum regulatory speed as follows:

REGULATORY SPEED LIMIT	MINIMUM TAPER
50 KM/H AND LESS	30 M
60 TO 70 KM/H	60 M
80 KM/H	120 M
90 KM/H AND MORE	240 M

In 50, 60, or 70 km/h speed zones, taper lengths as noted above may be reduced to 25% of the minimum table value for utility truck operations where there is an approved flashing arrow board in operation on the utility vehicle.

If the work area affects more than one traffic lane width, each traffic lane shall be closed separately and a tangent section provided between

FORM 708

the two tapers. The minimum length of the tangent section shall be as follows:

REGULATORY SPEED LIMIT	MINIMUM TANGENT BETWEEN TAPERS
50 KM/H AND LESS	50 M
60 TO 70 KM/H	100 M
80 KM/H	150 M
90 KM/H AND MORE	240 M

708.03 SPACING OF DELINEATORS

The centre to centre distance between delineators varies with the regulatory speed for both tapers and tangents and shall be established as follows:

REGULATORY SPEED LIMIT	MAXIMUM CENTRE TO CENTRE SPACING
50 KM/H AND LESS	5 M
60 TO 70 KM/H	10 M
80 KM/H	15 M
90 KM/H AND MORE	15 M

708.04 DESIGN AND COLOUR

Delineators, with the exception of traffic cones and delineator posts, shall be designed with alternating striped orange and black colour placed in a horizontal position. Traffic cones shall be solid orange in colour. Delineator posts shall be orange in colour with two reflectorized white strips (75 mm) per post.

708.05 FORMS OF DELINEATORS

A number of forms of delineation may be used, as outlined in the following:

1. Construction Markers

Construction markers shall be of the dimension indicated. They shall be retro-reflectorized with high intensity grade orange reflective sheeting to indicate the same colour and shape by night as by day.

2. Chevron Markers

Chevron markers shall be used on tapers for detours and diversions. They shall replace the normal construction marker at a spacing of 30 m. The arrowhead shall point in the direction of the turn. They shall be retro-reflectorized using high intensity grade orange reflective sheeting to indicate the same color and shape by night as by day.

3. Barricades

Barricades shall be used to define the work area and to close streets and roads in the area where work is being carried out. Barricades shall be retro-reflectorized with high intensity orange reflective sheeting to indicate the same color and shape by night as by day.

Heavy barricades shall be used to provide complete road or lane closures for periods in excess of 5 days in length.

4. Drums

Flexible drums used to channelize or delineate traffic shall be a minimum of 1000 mm in height and a minimum of 550 mm in diameter at the base. The markings on the flexible drums shall be horizontal, circumferential alternating black and reflectorized orange strips each being 100 mm in width.

All drums will not be of a construction that creates a hazard to vehicles and must be approved by the Engineer.

5. Traffic Cones

The dimensions of traffic cones should be related to the maximum speed on the roadway and their height shall comply with the following minimum requirements.

MAXIMUM SPEED KM/H	MINIMUM HEIGHT (MM)
50 OR LESS MORE THAN 50	450700

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6. Flashing Arrow Light Units

For highways with a speed limit of 90 km/h or more, detours and diversions that are anticipated to be in place for 15 days or more shall have a flashing arrow light trailer unit located within each taper where there is a lane drop situation or where the speed limit is reduced in excess of 20 km/h. The arrow board shall be a minimum of 1200 mm long by 600 mm high and shall be of a type and design approved by the Engineer.

7. Delineator Posts / Candles

Delineator posts / Candles used to channelize or delineate traffic shall be 1100 mm in height and 100 mm in diameter. The markings consist of two white high intensity reflective bands 75 mm in width. Unit is weighed down with a standard 7kg rubber base. Extra 7kg base inserts can be used when required by wind conditions.

708.06 BASIS OF PAYMENT

All costs associated with temporary condition signing to standards as outlined in this Section shall be the responsibility of the Contractor. Cost of the signs, handling, installation, removal, asphalt reinstatement and / or repair, materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services, and Transportation.



SECTION 710

WORK SITE SIGNAGE, BARRICADES AND DELINEATION DEVICES

INDEX

- 710.01 APPLICATION
- 710.02 LOCATION OF DELINEATION DEVICES
- 710.03 SPACING OF DELINEATORS
- 710.04 FORMS OF DELINEATORS AND BARRICADES
- 710.05 BASIS OF PAYMENT

710.01 APPLICATION

Delineation devices shall be used to channelize traffic when the traffic flow is impeded as a result of obstructions, work areas or a narrowing of the roadway. They form part of the general category called Traffic Control Devices and shall be used as a supplement to signs and barricades.

Where the temporary condition will exist during the hours of darkness, delineation shall be achieved by the use of construction markers, chevron markers, barricades, drums, traffic cones, flashing arrow light units, delineator posts, traffic candles or similar devices.. In all cases, markers and barricades used to achieve delineation during the hours of darkness shall be retro-reflectorized using high intensity grade sheeting to show the same colour and shape by night as by day. Fluorescent paint shall **NOT** be used as a reflectorized substitute.

Traffic cones may be used where the temporary condition will exist during daylight hours only and where the roadway will be in its normal operating condition throughout the hours of darkness.

710.02 LOCATION OF DELINEATION DEVICES

Any construction or maintenance activity on or within 1m of a roadway shall be marked by delineators along the work site and its approaches. Along the approaches to the work site, or obstruction, the angle at which delineators are placed is called the taper. The taper varies according to the maximum regulatory speed limit as follows:

REGULATORY SPEED LIMIT	MINIMUM TAPER
50 KM/H OR LESS	30 M
60-70 KM/H	60 M
80 KM/H	120 M
90 KM/H AND T.C.H.	240 M

If the work area affects more than one traffic lane width, each traffic lane shall be closed separately and a tangent section provided between two tapers. The minimum length of the tangent section shall be as follows:

REGULATORY SPEED LIMIT	MINIMUM TANGENT
50 KM/H OR LESS	50 M
60-70 KM/H	100 M
80 KM/H	150 M
90 KM/H AND T.C.H.	240 M

710.03 SPACING OF DELINEATORS

The centre to centre distance between delineators varies with the regulatory speed limit for both tapers and tangent sections and shall be established as follows:

REGULATORY SPEED LIMIT	MINIMUM SPACING
50 KM/H OR LESS	5 M
60-70 KM/H	10 M
80 KM/H	15 M
90 KM/H AND T.C.H.	15 M

Where delineation is required in excess of 600m on a construction zone, spacing may be increased to 50m.

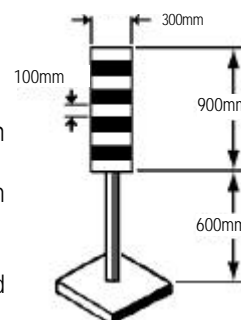
710.04 FORMS OF DELINEATORS AND BARRICADES

A number of forms of delineation may be used as outlined in the following.

11. Construction Markers

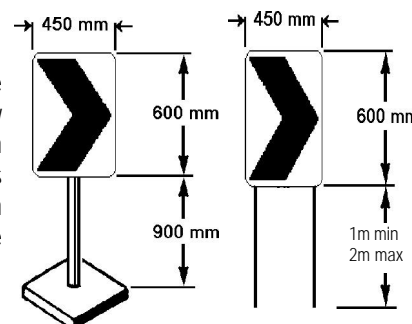
Construction Markers shall be of the dimensions indicated. They shall be retro-reflectorized using high intensity grade orange reflective sheeting to indicate the same colour and shape by night as by day. Where Construction Markers are required for a distance of greater than 300m the use of 225 mm x 600 mm markers is permissible.

Some markers may require a weight to keep them from being knocked down or blown over. Only approved sand bags will be permitted and the use of rocks or boulders will not be considered.



2. Chevron Markers

Chevron Markers shall be used on tapers for detours and diversions. They shall replace the normal construction marker at a spacing of every 30 m from the start of the taper. The arrow head shall point in the direction of the turn. They shall be retro-reflectorized using high intensity grade orange reflective sheeting to indicate the same colour and shape by night as by day. Some markers may require a weight to keep them from being knocked down or blown over. Only approved sand bags will be permitted and the use of rocks or boulders will not be considered.



Where traffic has to be diverted or channelized to cross multi-lanes of paved surfaces, delineator devices, such as hazard markers and chevrons, shall be installed as outlined in this section.

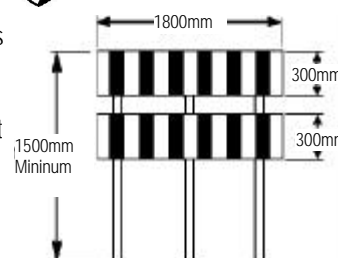
Signs 450mm in width, or greater may also be installed two pieces of 25 mm rebar to a height of 1 m to 2 m above the travelled portion of the roadway to the bottom edge of the sign.

3. Barricades

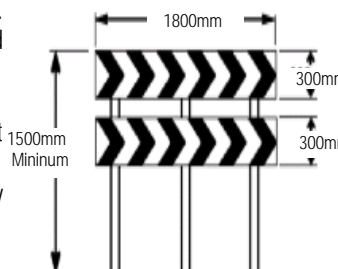
For reasons of traffic safety and for the protection of workers, barricades shall be used to define the work area. Such protection is considered a part of the temporary signing arrangement. Barricades shall also be used to close streets or roads in the area where the work is being carried out.

Barricades are always placed immediately preceding the work area in the approach side and act as a physical barrier between the road user and the obstruction or activity. These barricades shall be reflectorized or illuminated to indicate the same colour and shape by night as by day. The use of fluorescent paint on barricades shall not be considered.

All barricades shall have a retro-reflective high intensity grade orange and black face meeting the approval of the Engineer.

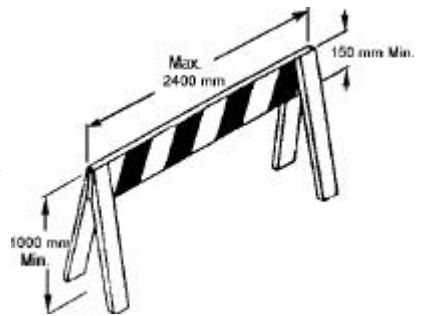


HEAVY BARRICADE



HEAVY BARRICADE
(DIRECTION OF TRAFFIC
INDICATED BY ARROW)

Heavy barricades shall be used to provide complete closure of a road or lane for an extended period of longer than five days. Their supports shall consist of posts set in the ground with two TC-64C heavy barricade faces attached as shown. Where no direction is required, barricade TC-64B shall be used, as shown.



LIGHT BARRICADE

Light barricades shall be used for works of short duration to provide closure of a traffic lane or roadways or blocking off road excavation sites or other work site hazards. Light barricades shall not be used as a channelized device. The use of fluorescent paint on light barricades shall not be considered. (TC-64A sign is required on each light barricade).

4. Drums

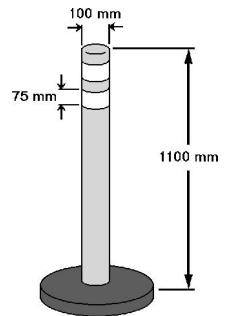
Drums are normally 200 litres capacity set on end and used as delineators. Drums shall be reflectorized to indicate the same colour and shape by night as by day. The drums are to be predominantly orange, not fluorescent, but a minimum of two white reflectorized strips (100 mm width minimum) per drum are required.

Flexible drums may be used as an alternative method to channelize or delineate flow and shall be approximately 1000 mm in height and a minimum of 550 mm in diameter at the base. The markings on the flexible drums shall be horizontal, circumferential alternating black and reflectorized orange strips.

All drums should not be of a construction which creates a hazard to vehicles and must be approved by the Engineer.

5. Delineator Posts

Delineator posts used to channelize or delineate traffic shall be 1100 mm in height and 100 mm in diameter. The markings consist of two white high intensity reflective bands 75 mm in width. Unit is weighed down with a standard 7kg rubber base. Extra 7kg base inserts can be used when required by wind conditions.



6. Traffic Cones

The dimensions of traffic cones should be related to the maximum speed on the roadway and their height shall comply with the following minimum requirements.

MAXIMUM SPEED KM/H	MINIMUM HEIGHT (MM)
50 OR LESS	450
MORE THAN 50	700

The use of traffic cones is only permitted during hours of daylight.

7. Flashing Arrow Light Units

For highways with a speed limit of 90 km/h or higher, detours and diversions that are anticipated to be in place longer than fifteen days shall have a flashing arrow light trailer unit located within each taper length where either of the following conditions exist:

1. Lane drop situation.
2. Speed limit reduction of more than 20 km/h from the existing posted speed limit.

The arrow board shall be a minimum size, 1200mm in width by 600mm high, and shall be of a type and design as approved by the Engineer.

710.05 BASIS OF PAYMENT

All costs associated with temporary condition signing and equipment as outlined in this Section shall be the responsibility of the Contractor. Cost of the signs, handling, installation, materials removal, asphalt reinstatement and / or repair and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services and Transportation.

FORM 713



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 713

MISCELLANEOUS WARNING DEVICES

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- 713.01 APPLICATION
- 713.02 TRUCKS WITH FLASHERS
- 713.03 MISCELLANEOUS
- 713.04 PORTABLE LANE CONTROL SIGNALS
- 714.05 BASIS OF PAYMENT

713.01 APPLICATION

Under certain conditions, as outlined, in the following section a number of other warning devices, including the following, may be used to augment the standard devices outlined in the preceding Sections

713.02 TRUCKS WITH FLASHERS

Trucks with flashers may be used as a replacement for normal signing, in some cases, where the work site is of a very temporary nature and its location changes on a continuing basis. In such instances, the truck shall be equipped with a rotating amber flasher mounted on its roof, and standard four-way flashers. This vehicle shall display a bumper, a minimum of 250 mm wide, with alternate orange and black strips at 45° and shall be equipped with the appropriate sign to properly guide vehicles approaching from the rear. The bumper and the sign shall be reflectorized to indicate the same shape and colour by night as by day.

713.03 MISCELLANEOUS

Other miscellaneous traffic control devices, such as flares, flashlights, floodlights, lanterns, etc., may be used, as required, to supplement the signs and other devices described in this section. In all cases, the approval of the Engineer is required.

713.04 PORTABLE LANE CONTROL SIGNALS

With the prior approval of the Department of Works, Services and Transportation, portable lane control signals may be used in lieu of flagpersons to alternate traffic past a work area. Head Office Maintenance Division shall be advised at least four weeks before application in each case of the intent to use this device.

The user will be required to adjust the timing to the approval of the Director of Maintenance.

Portable signals shall be used only under conditions where the lights are clearly visible to an approaching motorist such that the vehicle can be brought to a safe stop at any approach speed. Intensity of the signal lamps shall be maintained in such a manner that the lights are clearly visible for a distance of at least 500 metres.

It is essential that these devices be removed immediately when conditions no longer require their use.

713.05 BASIS OF PAYMENT

All costs associated with temporary condition signing and equipment as outlined in this section shall be the responsibility of the Contractor. Cost of the signs, handling, installation, removal, asphalt reinstatement and / or repair materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services and Transportation.



SECTION 715

FLAGPERSON OPERATIONS

INDEX

715.01 SCOPE

715.02 FLAGPERSON EQUIPMENT

715.03 FLAGPERSON ADVANCE SIGN

715.04 GENERAL GUIDELINES

715.05 FLAGPERSON REQUIREMENTS

715.06 BASIS OF PAYMENT

715.01 SCOPE

Under certain conditions, construction or maintenance activity on or along a roadway may require the use of a flagperson to expedite the work and to safely guide motorists through the work site area. The following sections specify the appropriate equipment, signs, and usage of flagpersons under such circumstances. The final decision as to the use of flagpersons shall be as directed by the Engineer.

715.02 FLAGPERSON EQUIPMENT

The flagperson shall wear a safety jacket or vest, safety boots (CSA Grade 1), safety headgear, and should be equipped with a flagperson's "STOP" and "SLOW" reflectorized sign (minimum size 450 mm x 450 mm). For night operation, the flagperson should have a red signalling baton flashlight to supplement the diamond sign.

715.03 FLAGPERSON ADVANCE SIGN

Except for very brief emergency situations "Flagperson Ahead" (TC-21) signs shall be posted in advance of each flagperson. It shall be of a design as shown in the "Uniform Traffic Control Devices of Canada Metric Edition". It shall be retro-reflectorized with high intensity grade sheeting to indicate the same colour and shape by night as by day.

For the hours of daylight only the use of flagperson signs using a sign blank of plastic or other roll-up material made from retro-reflective sheeting will be permitted. All roll-up signs are subject to the approval of the Engineer or the Director of Maintenance.

All advance flagperson signage shall be removed or covered promptly when the flagging operations are terminated from a construction work zone for any period of time. Signage left up will be expropriated by the Department of Works, Services and Transportation.

715.04 GENERAL GUIDELINES

Flagpersons should be highly visible. For this reason, they must stand alone, never permitting a group of workers to congregate around them.

Flagpersons working as a team shall agree on communication signals before commencing their duties. If the flagpersons are not visible to one another, two-way radios are necessary to ensure proper communications and directing of traffic.

No flagperson shall start working unless all required advance flagperson signs are in place. No other construction signs shall be located between the flagperson position and the advance flagperson signage.

The flagperson is not permitted to use a radio, tape player or any other device which impairs sight, hearing, or attention while working.

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At no time are flagpersons permitted to use flags to control traffic.

No flagperson shall leave their post unless authorized to do so or replaced by another flagperson. As long as traffic cannot flow freely, even at mealtime, the flagperson must stay on duty.

Flagpersons should stand just outside the lane of traffic at a point from the end of the working area so as to be able to protect personnel and equipment. The distance from the flagperson to the work site shall be 10 m for every 10 km/h of normal speed limit.

Flagpersons and equipment operators working at that location are to make every effort to keep delays to motorists to a minimum. In heavy traffic, delays should be split equally between the opposing lanes of traffic and in normal operations, no more than eight vehicles in one direction can be kept waiting. At all times priority shall be given to the motorist to proceed through the construction zone. Flagpersons not following these guidelines shall be dismissed from the work site.

When the flagperson leaves their position at the end of operation on a work zone, the Contractor must remove or cover all applicable advance flagperson signage.

715.05 FLAGPERSON REQUIREMENTS

Any maintenance or construction job which results in lane blockage requires traffic control, usually in the form of flagpersons. The following construction situations shall be used as guidelines in the deployment of flagpersons:

- (a) At least one flagperson shall be provided on local roads when the traffic flow in one direction is diverted wholly or partially into the lane of oncoming traffic and the lane of oncoming traffic is clearly visible beyond the one lane section for the distance as shown in Table 715.05.01 for the appropriate speed limit.

TABLE 715.05.01

MAX SPEED	CLEAR VISIBILITY REQUIRED IN EACH DIRECTION
80 KM/H	230 M
70 KM/H	200 M
60 KM/H	170 M
50 KM/H	140 M
40 KM/H	110 M

- (b) At least two flagpersons shall be provided on local roads when the traffic flow in one direction is diverted wholly or partially into the lane of oncoming traffic and the lane of oncoming traffic is not clearly visible beyond the one lane section as noted in Table 715.05.01.
- (c) The Engineer may, where the normal traffic volume on a local road is less than fifteen vehicles per hour, reduce the flagperson requirements.
- (d) At least two flagpersons shall be provided on collector and arterial roads when the work activities require the traffic flow in one direction to be diverted either wholly or partially into the lane of oncoming traffic.
- (e) At least two flagpersons shall be provided when the traffic flow in both directions is diverted from the normal vehicle path onto a one lane section. Where traffic flow in both directions is diverted from the normal vehicle path onto a two lane section, the use of a flagperson is not required. Traffic flow may be safely regulated through the area by the proper use of construction signs.
- (f) At least two flagpersons shall be provided to direct traffic at a major detour. These flagpersons must be located at each end of the detour and must be familiar with the area of the detour route. Extended operations of a detour will require public advertising and detour signs along the complete detour route in place of the flagpersons.
- (g) At least two flagpersons are required / shall be provided at truck entrances/exits on arterial roads when the truck traffic entering or exiting the access road is in excess of ten vehicles per hour.
- (h) At least two flagpersons are required / shall be provided at truck entrances/exits on collector and local roads with a normal traffic volume of fifty vehicles per hour on the through road and when the truck traffic entering and exiting the access road is in excess of ten vehicles per hour.

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- (i) At least three flagpersons shall be provided, positioned as shown in Section 750 (form 757-1 and 757-2), on collector and arterial roads when the work activities require the traffic flow in one direction to be diverted either wholly or partially into the lane of oncoming traffic and when the horizontal and/or vertical alignment at the work site does not have the distance of clear visibility required in Table 715.05.01.
- (j) At least one flagperson shall be provided on arterial roads which have two lanes of one-way traffic and traffic volumes in excess of one hundred vehicles per hour where the work activities require one lane be closed at the work site.
- (k) The use of a flagperson is not required on sections of new highway which are not open to public use.
- (l) At least one flagperson shall be provided on a temporary bridge by-pass of one lane width. At locations where portable traffic lights are in operation, the use of a flagperson is not required. At a two lane by-pass, the use of a flagperson is not required as traffic flow may be safely regulated through the area by the proper use of construction signs.

715.06 BASIS OF PAYMENT

Refer to "Wages of Flagperson", Section 125.



SECTION 717 CONSTRUCTION SPEED ZONES

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717.01	SCOPE
717.02	GENERAL INFORMATION
717.03	SPEED SIGNS
717.04	GUIDELINES FOR SPEED LIMITS
717.05	BASIS OF PAYMENT

717.01 SCOPE

Construction Speed Zones will be established on all construction projects or portions of projects requiring traffic control.

717.02 GENERAL INFORMATION

Speed limits must reflect the road conditions in existence at the time. Signs must be removed or altered immediately when the condition changes. When the road condition does not warrant reduced speed during non-working periods, overnight, or weekends, the signs shall be removed or covered.

On a divided highway, if construction involves only one side of the highway, the speed limit will be lowered in the affected direction of travel only and will remain unaltered in the opposite direction.

Where the geometrics of the roadway are not reduced but public traffic is required to mingle with heavy equipment or like operations, a combination of construction signage and proper flagging procedures may be adequate provision for the safe passage of traffic and reduced speed limit signage may not be necessary.

Signing of the total length of construction projects by reduced speed limit will not be permitted. The only acceptable method for speed signing is to have each work zone individually considered, based on the general geometric conditions of the work site.

There are many types of maintenance and construction projects where a reduction of the normal speed limit is not required. If a good reason for reducing the existing speed exists, weather or not it is readily apparent to the motorist, then he should be informed of the reason for a speed reduction through the use of advance construction signs at the work site. The use of speed limit signs by themselves will not be permitted.

All existing speed limit signs within the reduced speed zone shall be removed or covered while the temporary speed limit is in effect.

717.03 SPEED SIGNS

All speed limits indicated on these signs shall be in 10 km/h increments.

The Maximum Speed Ahead signs shall be placed 150 m to 250 m in advance of a construction speed sign where the speed reduction is more than 10 km/h.

Where the Maximum Speed Ahead sign is positioned in advance of normal temporary condition signage an advance "Construction Ahead" sign must be installed ahead of the maximum speed ahead sign.

At the end of the construction zone, which has a reduced speed limit posted, the Contractor shall have a speed limit sign posted indicating a return to the normal speed limit on that particular section of highway. This sign may be omitted if there exists a permanently installed speed limit sign exists within 300m of the end of the reduced speed zone.

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Reduced speed limit signs left in place or not adequately covered when the work zone condition does not warrant any reduction will be expropriated by the Department of Works, Services and Transportation.

717.04 GUIDELINES FOR SPEED LIMITS

The recommended speed limits shown in Table 717.04.01 are provided for geometrics only and judgment must be used to adjust these speeds depending on the surface conditions, the proximity and numbers of workers, equipment, and type of obstruction to the through traffic.

TABLE 717.04.01

CONSTRUCTION ZONE SPEED LIMIT	SIGHT DISTANCE IN EACH DIRECTION
90 KM/H	280 M OR GREATER
80 KM/H	230 M TO 279 M
70 KM/H	200 M TO 229 M
60 KM/H	170 M TO 199 M
50 KM/H	140 M TO 169 M
40 KM/H	110 M TO 139 M
30 KM/H	LESS THAN 109 M

20 km/h speed zones may only be established with the approval of the Engineer.

Chip Seal projects shall have 20 km/h as the posted speed limit for the length of the construction project. This speed limit shall remain in effect until such time as the problem of flying aggregate at higher speeds is minimal.

All posted speed limits through construction zones must have prior approval from the Engineer on the construction project.

717.05 BASIS OF PAYMENT

All costs associated with provision and maintenance of construction speed zones to standards as outlined in this section including costs of the signs, handling, installation, materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services and Transportation.

FORM 720



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 720 PROJECT SIGNS

INDEX

720.01	SCOPE
720.02	TYPES OF SIGNS
720.03	HANDLING AND ERECTION OF SIGNS
720.04	REMOVAL OF SIGNS
720.05	BASIS OF PAYMENT

720.01 SCOPE

On all construction projects undertaken for the Department of Works, Services and Transportation, the Contractor shall be responsible for erecting two project signs at each work site included in the project, one at each end of the work site, in a location approved by the Engineer.

720.02 TYPES OF SIGNS

The Department of Works, Services and Transportation produces two different types of project signs for use on construction projects:

1. On Provincially funded projects two Provincial signs, 1200mm x 2400mm, each shall be erected.
2. On federally funded projects two Transport Canada signs, 2400mm x 3600mm, each shall be erected.

720.03 HANDLING AND ERECTION OF SIGNS

These project signs can be picked up by the Contractor at either of the following Department of Works, Services and Transportation depots: White Hills (St. John's), Clarenville, Grand Falls-Windsor or Deer Lake.

These signs shall be erected and installed by the Contractor using proper methods and materials as required for the size of the project signs used, as outlined in Section 580, sign post installations.

After the sign posts are firmly in the ground, the Contractor shall affix the sign to the posts using 9mm x 75mm galvanized lag screws.

720.04 REMOVAL OF SIGNS

After the project is completed, these signs and posts shall be removed by the Department of Works, Services and Transportation without claim from the Contractor.

720.05 BASIS OF PAYMENT

Project signs shall be supplied by the Department of Works, Services and Transportation at no charge to the Contractor. However, all handling charges from the depots previously mentioned, to the project and all installation costs for all required project signs shall be the Contractor's responsibility, and no payment shall be considered by the Department of Works, Services and Transportation.

FORM 730



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 730

PROCUREMENT AND COST OF SIGNAGE (TEMPORARY)

INDEX

730.01 SCOPE

730.02 COST

730.03 PROCUREMENT OF SIGNS

730.01 SCOPE

As previously stated in Section 701.02 no construction work will be permitted to commence until all traffic control devices are erected in position, as shown in this Division and approved by the Engineer.

730.02 COST

All costs associated with temporary condition signing to standards as outlined in Division 7 shall be the responsibility of the Contractor. Costs of the signs, handling, installation, materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Works, Services, and Transportation. Project signs shall be supplied by the Department of Works, Services, and Transportation at no charge to the Contractor. However, all handling charges from the depots listed in Section 720 to the project and all installation costs for the project signs shall be the Contractor's responsibility.

730.03 PROCUREMENT OF SIGNS

Temporary Condition signs described in this Division can be purchased from the Department of Works, Services, and Transportation, Sign Shop, White Hills, St. John's.

Orders for signs shall be placed through the Engineer who will complete the sign requisition to Department requirements and verify that the correct signs are being used.

Purchase price for signs will be approximately \$110 per m² excluding sales taxes, subject to change without notice.

Contractor's sign orders must include a purchase order number, certified cheque, or money order made payable to the Newfoundland Exchequer Account.

FORM 750



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

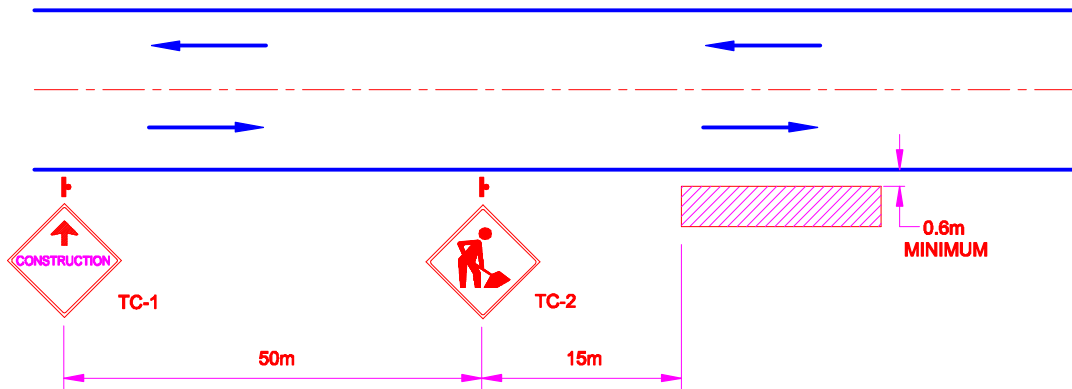
SECTION 750 TYPICAL APPLICATIONS

This Section is composed of several examples of signing arrangements for typical work areas.

The drawings showing examples of the various signing arrangements contained in this book are listed as follows -

FORM	PAGE
750	Work Adjacent to Roadway
	Urban Streets - Two Lanes
	Rural Roads and TCH - Two Lanes
	TCH or Equivalent
751	Work at Edge of Roadway
	Roads Other than TCH
	TCH or Equivalent
752	Lanes Closed
	One Lane Closed
	One Lane Closed - Low Traffic Volume
	One Lane Closed - Slow Moving Operations
	One Lane Diversion on Bridge
	Center Lane Closed
753	Successive Work Areas
754	Roadside Diversion
	Less than 90 km/h
	90 km/h Left Side
	90 km/h Right Side
755	Detour
	Without Flagperson
	With Flagperson
756	Delineation
	Complete Lane Closure - 2 Lane / 2 Direction Highway
	Complete Lane Closure - Without Obstruction to Opposing Traffic
	Complete Lane Closure - Diversion of Both Lanes
757	Positioning of Flagperson
	Straight Road - Curve
	Hill
758	Pavement Drop Off

URBAN STREETS
TWO LANES
TWO WAY TRAFFIC
(SPEED LIMIT 50 km/h OR LESS)



LEGEND	
	Work Area
	Sign
	Delineator
	Barricade

REQUIRED SIGNS FOR LAYOUT	
SIGN	QUANTITY
TC-1	1
TC-2	1



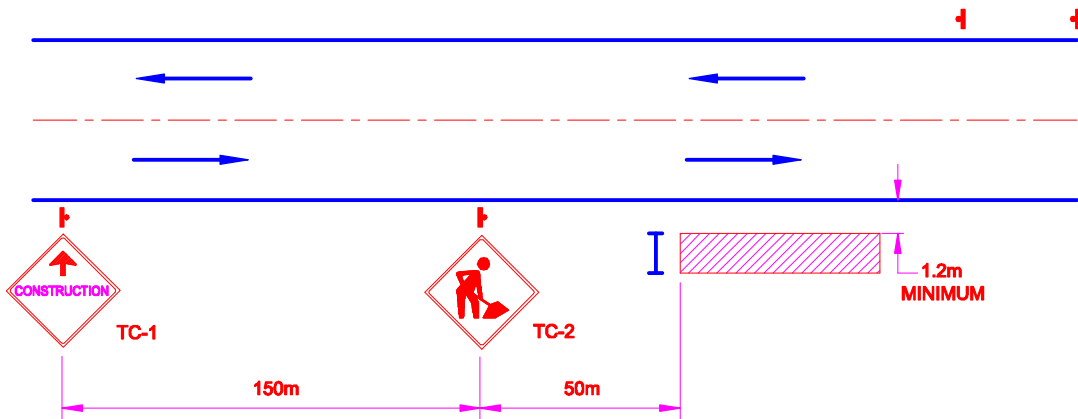
GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
DEPARTMENT OF WORKS,
SERVICES AND TRANSPORTATION
HIGHWAY DESIGN DIVISION

WORK ADJACENT TO ROADWAY

DRAWN BY: D. A. DATE: 02-01-17 SCALE: N.T.S.

RURAL ROADS AND T.C.H. OR EQUIVALENT TWO LANES TWO WAY TRAFFIC

NOTE:
WHERE THE SPEED IS LESS THAN 70
km/h, SIGNS ARE NOT REQUIRED ON
THIS SIDE. ALSO, SIGN SPACING IS
TO BE REDUCED TO 100m.



LEGEND	
	Work Area
	Sign
	Delineator
	Barricade

REQUIRED SIGNS FOR LAYOUT	
SIGN	QUANTITY
TC-1	2
TC-2	2
TC-64A BARRICADE (20 x 240)	1



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
DEPARTMENT OF WORKS,
SERVICES AND TRANSPORTATION
HIGHWAY DESIGN DIVISION

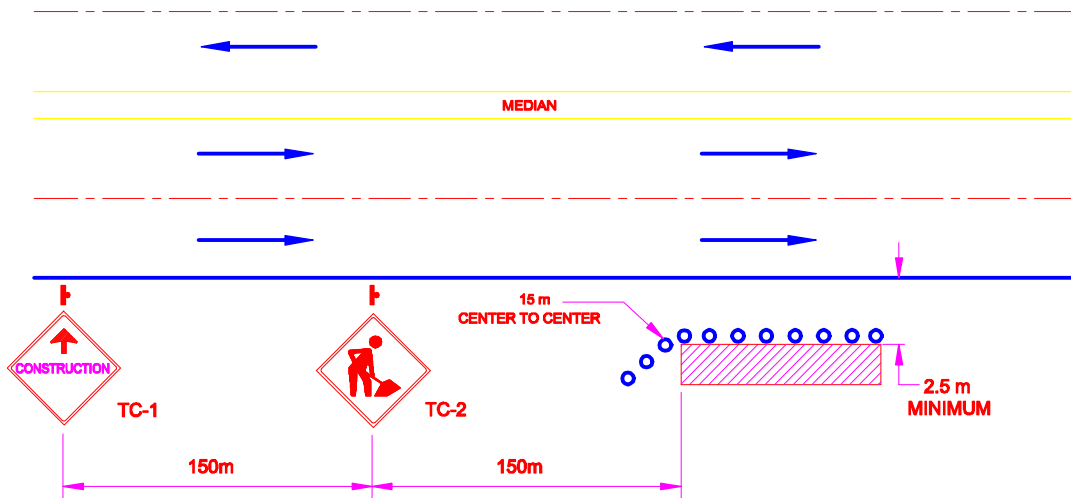
WORK ADJACENT TO ROADWAY

DRAWN BY: D. A.

DATE: 02-01-17

SCALE: N.T.S.

T.C.H. OR EQUIVALENT
TWO LANES
ONE WAY TRAFFIC



LEGEND	
	Work Area
	Sign
	Delineator
	Barricade

REQUIRED SIGNS FOR LAYOUT	
SIGN	QUANTITY
TC-1	1
TC-2	1
TC-62	11 APPROX.



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
DEPARTMENT OF WORKS,
SERVICES AND TRANSPORTATION
HIGHWAY DESIGN DIVISION

WORK ADJACENT TO ROADWAY

DRAWN BY: D. A. DATE: 02-01-17 SCALE: N.T.S.



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 801
OWNER'S POLICY

801 OWNER'S POLICY

To ensure protection of the environment, the work at all times shall be subject to inspection by the staff of relevant municipal, provincial and federal agencies. Normally, all inspections other than by the Engineer will be arranged in advance through the Engineer. Any specific matters relating to environmental protection will be dealt with between the Contractor and the Engineer.

Any violations of environmental permits or authorizations or any environmental related incidents which are observed by inspectors representing regulatory agencies are to be reported by them prior to leaving the site to the Engineer. Except in emergency situations, environmental protection measures required by other agencies must be approved by the Engineer prior to implementation by the Contractor.

**SECTION 805****CONTRACTOR'S RESPONSIBILITIES - REGULATORY AGENCIES**

The Contractor shall ensure that its employees, Sub-contractors and their employees, machinery and equipment operators, and truckers comply with the conditions of the contract and with all applicable environmental laws, regulations, permits, and requirements of federal, provincial and municipal authorities, and such other rules and regulations as the Owner may establish.

Contractors, Subcontractors and their personnel shall not harass wildlife or waterfowl or unduly disturb fish. Any contravention of environmental requirements, including employee actions accidental or otherwise, resulting in environmental damage shall be reported to the Engineer without delay.

The Contractor may be required to obtain all or some of the following permits where such are required:

MAJOR REGULATORY APPROVALS BY TYPE AND AGENCY

<u>TYPE OF PERMIT</u>	<u>AGENCY</u>
1. Stream Crossing Authorizations	Department of Fisheries and Oceans
2. Wood Cutting/Clearing	Forestry Division, Department of Forest Resources and Agrifoods
3. Burning Permit	Forestry Division, Department of Forest Resources and Agrifoods
4. Fuel Storage/ Handling	Government Services Center, Department of Government Services and Lands
5. Water Supply/ Sewage Disposal	Government Services Center, Department of Government Services and Lands
6. Asphalt Plants	Government Services Center, Department of Government Services and Lands
7. Solid Waste Disposal	Local Municipal Authority
8. Quarry or Pit Operations	Mineral Lands Division, Operations Department Of Mines and Energy
9. Structures at Navigable Waters	Canadian Coast Guard, Department of Fisheries and Oceans
10. Herbicide Application	Pesticide Control Branch Department of Environment
11. Stream Crossings(designed by the Contractor)	Water Resources Division Department Of Environment

The Contractor shall obtain all other permits and approvals which may be necessary to comply with government laws and regulations. Prior to the commencement of specific work elements, the Contractor shall immediately provide the Engineer with two copies of all permits.



SECTION 815

PROTECTION OF WATERCOURSES AND WATER BODIES

INDEX

815.01	SCOPE
815.02	LEGISLATIVE REQUIREMENTS
815.03	FORDING OF WATERCOURSES
815.04	CLEARING AND/OR GRUBBING ADJACENT TO WATERCOURSES
815.05	GENERAL PROCEDURES FOR INSTALLING WATERCOURSE CROSSINGS
815.06	USE OF FRESH CONCRETE IN OR NEAR BODIES OF WATER
815.07	CONTROL AND TREATMENT OF SILTED WATER
815.08	FILL PLACEMENT AT WATER BODIES

815.01 SCOPE

This specification covers the environmental requirements for work being carried out at watercourses and water bodies. It includes references to Federal and Provincial Legislation and prescribed methods and procedures to employ when carrying out such work as culvert or bridge installations, stream diversions, fording, fill placement at water bodies, and any other work which may alter or impact any watercourse or water body, or the quality of the water therein.

815.02 LEGISLATIVE REQUIREMENTS

The Contractor shall be aware of all Federal and Provincial Legislation governing the protection of watercourses and water bodies and all revisions and amendments to this legislation.

815.02.01 PROTECTION OF INLAND FISHERIES ENVIRONMENT

All permanent or temporary works or undertakings which are proposed for watercourses or water bodies constituting fish habitat require authorization from the Fish Habitat Management Branch of the Department of Fisheries and Oceans Canada at least two weeks prior to the commencement of any work. The Contractor is required to obtain such approval and provide the Engineer with two copies prior to any work.

Application forms for authorization for works or undertakings affecting fish habitat are available at Department of Fisheries and Oceans Canada offices located at St. John's, Grand Bank, Grand Falls, Goose Bay, and Corner Brook.

Contractors are referred to the Department of Fisheries and Oceans Canada publication entitled "Resource Road Construction - Environmental Guidelines and Design Criteria", latest edition, (and to other technical information). The DFO "Fact sheets" contain recommended guidelines for culvert installations, road and bridge construction, and other works. They include mitigative measures and procedures intended to assist Contractors in minimizing impacts on fish and fish habitat.

Contractors are advised that Environmental and Fisheries regulations require that any work done in or near a watercourse, deemed to be viable fish habitat, must be restricted to the minimum of disturbance. The establishment of temporary and permanent buffer zones are required. (Reference, Standard Drawing No.1237). Great care must be taken during construction not to harmfully alter, disrupt, or destroy fish habitat or to deposit any substance which may be harmful to fish habitat in or near any watercourse where it may enter the watercourse. Culvert pipes must be constructed, according to the requirements of the applicable permits, to allow free movement of fish.

Contractors are advised to refer to the Fisheries Act with particular attention to:

- Section 35 - Outlines required authorization for work or undertaking which may affect fish habitat.
- Section 36 - Prohibits the deposit of a harmful substance of any type into water frequented by fish.
- Section 37 - Powers of the Minister for the provision of information such as plans, specifications, studies, etc., and to require any modifications to such plans and/or related information.

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- Section 38 - Powers of a Ministerial Inspection.
- Sections 40-42 - Enforcement and Penalties.

815.02.02 THE ENVIRONMENTAL CONTROL (WATER AND SEWAGE) REGULATIONS

Contractors shall maintain compliance with the Environmental Control (Water and Sewage) Regulations, 1980 or latest edition.

No person shall discharge into a body of water any sewage or effluent:

- containing a constituent specified in Column 1 of Schedule A having a content in milligrams per liter in excess of the maximum specified in Column 2 of that Schedule.
- having a temperature in excess of 32°C.
- having a pH value less than 5.5 or greater than 9.0; or,

No person shall discharge into a public sewer or sewer leading to a public sewer, sewage or effluent:

- containing a constituent specified in Column 1 of Schedule B having a content in milligrams per liter (parts per million) in excess of the maximum specified in Column 2 of that Schedule.
- having a temperature in excess of 65°C, or,
- having a pH value less than 5.5 or greater than 9.0.

SCHEDULE A

COLUMN 1 - CONSTITUENTS	COLUMN 2 MAXIMUM CONTENT (IN MILLIGRAMS PER LITER UNLESS NOTED)
B.O.D.	20
COLIFORM - FECAL	1,000/100 ML
COLIFORM - TOTAL	5,000/100 ML
SOLID (DISSOLVED)	1,000 (SEE NOTE)
SOLID (SUSPENDED)	30 (SEE NOTE)
OILS (ETHER EXTRACT)	15
FLOATING DEBRIS, OILS, & GREASE	NONE TO BE VISIBLE
CHLORINE	1

SCHEDULE B

COLUMN 1 - CONSTITUENTS	COLUMN 2 - MAXIMUM CONTENT (IN MILLIGRAMS PER LITER)
5-DAY B.O.D.	300
CHLORINE DEMAND	30
FATS, OILS & GREASE (ETHER EXTRACT)	100
SUSPENDED SOLIDS	350

NOTE:

If water is being taken from a watercourse, used, treated and subsequently returned to the same water course, these solids data mean that the effluent should not contain more than 1000 milligrams per liter in total, or 30 milligrams per liter more than was in the water originally extracted.

815.02.03 THE DEPARTMENT OF ENVIRONMENT ACT

Where the Contractor must carry out any alteration of a body of water **which is not required specifically as part of the contractual work with the Department of Works, Services and Transportation**, the Contractor must obtain a Certificate of Approval from the Department of Environment and Labour before carrying out the work. Alterations to watercourses and water bodies such as culvert installations, bridges, stream diversions, rock fill placement in water bodies, etc., which are typically required as part of the contractual work are authorized and administered by DWST and do not require separate approval from the Department of Environment and Labour. All such alterations to bodies of water must be carried out according to established procedures of the regulatory agencies so as to prevent pollution or damage to the environment.

The Contractor is referred to the following **Environmental Guidelines** of the Department of Environment, Water Resources Division, regarding construction procedures at watercourses:

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Chapter	Title	Chapter	Title
3	WATERCOURSE CROSSINGS	7	DIVERSIONS, NEW CHANNELS, AND MAJOR ALTERATIONS
4	BRIDGES	9	PIPE CROSSINGS
5	CULVERTS	13	GENERAL CONSTRUCTION PRACTICES
6	FORDING		

815.03 FORDING OF WATERCOURSES

The use of equipment or machinery in a watercourse or water body is generally not permitted. Should it be necessary for equipment to ford a watercourse, then the approval of the Resident Engineer is required for the specified equipment only and at a designated location. The same crossing point shall be used each time that a fording is required. When extensive or frequent crossing of a watercourse is necessary, a temporary culvert or bridge installation may be required instead of fording. The Contractor is referred to the Environmental Guidelines Chapter 6, "Fording" of the Dept. of Environment and Labour, regarding the selection, site preparation, and use of fording sites.

815.04 CLEARING AND/OR GRUBBING ADJACENT TO WATERCOURSES

The Engineer shall mark limits for clearing and grubbing adjacent to watercourses. Buffer zones of undisturbed vegetation shall be maintained at watercourse crossings as marked in the field. (Reference, Standard Drawing No.1237, Typical Temporary and Permanent Buffer Zones At Stream Crossings.) A permanent buffer zone shall be maintained both sides of the construction zone at watercourse crossings, wherein, no disturbance or cutting of vegetation is to take place. A temporary ungrubbed buffer zone shall be maintained on both sides of the watercourse, unless otherwise directed by the Engineer, within the construction zone at watercourse crossings until such time as the installation of the crossing is to be carried out.

815.05 GENERAL PROCEDURES FOR INSTALLING WATERCOURSE CROSSINGS

The Contractor shall present to the Engineer for approval, a plan for the construction of unwatering systems including diversion systems, pumping systems, settling and/or filtration systems, a minimum of **3 working days** prior to the start of any work at the site.

A pre-construction meeting shall be convened on-site between the Contractor and the Engineer to review environmental protection measures and associated contract details pertaining to the watercourse crossing, prior to any work being carried out at the proposed crossing site.

All work carried out at watercourses shall be performed in the dry and with due care and caution so as to prevent unnecessary disturbance or impact on adjacent land or downstream areas. Where watercourses are deemed fish habitat, work within the channel is generally prohibited between September 15 and June 1, on the island portion of the province, and between September 1 and June 30 for Labrador, unless otherwise approved by DFO and the Resident Engineer. The Contractor shall carry out all work in and around watercourses in accordance with all Federal and Provincial permits and requirements, the relevant sections of the DWST Specifications Book, and the contract drawings.

The Contractor shall give **3 working days** notice prior to any in stream or near stream grubbing or excavation.

Buffer zones shall be established and maintained as described in section 815.04.

An approved cofferdam shall be installed at the low end of the construction zone to collect all site water which is to be disposed of in an approved manner. (See Section 815.07 Treatment of Silted Water).

The operation of heavy equipment shall be confined to dry stable areas in order to prevent the generation of mud and silted water. All flow shall be diverted or pumped around or through the work area, by a means acceptable to the Engineer, so as to maintain flow in the watercourse immediately below the site, prevent erosion, and maintain acceptable water quality. The flow diversion system shall have sufficient freeboard to be capable of accommodating rain events or provision shall be made to safely discharge elevated flows without causing washouts of constructed works, erosion, or siltation in downstream areas. The discharge location of the pumping or diversion system shall be stabilized to prevent erosion. All unwatering operations shall be constantly monitored by the Contractor.

Work should be carried out from the downstream section of the work area and progress to the upstream .

The Contractor shall ensure that fish are not left stranded in the work area at the time the diversion system is made operational. All stranded fish shall be removed by appropriate means and quickly returned to the watercourse below the construction area to prevent mortalities. An impermeable cofferdam of non-erodible material, such as sandbags and sheet plastic, shall be constructed at the outlet area of the construction zone to prevent any silted water from entering downstream areas and to assist in unwatering operations.

FORM 815

The location, size, construction, and operation of sedimentation basins shall be carried out according to DWST specifications or as directed by the Engineer and so as to achieve adequate settling parameters within the basins and ensure that discharged water from the basins, which is entering any watercourse, meets the water quality standards set forth in the Environmental Control (Water and Sewage) Regulations, (See Section 815.02.02).

Operation of the sedimentation basins shall be continuously monitored by the Contractor to ensure proper functioning and maintenance.

Excavation shall be carried out to the limits marked in the field by the Engineer. All excavations shall be carried out using a tracked excavator which will operate within the limits of the work area or as directed by the Engineer.

Excavated material shall be removed from the site and stockpiled at an approved location where it will not enter any watercourse.

When corrugated steel pipes are installed, impervious material shall be placed under the invert of the pipe and around the haunches of the pipe at the inlet area so as to ensure that all flow is confined within the pipe, particularly during low flow conditions, and not lost into the porous fill zones outside the pipe.

All sections of newly constructed channel shall be adequately stabilized so as to prevent destabilization, erosion, or scouring of the channel.

Any disturbed areas or exposed soils within the high water zone of the watercourse shall be stabilized by such means as placing rip-rap or well staked sodding. Other adjacent disturbed areas shall be rehabilitated by sodding or seeding, or as directed by the Resident Engineer.

Upon completion of the work, flow shall be introduced slowly into the new channel or watercourse crossing. Any silted water generated as a result shall be prevented from entering downstream areas of the watercourse, and pumped or treated as required.

All construction related waste materials shall be removed from the work site(s).

Sedimentation basins shall be pumped dry and backfilled with the original excavated material and compacted. Hand seeding, hydroseeding, and /or sodding of disturbed areas shall be carried out as directed by the Resident Engineer. Additional rehabilitation may be required by the Engineer.

815.06 USE OF FRESH CONCRETE IN OR NEAR BODIES OF WATER

When concrete is placed in or adjacent to a watercourse or water body, all necessary precautions shall be taken to prevent the concrete from adversely affecting water quality. Whenever possible, fresh concrete shall not come in contact directly with the waters of a watercourse. Standing water zones shall be drawn down prior to placing fresh concrete. All form work shall be well secured and made tight to prevent leakage of fresh concrete into any adjacent waters. Where tremmie concrete is required, the work shall be carried out under the specific directions of the Engineer. The washing of concrete delivery trucks or chutes is not permitted within 100 m of any watercourse or water body. All necessary precautions shall be taken when handling related substances such as form coatings and concrete admixtures to prevent any spill or leakage of these substances.

815.07 CONTROL AND TREATMENT OF SILTED WATER

Silted or muddy water is not permitted to be released into any watercourse or water body or into any ditch or area that leads directly to a watercourse or water body. Runoff from adjacent areas shall be channeled, piped, diverted, or confined to prevent the water from entering construction zones and becoming polluted. Where due to rain events, runoff from construction zones and areas of exposed soils contains mud or silt, appropriate measures shall be taken by the Contractor to confine, settle, or channel such water so that adjacent watercourses or water bodies are not adversely affected. Such measures may include the provision of mud basins, settling basins, ditch blocks, silt fencing, temporary ditching, or other means necessary to prevent pollution. Silted runoff water or water released or pumped from construction zones may be discharged to an approved vegetated area where ground absorption will occur or to an approved settling area or to a settling basin constructed in accordance with contract drawings or as directed by the Engineer.

815.08 FILL PLACEMENT AT WATER BODIES

Fill material placed in or at water bodies shall be clean blasted rock. Where in the opinion of the Engineer, significant silty bottom sediments will disperse with potential of creating water quality problems, the fill zone shall be isolated from the remainder of the water body by such means as a silt curtain as approved by the Engineer. Rock shall be placed into the water zone so as to create the least amount of disturbance of bottom sediments. Rock shall be placed along the outer edge of the fill zone to close off and isolate the fill zone from the rest of the water body. Fill placement shall proceed with runs of rock along the inside of the first outer run of fill. Successive runs of rock fill shall be placed in this manner until the zone is filled back to the inner fill limits. Height of the placed rock fill shall be maintained a minimum of 300 mm above water level during fill operations. Equipment shall not operate in standing water zones. Removal of displaced sediments and/or bog shall be carried out as directed by the Owner. Pumping of water from the fill zone to a designated area may be required by the Owner to reduce water levels in the fill zone and prevent movement of silted water through the rock fill back into the water body.

**SECTION 816****SILT FENCE****INDEX**

816.01	SCOPE
816.02	MATERIALS
816.03	CONSTRUCTION
816.04	MAINTENANCE AND CLEAN OUT
816.05	REMOVAL
816.06	MEASUREMENT FOR PAYMENT
816.07	BASIS OF PAYMENT

816.01 SCOPE

This specification deals with the requirements for the provision, maintenance, and eventual removal of silt fence. Silt Fences are intended for reducing the amount of silt present in run off from highway projects during the construction process.

816.02 MATERIALS

The silt fence shall consist of a filter fabric fence held in place by posts. The filter fabric shall be of a weight of at least 200g/m². The fabric shall be at least 900mm wide. The fence posts shall be of sufficient length to support the fabric, be sturdy and be of dimensions of at least 50mm square. The staples shall be sufficiently sturdy to support the fabric for the required life of the fence.

816.03 CONSTRUCTION

The silt fence shall be constructed as shown on Form 1238 "Typical Silt Fence", and placed at the location, or locations, as required by the Engineer.

At the location required by the Engineer, the Contractor shall excavate a trench in a crescent shape across the projected flow path with ends pointing up slope. The trench shall have a width of approximately 100mm, and a depth of approximately 100mm.

The posts shall be secured at 3m intervals on the immediate down slope side of the trench.

The filter fabric shall be taken from a continuous roll, and cut to the required length. The filter fabric shall be stapled to the upstream side of the stakes, with 200mm of fabric extending into the trench and spread over the trench bottom.

The trench shall be backfilled and compacted to secure the fabric in the ground. The silt fence shall be properly constructed to ensure continuous protection along its perimeter.

816.04 MAINTENANCE AND CLEAN OUT

The Contractor shall maintain the silt fence, until such times as the Engineer requires that the silt fence be removed.

The Contractor shall carry out such silt and debris clean out, as required, in order that the silt fence continues to perform its function of reducing the amount of silt present in the run-off. Should the fabric become clogged, and rendered useless, then the Contractor shall replace the fabric with new fabric at his own expense.

816.05 REMOVAL

The Contractor shall remove the silt fence, when required to do so by the Engineer. The posts shall be taken out of the ground and the site cleaned up. Waste materials shall be disposed of in an approved waste disposal area, provided by the Contractor.

816.06 MEASUREMENT FOR PAYMENT

Measurement for payment will be made on the basis of the required length of fence installed, computed in metres rounded to one decimal place.

816.07 BASIS OF PAYMENT

Payment at the contract unit price for silt fence shall be compensation in full for all materials, labour and use of equipment: to supply the filter fabric, posts and staples, to excavate the trench, to install the posts, to secure the fabric to the posts, to backfill and compact the trench, to maintain and clean out the fence, to replace any worn out filter fabric with new fabric provided by the Contractor at his own expense, to remove the silt fence and posts, dispose of waste materials and clean up the site.



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Works, Services, and Transportation
Highway Design Division

SECTION 817
CHECK DAM SEDIMENT TRAP

INDEX

817.01	SCOPE
817.02	MATERIALS
817.03	CONSTRUCTION
817.04	MAINTENANCE AND CLEAN OUT
817.05	DISPOSAL
817.06	MEASUREMENT FOR PAYMENT
817.07	BASIS OF PAYMENT

817.01 SCOPE

This specification deals with the requirements for the provision, maintenance, and eventual disposal of a check dam sediment trap. Check dam sediment traps are intended for reducing the amount of silt present in run off from highway cuts during the construction process.

817.02 MATERIALS

The check dam sediment trap shall consist of rock fill with filter fabric on the upstream face held in place with small shot rock.

The filter fabric, and shall be of a weight of at least 200g/m².

The rock fill shall be clean rock, with rock fragments sized between 100 and 150mm.

The small shot rock shall be clean rock, with fragments no larger than 120mm.

817.03 CONSTRUCTION

The check dam sediment trap shall be constructed as shown on Form 1239"Typical Check Dam Sediment Trap". The silty water storage area shall be excavated, and the check dam constructed, at the location as required by the Engineer.

817.04 MAINTENANCE AND CLEAN OUT

The Contractor shall maintain the checkdam, until such time as the Engineer requires that the check dam be removed.

The Contractor shall carry out such silt and debris clean outs as are required, in order that the check dam continue to perform its function of reducing the amount of silt present in the run-off.

817.05 DISPOSAL

The Contractor shall remove the check dam sediment trap, when required to do so by the Engineer.

On removal of the check dam, the fabric shall be disposed of in an approved waste disposal area provided by the Contractor. The ditch shall be cleaned up and graded to the required ditch cross section.

817.06 MEASUREMENT FOR PAYMENT

Measurement for payment will be based on the number of required check dam sediment traps constructed.

817.07 BASIS OF PAYMENT

Payment at the contract unit price for each check dam sediment trap shall be compensation in full for all labour, materials and use of equipment to: excavate the silty water storage area, load the rock fill and small shot rock at the source and haul to the check dam site, supply the filter fabric, construct the check dam as required, maintain and clean out the check dam sediment trap as required, and finally remove the check dam, dispose of the waste materials, clean up and grade the site.

The rock fill and small shot rock shall be paid for under: "Excavation hauled 1km or under - Solid Rock", Excavation hauled 1km or under - Ditching Solid Rock", or "Excavation hauled 1km or under - Quarried Rock", as applicable. However, any additional hand work required to sort the rock fill and the small shot rock to obtain the required size of fragments, and to grade the rock to the required check dam dimensions, shall be included in the payment for the check dam sediment trap.



SECTION 820

STORAGE AND HANDLING OF FUELS AND OTHER HAZARDOUS, TOXIC, OR DANGEROUS MATERIAL

INDEX

820.01	STORAGE TANK REGISTRATION, INSPECTION, AND REMOVAL
820.02	SPILL REPORTING AND CLEANUP PROCEDURES
820.03	FUEL STORAGE AND HANDLING PROCEDURES
820.04	EQUIPMENT SERVICING PROCEDURES
820.05	USE OF HAZARDOUS, TOXIC OR DANGEROUS MATERIAL

820.01 STORAGE TANK REGISTRATION, INSPECTION, AND REMOVAL

All storage tank systems must be registered under and in compliance with Newfoundland Regulation 258/82, The Storage and Handling of Gasoline and Associated Products Regulations, 1982 before commencing operation. Registration does not apply to storage tank systems of a capacity less than 2500 litres that are connected to a heating appliance. Contractors shall supply verification of storage tank registration to the Engineer prior to the commencement of work.

Storage tank systems shall be inspected on a regular basis as per Section 20 of Newfoundland Regulation 258/82 Storage and Handling of Gasoline and Associated Products. This involves, but is not limited to, gauging or dipping, reconciliation of records, and the proper maintenance of reconciliation records for a period of two years. Records shall be maintained for inspection by the Engineer, ESO and/or Government Service Centre Inspectors.

The owner of a storage tank system shall, within 30 days of known abandonment, empty the system of all products, remove the tank and associated piping from the ground, remove any contaminated soil, clean the area and restore the site to the satisfaction of the Engineer and in accordance with the criteria of the Government Services Centre.

820.02 SPILL REPORTING & CLEANUP PROCEDURES

The Contractor, Subcontractors, and their personnel shall take all necessary precautions to prevent the spillage, misplacement, or loss of fuels and other hazardous material.

The Contractor and Subcontractors shall abide by the following measures in the event of the detection of a fuel or hazardous material spill of **70** litres or more:

- (i) make every effort to stop leakage and contain contaminant flow;
- (ii) **immediately** upon detection, report spill location and size to the Canadian Coast Guard spill report number **772-2083** and to the Owner; follow up with a full written report containing information on the cause of the spill, remedial action taken, damage or contamination estimate, and any further action to be taken;
- (iii) remove contaminant from spill site by absorbent, pumping, burning, or whatever method is appropriate and acceptable to Owner. Clean-up the affected area in accordance with the requirements of the Government Services Centre and then dispose of contaminated debris at an approved waste disposal site.
- (iv) take all necessary action to ensure the incident does not recur.

The Contractor shall apply the following criteria in reaching decisions on contaminant and clean-up procedures:

- (i) minimize danger to persons;
- (ii) minimize pollution to watercourses and wetlands;
- (iii) minimize the size of the area affected by a spill; and
- (iv) minimize the degree of disturbance to the area and watercourses during clean-up. Any spillage of hydrocarbons less than 70 litres shall be immediately cleaned up by the Contractor and reported promptly to the Engineer.

The Contractor shall dispose of any soil contaminated by small leaks of oil or lubricating fluids from equipment in a manner approved by the Engineer and in accordance with the criteria of the Government Services Centre. The Contractor shall have on site a suitable quantity of absorbent material such as "Oclansorb" or similar product which can be accessed quickly and effectively in the event of **any** hydrocarbon spill. The contractor shall advise fuel handling staff of its location and application.

820.03 FUEL STORAGE & HANDLING PROCEDURES

Contractor shall ensure that fuels and hazardous materials are handled only by personnel who are trained and qualified in handling these materials in accordance with manufacturers' instructions and government regulations. The Contractor will be required to verify personnel qualifications as they pertain to this item and provide written confirmation of same to the Engineer. The Contractor shall supply a copy of the product safety data sheet to the Engineer of all hazardous, toxic or dangerous materials or substances which will be used during the course of the contract. Refuelling operations shall be supervised at all times. Under no circumstances shall any refuelling procedure be left unattended by the operator.

Handling and fueling procedures shall be carried out to prevent the contamination of soil or water. Smoking shall be prohibited within **10 m** of a fuel storage area or during refuelling operations. Fuelling or servicing of mobile equipment shall not be allowed within **100 m** of a watercourse, water body, or designated wetlands. Oils, greases, gasoline, diesel, hydraulic and transmission fluids or other fuels shall be stored at least **100m** (horizontal distance) from any water course, water body, or designated wetland unless otherwise approved by the Engineer.

Any above ground fuel containers, with the exception of those exempted under Newfoundland Regulation 258/82, shall be self dyked units that are in compliance with the terms and conditions of the approval of the Government Services Center. Fuel storage areas and non-portable transfer lines shall be clearly marked or barricaded to ensure that they are not damaged by moving vehicles. The markers shall be visible under all weather conditions. Waste oils and lubricants shall be retained in a tank or closed container, and disposed of by a company licensed by the Government Services Center for the handling and disposal of waste oil products.

820.04 EQUIPMENT SERVICING PROCEDURES

All heavy equipment maintenance shall be carried out by using suitable fluid collection equipment and in a manner which ensures all waste material is collected and suitably disposed of. The Contractor shall ensure that all equipment is mechanically sound to avoid leaks of grease, oil, diesel, gasoline, and hydraulic and transmission fluids. The Contractor shall ensure that no servicing or washing of heavy equipment occurs adjacent to watercourses and designated wetlands. Fueling, servicing or washing of equipment shall not be allowed within **100 m** of a watercourse except within a refueling site approved by the Engineer where conditions allow for containment of accidentally spilled fuels. The Contractor shall remove from the work area and properly dispose of all waste oil, filters, containers or other such debris at an approved waste disposal site.

820.05 USE OF HAZARDOUS, TOXIC OR DANGEROUS MATERIAL**820.05.01 USE OF HERBICIDES****Scope**

This specification covers the supply and application of herbicide to broadleaf brush and trees.

Specific locations to be sprayed, and areas to be omitted, shall be designated by the Engineer.

General

The Contractor and Subcontractor(s) are required to comply with environmental protection measures contained in this section and all applicable environmental protection regulations of Federal, Provincial, and Municipal Authorities.

No pesticides or other hazardous, toxic, or dangerous chemicals shall be used without prior approval of the owner. Each chemical to be used, its application rate, and area of use, shall be subject to regulations under the Newfoundland Pesticides Control Act, 1983 and Regulation 86/84, the Pesticide Control Regulations. A copy of the Material Safety Data Sheet (MSDS) shall be supplied to the Resident Engineer 5 days prior to any use by the Contractor. Two copies of any approval issued to the Contractor for chemical usage under these Regulations shall be provided to the Engineer.

Materials

The herbicide to be used to execute the work of this contract shall be, as specified in the contract documents.

All herbicide brought onto site for the execution of the contract shall be contained in sealed containers and will be inspected by the owner to ensure that such herbicides are properly registered under the Pesticides Control Act RSN 1990, and approved by the Newfoundland

Department of Environment, and are of the type, strength and quality specified therein. Any herbicide not meeting these requirements shall be rejected.

"BLAZON" dye shall be used as colouring agent at the manufacturer's recommended concentration.

Equipment

Prior to acceptance of the tender, the Contractor shall provide proof that the spray equipment, auxiliary mixing and storage equipment, and associated equipment that is intended to be used meets the requirements of the manufacturer of the herbicide.

All equipment applying liquid herbicide solution shall be capable of ensuring that all active ingredients are contained in the target area.

The Contractor shall provide all material, construction plant and personnel necessary for the continued operation of application equipment.

General Application Requirements

Herbicides shall be applied by low volume broadcast spray ground application in all areas to be treated utilizing a spray delivery system (such as the Radiarc sprayer or approved equivalent) which offers effective drift control. Aerial spraying from planes and helicopters will not be permitted. The spray system utilized must be acceptable to both the herbicide manufacturer and the Resident Engineer assigned to monitoring the herbicide application.

The Contractor is required to obtain a Pesticide Operator's License from the Pesticide Control Section, Department of Environment.

Prior to the commencement of specific work elements, the Contractor shall immediately provide the Engineer with two copies of all permits.

Any contravention of environmental requirements, including employee actions accidental or otherwise, resulting in environmental damage shall be reported to the Engineer without delay.

Contractor shall be responsible for clean-up, reclamation and/or restorative measures as may be directed by the Engineer, or by provincial or federal agencies through the Engineer.

Spray Conditions and Restrictions

The Contractor shall provide proof satisfactory to the Engineer that the strength of spray solution and the method of application meets the requirements of the manufacturer supplying the herbicide as specified on the product label. A supervisor from the Department will be appointed to monitor the Contractor at all times when he is working with the herbicide.

Contractors are advised that, notwithstanding the stipulations included with the Contractor's Pesticide Operators License issued by the Pesticide Control Section of the Department of Environment, the Contractor will ensure that:

- (a) The herbicide shall be applied only to the highway right-of-way which has been previously cut, and subsequently designated for treatment.
- (b) The Contractor shall be aware that some watercourses may be in close proximity to the designated spray area. Due care and caution shall be taken to ensure that herbicide spraying operations do not impact on any watercourses or water bodies.
- (i) Ground based spraying is permitted only when: wind speeds are between 2 and 15km/h, air temperatures are below 25°C, the relative humidity is above 50%, it is not raining, and rain is not anticipated over the next two hour period.
- (j) The Engineer in consultation with the Contractor and officials of the nearest weather office shall determine daily the suitability of weather conditions to undertake the application of herbicide. The Engineer has the authority to stop the spraying of herbicide at any time.
- (k) There shall be no herbicide application within densely populated areas. Spray areas within commercial or residential developments, house or cottage areas are to be determined in the field by the Engineer. A **50 m** buffer shall be maintained.
- (l) Areas designated by the Engineer as areas to be omitted from spraying, shall not be sprayed.
- (m) The Contractor shall take due care and caution when applying herbicide in close proximity to land used for agricultural purposes. Drifting of spray onto land utilized for agricultural purposes shall not be permitted.

- (n) Equipment is not permitted to operate in any watercourse or ditch containing water which enters a watercourse.

Daily Logs and Written Report

Contractors are advised that reports and records are required by the provincial Department of Environment. Their use is of the utmost importance to any right-of-way management program and they shall form an important part of this contract. The Contractor shall ensure that all logs, records and reports are completed fully, are legible, and are signed by authorized personnel.

The submission of appropriate documentation as may be required shall be a requirement to the satisfactory completion of this contract.

Safety

The Contractor shall be responsible for the proper handling and safe use of all herbicides.

The Contractor shall be responsible for the safety of its employees in the application of herbicides and for the supply and use of all recognized safety equipment.

The Contractor shall have with each crew, a minimum of one person who is qualified in First Aid. This person(s) shall also be in possession of a valid First Aid Certificate.

In addition to standard First Aid Kits, Contractor shall, at its own expense, have on site with each of its crews adequate first aid supplies that are unique to accidental herbicide exposure.

The Contractor shall rinse empty herbicide containers three times and use the rinse in the spray mixture. If the rinsed containers are not to be returned for refilling with herbicide then the rinsed containers shall be punctured several times to ensure they will not be used for filling with other substances and then disposed of in a manner approved by the Department of Environment.

The Contractor shall ensure the safety of all individuals including pedestrians, residents, vehicular passengers and operators or others as may be encountered during spray operations.

Clean Up

Upon completion of herbicide application, the Contractor shall remove all of their rubbish, debris, surplus materials and equipment from the site.

The Contractor shall place rubbish and refuse in proper containers and shall dispose of same at an approved waste disposal site with permission of the waste disposal site owner/operator.

The Contractor shall not wash equipment or containers, nor dump herbicides in or near any fresh or salt water bodies, or at any location where the herbicide may enter a body of water.

Spills

- (a) The Contractor shall maintain on site with each crew engaged in the mixing and application of the herbicide mixture, an approved supply of absorbent materials.

Absorbent materials shall consist of activated charcoal, sawdust, peat moss or other materials in quantities as may be required by appropriate authority and the Engineer.

In the occurrence of spillage or leakage, the Contractor shall undertake prompt action to minimize the extent of damage through the application of absorbent materials or other procedures as may be required.

Any soils or other materials contaminated as a result of spillage, leakage or inappropriate actions taken by applicators shall be removed and the affected areas subsequently rehabilitated at the Contractor's expense.

Disposal of contaminated soils and other materials shall be the responsibility of the Contractor subject to approval by the appropriate authority, the Engineer and the Pesticide Control Section.

- (b) All spills involving greater than 10 litres of mixed formulation or the equivalent of unmixed formulation shall be reported immediately to the Pesticides Control Section as described below. All spills involving mixed or unmixed pesticide in or within 500m of water

bodies, wells or areas frequented by people, shall be reported immediately to the Pesticides Control Section, St. John's (Ph: 729-3395) and Environment Canada (EPS) St. John's (Ph: 772-2083).

The Contractor shall submit a corresponding written report within two (2) days of occurrence. The report shall identify cause, actions taken to clean up area, actions taken to prevent a recurrence, actions taken to dispose of contaminated material and any environmental damage.

Newspaper Notice

The Contractor shall advise the public of the purpose and scope of the project by means of newspaper notices. The Contractor shall place the notices in at least one newspaper with circulation in the municipalities whose boundaries encompass treatment areas. The newspaper ad will appear in any issue at least one week prior to commencing the program. The ad will state the area that is proposed for treatment over the next 21 calendar days at the end of which another ad is to be placed until the program is completed. The ad will contain a phone number at which the Contractor may be contacted for information regarding the spraying operation.

Signs

The Contractor shall erect signs provided by the Department indicating that the right-of-way has been treated with herbicide. These signs shall be posted at the time of treatment and indicate the type of herbicide used and the locations treated.

Guarantee

The Contractor shall achieve a 95% brush kill in the target area. If spot checks, after the herbicide treatment is completed, reveals that the 95% brush kill was not achieved, then the Contractor will be required, at his own expense, to retreat these areas to obtain the 95% brush kill in the target area.

Measurement For Payment

Measurement will be made of the horizontal area actually sprayed with herbicide within the area indicated to be sprayed or as staked out by the Engineer. These measurements shall be computed to obtain the area in hectares, measured to three decimal places.

Spraying of areas beyond the limits as designated by Engineer will not be measured for payment.

Basis of Payment

Payment at the contract price for supply and application of herbicide shall be compensation in full for all labour, materials and equipment use to carry out the work indicated in these specifications, and shall include all costs involved in: placing newspaper notices, providing signs, and obtaining and conforming to the conditions of required permits, together with the removal of any debris (containers, absorbent, etc.) including obtaining an approved waste disposal area and hauling away and disposing of the debris in the waste disposal area, if required.

820.05.02 OTHER TOXIC OR DANGEROUS MATERIAL

Toxic construction material e.g., creosote treated timber, shall be stored at least **100 m** away from all areas where drainage is directed into any watercourse or wetlands.

Toxic or dangerous substances such as form release agents, fuels, concrete additives (including superplasticisers), and other such substances, shall be transported, stored, and handled with all necessary precautions so as to prevent any spillage from occurring. Drip pans shall be used at locations where such liquids are being drawn off in order to contain any minor spills, and as a safety measure for containment of a significant spillage.



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SECTION 825
WASTE MANAGEMENT

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825.01 SOLID WASTE DISPOSAL

825.02 SANITARY FACILITIES/SEWAGE DISPOSAL

825.01 SOLID WASTE DISPOSAL

The Contractor shall collect and dispose of all waste produced by its employees and those of its Subcontractors in a manner approved by the Engineer, and in accordance with the Waste Material Disposal Act. Through the placement of suitable containers at the site, the Contractor shall collect and dispose of rubbish and domestic garbage generated by employees. During the progress of the work, the Contractor shall keep the areas occupied by it and access to such areas in a neat, clean, and safe condition, and free from the accumulation of all waste materials including crating materials, rubbish, drink containers, cigarette cartons, and all other waste. All solid waste shall be removed from the job site and recycled or disposed of at an Approved Waste Disposal Site, with the permission of the municipal authority. No waste material shall be deposited in any watercourse or wetland.

Upon completion of the work the Contractor shall, at its own expense, and to the satisfaction of the Engineer, dispose of or remove from the job site all construction plant, rubbish, unused material, including concrete forms, filter fabric material, sediment fencing, sand bags, and other equipment and materials belonging to it or used under its direction during the performance of the work. The site shall be left in a neat and clean condition.

In the event of the Contractor's failure to comply with any of the foregoing, the same may be accomplished by the owner within **30 days** of the completion of the work and the cost of same may be deducted from any money due or owing to the Contractor whether under this or any other contract.

825.02 SANITARY FACILITIES / SEWAGE DISPOSAL

The Contractor shall maintain portable latrines on site or systems approved by the Government Services Center. The sanitary facilities shall be used by all Contractor employees and those of subcontractors. The Contractor shall transport the waste from these units, using a collection company (whenever possible) licensed by Government Services Center. Otherwise, transportation and disposal shall be by a means and at a facility or location as approved by the Government Services Center.



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SECTION 830
MARSHALING YARDS & TEMPORARY WORK CAMPS

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830 MARSHALING YARDS & TEMPORARY WORK CAMPS

Equipment or material storage yards and temporary work camps shall be located at least **100 m** from any watercourse or designated wetland.

The Contractor is responsible for obtaining **all** appropriate permits from government agencies with legislation and regulations relevant to camp facilities. These permits include, but are not necessarily limited to, those related to: solid and liquid waste disposal, water supply, sewage treatment, development control, Crown Lands, and any Municipal Authority having jurisdiction over the area.

Any site proposed for a marshaling yard or work camp should be of low value with respect to its potential for other uses when compared to other lands in the area. Abandoned gravel pits, abandoned commercial enterprises, or other previously disturbed areas are preferred locations. Any site must be located so as to minimize potential traffic hazards. Incoming and outgoing vehicles should be able to merge safely with other traffic. Prior to the commencement of construction the Contractor will submit a list of candidate sites, which will be reviewed and approved by the Engineer and any other relevant agency.



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SECTION 835
FOREST FIRE PREVENTION

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835 FOREST FIRE PREVENTION

The Contractor shall obtain a burning permit as may be required by the Forestry Division of the Department of Forest Resources and Agrifoods, where burning is to be conducted, and shall abide by the terms and conditions of the permit.

The Contractor shall take all precautions necessary to prevent fire hazards when working at the jobsite and shall keep the jobsite free of all flammable waste.

Fires shall be located a minimum of **10m** from the existing tree line or adjacent piles of slash. Fires and slash piles will be kept to small manageable sizes to prevent igniting or scorching of adjacent vegetation.

The Contractor shall have available, in proper operating condition, sufficient fire fighting equipment, as recommended by the Dept. of Forest Resources & Agrifoods, to suit its location, labour force, and construction plant. Such equipment shall comply with the standards of, and have approvals of, Underwriters Laboratories of Canada Limited and shall be maintained in accordance with National Fire Prevention Association Codes.

The Contractor shall ensure that specific employees are assigned to and trained in the use of fire fighting equipment. A list of these personnel shall be available on request by the Owner.

Rubber tires, waste oil, or similar material shall not be used to ignite slash or used to maintain the burning operation.

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SECTION 840

DUST CONTROL

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840 DUST CONTROL

The Contractor shall ensure that dust does not become a problem for adjacent property owners or construction site personnel or a hazard to vehicular traffic. When required, or as directed by the Engineer, water or an acceptable dust suppressant such as calcium chloride shall be used by the Contractor on haul routes or other locations on the project to control dust.

**SECTION 845****EQUIPMENT OPERATION AND PREVENTION OF EROSION AND SILTATION****INDEX****845.01 STORM WATER MANAGEMENT****845.02 TEMPORARY TRAVEL ROUTES****845.03 EROSION CONTROL MEASURES****845.04 LIMITATION OF OPERATIONS****845.01 STORM WATER MANAGEMENT**

The Contractor is responsible for storm water and drainage management during the period of the contract. This includes the collection, channeling, containment, settling, discharge and any other operation to effectively control storm runoff and prevent problems of erosion or siltation of adjacent or downstream areas. (See Section 815.07 Control and Treatment of Silted Water).

845.02 TEMPORARY TRAVEL ROUTES

Linear travel along the right of way by vehicles and equipment shall be restricted to one track or travel route, particularly during the early stages of opening access along the route, unless otherwise approved by the Engineer. The route shall be maintained by the Contractor free of standing water. Surface drainage will not be permitted to run along the route which can generate extensive mud and silt, and adversely affect materials to be excavated such as grubbing, unsuitable material, and overburden. Surface drainage shall be vented off the route at frequent intervals. Where drainage courses are encountered, and frequent crossings are required, temporary pipes (CSP or iron) shall be installed to permit passage of equipment and vehicles in the dry, without causing erosion and siltation. At certain locations fording may be permitted by the Engineer. (See Section 815.03 Fording of Watercourses).

845.03 EROSION & SILT CONTROL MEASURES**845.03.01 GENERAL PROTECTION MEASURES**

The Contractor shall minimize terrain disturbance and erosion resulting from its activities. The Contractor shall, as part of its work, implement erosion and silt control measures where its activities result in a blockage of natural drainage, the diversion of natural drainage, or the exposure of soil or subsoil to potential erosion. Particular measures which may be required include:

- (i) using an erosion control blanket;
- (ii) using an appropriate hydraulic mulch;
- (iii) spreading hay over exposed soils;
- (iv) spreading a thin layer of brush or slash over disturbed areas;
- (v) the installation of baffles or sediment traps at appropriate intervals within the area of disturbance;
- (vi) the installation of drainage collectors across the disturbed area to channel drainage into vegetated areas;
- (vii) the re-routing of disturbed drainage courses back into the natural course;
- (viii) the stabilization of exposed soils at drainage locations with appropriate rip-rap;
- (ix) where so directed by the Engineer, to construct check dams to confine mud or slurry at such locations as unsodded ditch lines, catch-basins and culvert inlets.
- (x) the pumping of silted water to settling or designated vegetated areas;
- (xi) the installation of mud basins of adequate size at run-off locations from exposed areas to contain heavy silt and mud as directed by the Engineer.

845.04 LIMITATION OF OPERATION

During periods of heavy rain, where in the opinion of the Engineer, the movement of excavated material and equipment may give rise to extensive mud conditions, or the potential to seriously impact watercourses, or adjacent land, the Contractor may be required to suspend operations until such time as site conditions allow operations to resume. The Contractor shall not be paid for such downtime.



SECTION 850

PROTECTION OF VEGETATION AND WETLANDS

INDEX

850.01 MAINTAIN NATURAL DRAINAGE PATTERN

850.02 PROTECTION OF TREES AND SHRUBS

850.03 OFF RIGHT OF WAY TRAVEL

850.04 BOGS AND WETLANDS

850.01 MAINTAIN NATURAL DRAINAGE PATTERN

Drainage is to be maintained in its natural state wherever possible, with provision being made for spring flooding. Where existing drainage patterns cannot be maintained, alternate drainage will be installed to approximate normal conditions with the approval of the Engineer.

850.02 PROTECTION OF TREES & SHRUBS

Some trees, shrubs and plants within the clearing limits may be required for use by the Owner or other groups. Where necessary, and as directed by the Engineer, such trees, shrubs and plants shall be flagged for removal. Also see Section 855.02 (Planting Of Trees and Shrubs).

Where branches of trees are to be removed as a result of damage or where roots **2.5 cm** in diameter or larger are exposed as a result of contractors excavation work, the stumps shall be cut cleanly using a saw or lopping tool. The roots shall be cut back level to the surface of the cut slope within 24 hours following their exposure.

The Contractor shall adhere to the following protection measures:

- (i) No unnecessary cutting of trees is to be conducted. Care will be taken during construction to prevent damage to trees and shrubs adjacent to the flagged clearing limits which are to remain after construction.
- (ii) Care shall be taken when sloping embankments not to expose roots of trees, or put the soil at the base of such trees in danger of future erosion or extensive downslope drainage.
- (iii) The Contractor shall not use living trees as survey marks and shall not cut blazes or otherwise mark live trees except with removable surveyor's tape and/or tags.
- (iv) Where cutting is necessitated, the Contractor shall stockpile and remove all merchantable timber not required by the Owner. Other wood waste and slash remaining near the uncut zone shall be disposed of by chipping, burning, or removal, as acceptable to the Engineer.

850.03 OFF RIGHT OF WAY TRAVEL

The Contractor shall limit equipment travel to the surveyed right-of-way and existing municipal and provincial roads. Use of equipment of any type is not permitted outside the clearing limits of the right of way without prior approval. To obtain approval for additional or new travel routes, the Contractor shall notify the Engineer a minimum of five working days in advance of such requirements and not commence work until written approval is given by the Engineer.

850.04 BOGS AND WETLANDS

Bogs and wetlands are considered sensitive terrain because of their high disturbance potential. Travel by machinery across bogs and wetlands shall be avoided whenever possible. When such travel is necessary, it shall be carried out as directed by the Engineer. Bog excavation shall conform with good construction practices and be carried out in accordance with other relevant sections of these specifications.



SECTION 855 REVEGETATION

INDEX

855.01	REVEGETATION FOR SURFACE STABILIZATION
855.02	PLANTING OF TREES AND SHRUBS
855.02.01	GENERAL INSTRUCTION
855.02.02	PLANTING METHODS AND MAINTENANCE
855.02.03	PAYMENT AND WARRANTY

855.01 REVEGETATION FOR SURFACE STABILIZATION

Immediately following and during some construction activities, the Engineer will identify areas requiring seeding/sodding or stabilization by a method to prevent erosion. These will include:

- (i) Extensive cuts in overburden material. These areas shall be hydro seeded within **three** calendar days of a cut being prepared and the work shall be carried out as directed by the Engineer;
- (ii) Stream crossing sites. Topsoil placement, sodding, and shrub or tree plantings may be required as directed by the Resident Engineer.
- (iii) All remaining disturbed areas, designated, will be hydro seeded or sodded as soon as possible in accordance with the DWST Specification Book - Section 632- Hydroseeding, Section 634 - Soil for Hydroseeding, Section 635- Lime for Hydroseeding, and Section 633- Sodding.

Where the potential for erosion exists, as on steep slopes, long slopes, or soft erodible type material, an appropriate erosion control material shall be applied to the surface. This can be in the form of an erosion control fabric or a sprayed on erosion control product which is approved by the Engineer and which will be in addition to hydroseeding as indicated in the contract documents or as directed by the Resident Engineer. Also see Section 845.03 (Erosion and Silt Control Measures).

The Engineer will inspect all revegetated areas periodically to ensure that adequate results have been achieved. During adverse dry conditions watering of revegetated areas shall be carried out as directed by the Engineer. Additional REVEGETATION work will be undertaken upon direction from the Engineer if the desired results are not achieved.

855.02 PLANTING OF TREES AND SHRUBS

855.02.01 GENERAL INSTRUCTIONS

The planting of trees will be carried out in those areas identified in the contract documents. The types of species, quantity, size, and exact location will be specified in the contract documents or otherwise the Contractor will be advised by the Engineer. **Nursery stock**, (purchased trees and shrubs in pots), or **site stock**, (trees and shrubs removed from a site and held over or planted out directly), may be used as specified in the contract documents or as directed by the Engineer.

Native species of trees and shrubs are generally preferred, however, non-native species may be specified where, for example, a faster growing species or a disease resistant species or variety is needed.

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The following species of trees are recommended:

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
PICEA	SPRUCE	ACER SPICATUM	MOUNTAIN MAPLE
ABIES BALSAMEA	FIR	ACER RUBRUM	RED MAPLE
BETULA PAPYRIFERA	BIRCH	ACER PLATANOIDES	NORWEGIAN MAPLE
SORBUS	DOG BERRY	SALIX DISCOLOR	WILLOW
LARIX LARICINA	LARCH, JUNIPER	SALIX BEBBIANA	WILLOW
LARIX KAEMPFERI	JAPANESE LARCH	POPULUS TREMULOIDES	TREMBLING ASPEN, POPLAR, APS
PRUNUS PENNSYLVANICA	PIN CHERRY	POPULUS BALSAMEA	COTTONWOOD, BALSAM POPLAR

The following species of large shrubs are recommended:

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
AMELANCHIER	CHUCKLEY PEAR	CORYLUS CORNUTA	HAZELNUT
VIBURNUM CASSINOIDES	NORTHERN WILD RAISON	ARONIA MELANOCARPA	EASTERN CHOKEBERRY, CHOKECHERRY
ALNUS CRISPA	ALDER	ARONIA PRUNIFOLIA	EASTERN CHOKEBERRY, CHOKECHERRY
CORNUS STOLONIFERA	RED OSIER DOGWOOD		

The following species of small shrubs are recommended:

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
MYRICA GALE	SWEET GALE, BOG MYRTLE	SAMBUCUS PATENS	RED ELDERBERRY
RHODODENDRON CANADENSE	RODORA	ROSA NITIDA	WILD ROSE
NEMOPANTHUS MUCRONATA	MOUNTAIN HOLLY	ROSA VIRGINIANA	WILD ROSE
VIBERNUM EDULE	SQUASHBERRY	RUBUS IDAEUS	RED RASPBERRY
CHAMAEDAPHNE CALICULATA	LEATHERLEAF	SPIRAEA LATIFOLIA	MEADOWSWEET

855.02.02 PLANTING METHODS AND MAINTENANCE

The Contractor is referred to the **Manual for Native Plant Material Recovery** available from the Department of Works, Services and Transportation for general information and recommended practices for the removal of trees and shrubs for either planting out directly or holding over for subsequent planting, and other aspects of care and maintenance.

All trees and shrubs do best when planted in early spring prior to the buds opening, but may also be successfully planted in late fall during their dormancy period. While it is possible to plant trees and shrubs at any time of the year, a regular watering program prepared by the Contractor and approved by the Resident Engineer to reduce or prevent mortalities is required during the active growing period. A watering program is required for all planted stock (nursery stock or site stock) in the first year. This should commence as soon as active growth begins, and as determined by the prevailing weather conditions and dryness of the soil throughout the growth season. Watering and other necessary maintenance such as the provision of staking or supports, pruning, mulching, etc. is the responsibility of the Contractor and no extra compensation will be paid for these items.

855.02.03 PAYMENT AND WARRANTY

Measurement for payment shall be by the number of individual trees of the specified species and size planted. The Contractor is responsible for preventing mortalities in planted stock. Trees and shrubs which die within 18 months of being planted shall be replaced by the Contractor at no additional cost to the Owner.



SECTION 860

PROTECTION OF HISTORIC RESOURCES

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860 PROTECTION OF HISTORIC RESOURCES

The Contractor shall be aware that the Historic Resources Act (1985) requires the protection of archaeological sites and artifacts, and sets forth procedures to be followed in the event that either are found. The Contractor shall be aware of the following sections of the Act:

- Section 10(1) - A person who discovers an archaeological object in, on, or forming part of the land within the province shall report the discovery forthwith to the Minister stating the nature of the object, the location where it was discovered and the date of the discovery.
- Section 10(2) - No person, other than the one to whom a permit has been issued under this Act, who discovers an archaeological object shall move, destroy, damage, deface or obliterate, alter, add to, mark or in any other way interfere with, remove or cause to be removed from the province that object.
- Section 11(1) - The property in all archaeological objects found in, on or taken from the land within the province, whether or not these objects are in the possession of Her Majesty is vested in Her Majesty.

Should any archaeological remains be encountered, such as stone, bone or iron tools, concentrations of bone, fireplaces, house pits and/or foundations, work in the area of the find shall cease immediately. The Contractor shall immediately notify the Owner through the Engineer, or the Senior Environmental Planner, or the Environmental Surveillance Officer immediately upon discovery of any historic resources. The Owner shall immediately notify the Historic Resources Division.



SECTION 865
OTHER ENVIRONMENTAL REQUIREMENTS

The Contractor shall be aware that other environmental requirements are contained in other sections. The attention of the Contractor is directed to:

SECTION 180	UNWATERING INCIDENTAL TO WORK
SECTION 201	CLEARING AND GRUBBING
SECTION 202	CLEARING
SECTION 203	GRUBBING
SECTION 204	GRADING OF FILL
SECTION 207	BORROW
SECTION 208	EXCAVATION OF DITCHES
SECTION 305	APPLICATION OF CALCIUM CHLORIDE
SECTION 310	USE OF PITS, QUARRIES, AND STOCKPILES FOR PRODUCTION OF MATERIALS SUPPLIED BY CONTRACTOR
SECTION 317	WINTER SAND
SECTION 320	TACK COAT
SECTION 330	HOT MIX ASPHALTIC CONCRETE
SECTION 401	DITCHING FOR OF STREAMS
SECTION 402	PERMANENT DIVERSION OF STREAMS
SECTION 403	EXCAVATION FOR FOUNDATIONS
SECTION 405	TEMPORARY DIVERSION OF STREAMS
SECTION 421	INSTALLATION OF PIPE CULVERTS
SECTION 423	SUPPLY AND INSTALLATION OF STRUCTURAL PLATE PIPE
SECTION 424	SUPPLY AND INSTALLATION OF STRUCTURAL PLATE ARCH
SECTION 426	DESIGN, SUPPLY, AND INSTALLATION OF LONG SPAN STRUCTURAL PLATE ARCH
SECTION 520	STORAGE OR DISPOSAL OF OLD ASPHALTIC PAVEMENT
SECTION 521	DEMOLITION AND REMOVAL OF SIDEWALKS, CURB AND GUTTER, MANHOLES, CATCH BASINS, DITCH INLETS, FENCES, GUIDE RAIL AND GUIDE POSTS
SECTION 522	DISPOSAL OR SALVAGE OF CULVERT OR PIPE
SECTION 634	SOIL FOR HYDROSEEDING
SECTION 635	LIME FOR HYDROSEEDING
SECTION 632	HYDROSEEDING
SECTION 902	EXCAVATION FOR FOUNDATION, UNWATERING AND EXTRA BACKFILL FOR STRUCTURES
SECTION 914	BRIDGE DECK WATERPROOFING



SECTION 902

**EXCAVATION FOR FOUNDATION,
 UNWATERING AND EXTRA BACKFILL FOR STRUCTURES**

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902.01 DESCRIPTION OF EXCAVATION

Excavation shall include the removal of all material necessary for the construction of foundations, substructures and the backfilling of the same in accordance with the plans or as directed by the Engineer.

All rock or other hard foundations shall have all loose or soft material removed to present a clean firm surface.

When a footing is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation. This shall include excavation by hand where so required or the use of excavator attachments which do not project below the final footing elevation. Alternatively, for footings excavated in the dry where the soil at or below the foundation elevation is disturbed as a result of construction operations; the foundation soil must be recompacted to yield a bearing capacity equal to or greater than that specified for the footing as approved by the Engineer.

In soft conditions, the final removal of material to foundation level shall not be made until the Contractor is ready to proceed with the construction of the footing. When material at the founding elevation is Other Material and has been over excavated, the elevation shall be re-established by replacing with suitable material and compacting it to the bearing capacity indicated on the contract drawings as approved by the Engineer. When the founding material is Solid Rock and has been over excavated, the foundation elevation shall be re-established to the original elevation with mass concrete. First, all loose and compressible material shall be removed from the excavation to the satisfaction of the Engineer. Next, concrete shall be placed to the foundation elevation and shall fill the entire volume of the over excavation. Concrete shall be of a quality compatible with that used in the footing.

FORM 902

Footing elevation shall be considered as approximate only and may be ordered to be changed by the Engineer on evaluation of conditions as the excavation proceeds.

Unless otherwise specified no excavation shall be made outside of that required for constructing substructure and the natural stream bed adjacent to the structure shall not be disturbed without permission from the Engineer. The Contractor shall ensure that the channel is brought back to its original condition unless otherwise authorized.

After each excavation is completed, the Contractor shall notify the Engineer and no concrete or other backfill shall be placed until the depths of excavation and the nature of the foundation material has been affirmed as satisfactory.

Materials excavated as excavation for foundations will be used for backfill if the material is deemed suitable by the Engineer.

Suitable excavated material beyond the requirements for backfilling the excavation will be incorporated into fill construction in accordance with Section 204 "Grading of Fill" and will include hauling up to 1km. Excavation for foundation materials not required or unsuitable for backfilling excavation or for fill construction will become the property of the Contractor. No overhaul will be paid for the removal and disposal of these materials. The use and classification of all excavation foundation materials will be as directed by the Engineer.

902.02 CLASSIFICATION

Excavation shall be measured and classified as solid rock and other material. Provided that whenever the classes of material excavated cannot be separately measured on an accurate basis, the material will be classified on a percentage basis.

- (a) Solid Rock - shall include all rock in masses or ledges in their original or stratified bed or position and all boulders and detached pieces of rock exceeding 0.50m³.
- (b) Other Material - shall include all solid material other than solid rock as defined above including boulders less than 0.50m³.

902.03 PROTECTION

All substructure work shall be adequately shored, braced or otherwise adequately protected in a rigid fashion in accordance with Section 907 "Formwork and Falsework".

Where the stability, safety or function of an existing roadway, railway or other works can be impaired by an excavation or temporary slope, the Contractor shall provide such protection as may be required including sheeting, shoring and driving of piles where necessary to prevent damage to such works.

Where any excavation may endanger physical facilities, public safety or that of workmen, or the face of the excavation is less than two (2.0) metres from the edge of travelled lane or asphaltic pavement, whichever is nearest, or the excavation is more than one (1.0) metre deep, the Contractor shall submit scaled drawings detailing the method of protection, physical dimensions and grades of sub sheeting, shoring, bracing and piling. These drawings shall be prepared, signed and stamped by a Professional Engineer licensed to practise in the Province of Newfoundland.

All work must conform to the latest revision of the Occupational Health and Safety Act, including all amendments.

Unless otherwise specified, any materials used for protection shall remain the property of the Contractor and shall be removed from the job site when no longer required.

902.04 UNWATERING FOR BRIDGE FOUNDATIONS

The Contractor shall carry out all work necessary to prevent disturbance to the foundation and unless otherwise specified, he shall place all the concrete in the dry.

Where the term "unwatering" is used in this specification, it shall mean the removal of all water that would impede the placing of concrete for the foundations of the permanent structures by means of temporary water-tight structures and pumps.

The Contractor shall submit plans and descriptions outlining the methods of unwatering that he intends to use. These plans shall be approved by the Engineer before construction is started; approval will not relieve the Contractor of his responsibility for unwatering the foundations to the satisfaction of the Engineer.

Any damage to the permanent structure due to any failure of the temporary structure used in the unwatering operations shall be remedied at the expense of the Contractor to the satisfaction of the Engineer, even to the extent of removal and reconstruction of said permanent structure.

Unwatering for bridge foundations shall include the supply of all equipment, materials and labour for the construction of the necessary water-tight temporary structures, their pumping out and subsequent removal.

Earth fill cofferdams shall be faced with a layer of plastic sheeting followed by sand bags. The purpose is to produce a dam that permits the least amount of infiltration and therefore requires the minimum amount of unwatering.

Effluent from an unwatering operation shall not be disposed of directly into a watercourse or water body. Effluent shall be discharged to a vegetated area or to a sedimentation basin for silt removal before being returned to a watercourse. Where possible, the vegetated area shall be not less than 60m from a water course or water body unless otherwise directed by the Engineer.

If for any reason, all water cannot be removed from the forms so as to permit concrete to be placed in the dry, the Engineer may authorize upon receipt of a written request from the Contractor, the placing of a concrete seal by means of a tremie pipe or some other method. When a concrete seal is so authorized, the Contractor shall supply at his own expense all equipment, materials and labour necessary for such tremie concrete and no payment will be made for tremie concrete so placed other than under the lump sum bid for "Unwatering".

Unless otherwise specified, all temporary unwatering and support structures shall remain the property of the Contractor and shall be removed from the job site when no longer required.

902.05 EXTRA BACKFILL

All backfilling and compaction work shall be conducted in the dry and under controlled conditions as approved by the Engineer.

The use of large vibratory compactors of the type used in roadway projects is prohibited adjacent to wingwall legs and abutments.

902.05.01 Select Material Compacted

The grubbing and excavation of all unsuitable material, and unwatering operations shall be completed before any select material is placed.

The quality of select material compacted shall be non-frost-susceptible free-draining granular material complying with the Department of Works, Services and Transportation specifications for Select Granular Base Course, Granular "A", Section 315, with the following exception:

The percentage of crushed materials is to be a minimum of 70% . This will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve. Only pieces having one or more freshly fractured faces will be counted as crushed material. Pieces with only small chips removed will not be considered as crushed.

Other physical and gradation requirements shall be in accordance with Section 315.02 of the Department's specification for the select Granular Base Course.

French drains comprised of washed well-graded stone including filter fabric and perforated pipe if indicated shall be placed at weep holes and wherever else required on the contract drawings.

The limits for placing select material compacted shall be as defined on the contract drawings or in the tender documents. Where select material is to be placed below abutment or pier footings, the limits shall be defined as that extending 1.0 metre beyond all sides and ends of the footing(s) and extending to the original ground elevation or bottom of excavation whichever is more pertinent from the bottom of the footing elevation at a side slope of 1.5:1(min.). The limits of placing shall be staked on the ground before placing operations begin.

Select material placed below abutment and pier footings, behind abutments, retaining walls, wing walls, type "C" curb and gutter and similar structural components shall be placed in horizontal layers having a maximum loose thickness of 250 mm before compaction. Where permission is given in writing by the Design Engineer or so indicated on the contract drawings, the maximum lift thickness can be increased to 500 mm where select material is being placed in non-structural applications. The backfill can be spread with a bull dozer and after each layer is spread, a vibratory compactor must be used as directed by the Engineer.

The Contractor shall compact the backfill behind abutments to a minimum of 95% of the maximum Standard Proctor Dry Density and to a minimum of 100% of the maximum Standard Proctor Dry Density below all footings, i.e. as per (ASTM D698-78). When directed by the Engineer, water may be added to assist the compaction effort but the amount of water added should not bring the moisture content above the optimum for the compactive effort used.

The contractor shall provide the Engineer with sufficient notice to perform Proctor and density testing. Acceptance shall be determined based upon samples taken from the point of final acceptance. The bottom layer must be spread, thoroughly compacted and tested before the next layer is placed.

No backfill shall be placed below a footing, against an abutment, wingwall or retaining wall until permission has been obtained from the Engineer.

Backfilling around arches, rigid frames, abutments and piers shall proceed simultaneously and evenly on both sides so as to avoid differential surface elevation in excess of 500 mm.

902.05.02 Compacted Ordinary Fill

All material and placing shall be in accordance with Section 204. However, location of the source will be the responsibility of the Contractor.

902.08 MEASUREMENT FOR PAYMENT

Excavation shall be measured in cubic metres in the original position of material excavated in conformity with the plans or as directed by the Engineer. Ordinarily no volume shall be included in the measurement for payment which is outside the volume bounded by vertical planes parallel to and beyond the neat lines of the footings unless such excavation is indicated on the contract drawings or specifically requested by the Engineer. The volume measured shall not include water or other liquids but shall include mud. The top limit for payment volume is original ground or new road subgrade elevation. Material removed above road subgrade elevation will be paid under Section 206 Grading of cuts of the General Specifications. The bottom limit is the completed bottom of footing.

The volume of boulders in excavation shall be determined on the basis of the three maximum rectilinear dimensions.

Unwatering shall be paid as lump sum as bid in the Unit Price Table.

Compacted ordinary fill and select material compacted shall be paid by the number of cubic metres in place to the nearest one decimal place and the volume measured shall be that between the theoretical or final grades and the original grades or lines as shown on the drawings, or as indicated herein.

902.09 BASIS OF PAYMENT**902.09.01 Excavation For Foundations**

Payment at the contract price for "Excavation for Foundations" (a) Solid Rock and (b) Other Material, will be full compensation for all labour, services, equipment and materials for all excavation required, protection of excavation, protection of adjacent works, stockpiling of excavated material for backfilling, hauling of excavated material up to 1km, placing and compaction of excavated material and disposal of any surplus or unsuitable excavated material.

Where the Engineer requires Excavation for Foundation material be hauled in excess of 1km, additional payment for overhaul will be made in accordance with Section 215 "Overhaul on Excavation".

902.09.02 Unwatering

Payment at the contract price for the item "Unwatering" in the Structure Unit Price Table shall be full compensation for all labour, services equipment and material to do the work according to the specifications.

902.09.03 Extra Backfill Select Material Compacted

Payment at the contract price for Extra Backfill Select Material Compacted shall be full compensation for all labour, equipment, plant and material involved in the cost of locating, obtaining approval, providing a pit or quarry, sampling, clearing, grubbing, producing, loading, hauling, placing of granular backfill to the structure, the granular material at weep hole drains, french drains, perforated subdrain, weeping tile and filter fabric where so indicated on the contract drawings, for compacting the material and all other work required to place, spread and ensure compaction of the material according to the specifications including the payment of royalties.

902.09.04 Extra Backfill Compacted Ordinary Fill

Payment at the contract price for Extra Backfill Compacted Ordinary Fill shall be full compensation for all labour, equipment and material, locating, obtaining approvals, clearing, grubbing, hauling, loading, placing and compacting the fill and all other work necessary to comply with specifications in Section 204.

902.09.05 Over excavation

Payment will not be made for over excavating due either to the Contractor's method of operation or his negligence. Neither will compensation be provided for the cost of remedial measures required by the Engineer as a result of over excavation by the Contractor.



SECTION 914

BRIDGE DECK WATERPROOFING

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914.01 SCOPE

The scope of this specification is the preparation and treatment of the concrete bridge deck, as shown on the plans and where designated by the Engineer, with a hot applied rubberized asphalt membrane such as Hydrotech No. 6125 flexible membrane waterproofing system or other approved equivalent.

914.02 PROCEDURE

The treatment procedure for bridge deck waterproofing is outlined as follows:

- The Contractor shall submit for approval to the Engineer a list of the application rates of the following materials:

Surface Conditioner	Asphalt Membrane	SS-1h or RS-1K diluted emulsion
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FORM 914

The submission shall contain the project name and number, name of the product manufacturer, product identification, proposed date of application, specific gravity and the weight or mass per drum of the asphalt membrane and any special procedures required.

All waterproofing work shall be performed by an applicator approved by the membrane manufacturer. The applicator shall provide such evidence satisfactory to the Engineer.

2. Inspection, surface preparation and cleaning of the concrete bridge deck.
3. Application of surface conditioner for asphaltic membrane.
4. Application of rubber membrane, as required to the concrete bridge deck where cracks in the concrete are evident, at control or construction joints and at the interface of all horizontal and vertical surfaces such as curbs and expansion joint dams.
5. Where rubber membrane is applied, a thin layer of surface conditioner and asphaltic membrane respectively shall be applied below the rubber membrane. Then the rubber membrane shall be put in place.
6. Next, the layer of asphalt membrane shall be hot applied to the entire deck surface area including the rubber membrane placed previously, including all vertical faces at curbs and expansion joint dams.
7. Immediately following the application of the asphalt membrane, a layer of asphalt impregnated protection board shall be placed onto the hot applied rubberized asphalt membrane.
8. After the protection board is placed a layer of tack coat shall be applied to the protection board. The tack coat shall be SS-1h or RS-1K emulsion diluted with an equal volume of water. The protection board is not designed for exposure and should be tack coated and paved as soon as practical.
9. At the vertical faces of all curbs a 15mm by 20mm asphalt impregnated strip shall be placed such that the top of the strip is flush with the top of the proposed asphaltic pavement.
10. Paving of the bridge deck shall begin within 24 hours after the bridge deck waterproofing is complete.
11. After the paving and compacting operations are complete, the 15mm by 20mm asphalt impregnated strip shall be removed and the joint filled with a hot applied joint sealing compound.
12. Finally, the surface adjacent to curbs and dams shall be sealed with hot applied SS-1h or RS-1K undiluted asphalt emulsion. The sealant, shall overlay the concrete surface by 25mm.

All concrete surfaces shall be cured in accordance with Section 904.05 of the Specifications Book for "Curing" and be in a dry condition before waterproofing operations may begin. Waterproofing work shall not be performed during rainy or inclement weather or on frost covered surfaces.

The Contractor shall give the Engineer a minimum of 48 hours notice prior to commencing the waterproofing application; in addition, the prepared bridge deck shall be specifically approved by the Engineer.

The Contractor shall be aware of Section 820.02 "Spill Reporting" and the required procedures.

914.03 MATERIALS

914.03.01 Surface Conditioner For Asphalt Membrane

The surface conditioner shall conform to the requirements of CGSB 37-GP-9Ma. Where the drying period will be only two (2) hours, Hydrotech No. 56170 Surface Conditioner or approved equivalent shall be used.

914.03.02 Asphalt Membrane

The asphalt membrane shall be Hydrotech No. 6125 hot applied rubberized asphalt or an approved equivalent.

914.03.03 Rubber Membrane

The rubber membrane shall be Elastosheet 6147 or an approved equivalent.

914.03.04 Protection Board

The protection boards shall be 3mm x 900mm x 1500mm asphalt impregnated waterproofing protection boards and shall be approved by the Engineer.

914.03.05 Tack Coat For Protection Board

The tack coat used in conjunction with the protection board shall be SS-1h or RS-1K emulsion diluted with an equal volume of water. The SS-1h/RS-1K emulsion shall meet the requirements of the Ontario Provincial Standard Specification 1103.

914.03.06 Joint Sealing Compound

Joint sealing compound shall be Hydrotech No. 6125 hot poured sealant or approved equivalent.

914.03.07 Hot Mix Asphaltic Concrete Sealant

The hot mix asphaltic concrete sealant shall be an undiluted SS-1H/RS-1K emulsion as in Section 914.03.05, "Tack Coat for Protection Board".

914.04 INSTALLATION**914.04.01 Concrete Surface Preparation**

The existing surface of the concrete shall be treated by sandblasting, bush hammering or other such methods as the Engineer may approve, so as to expose solid, laitance-free concrete. All dirt and debris shall be swept off and disposed of to leave a prepared surface satisfactory to the Engineer before tack coating. Immediately prior to the application of the tack coat, the concrete surface shall be cleaned with a jet of oil-free compressed air to remove all dust and any other foreign material. Waterproofing shall not commence until the Engineer has approved all preparation work.

Without limiting the generality thereof, in the preparation of new concrete decks the following can be anticipated: removal of concrete and grout spills, small depressions must be filled with Portland cement mixture, areas of heavy laitance require removal, sharp projections must be ground off and honeycombed concrete requires patching.

Old decks will generally require the removal of larger expanses of old hot mix pavement and waterproofing which is not well bonded; scaled or spalled concrete must be removed and replaced with Portland cement concrete. This will generally be considered as rehabilitation work and will be paid for separately under Section 919 of the Specifications Book for "Rehabilitation Of Concrete Structures".

Never use hot mix asphaltic patching to level up a deck prior to waterproofing.

914.04.02 Surface Conditioner For Asphalt Membrane

Surface conditioner such as Hydrotech No. 56170 shall be applied at a rate of 0.1 to 0.2 litres/m². Where acceptable alternatives are used, they shall be applied at a rate approved by the Engineer. Surface conditioner shall be applied with approved equipment which will provide a uniform application at the required rate. The surface conditioner shall be applied only when the concrete is dry, clean and when the air and concrete surface temperature are above 5°C. No traffic shall be permitted upon the surface conditioner until it has fully cured.

The surface conditioner shall be applied to the entire deck surface including those vertical surfaces which are to be treated with waterproofing such as the vertical faces at curbs and expansion joint dams.

Surface conditioner shall be applied in accordance with CGSB 37-GP-15M.

914.04.03 Application Of Asphalt Membrane

Application of hot applied, rubberized asphalt membrane for bridge deck waterproofing shall generally comply with CGSB 37-GP-51M.

Cakes of hot applied rubberized asphalt membrane shall be melted in an approved, indirect heating or double boiler type mechanically agitated heating and mixing until which shall keep the contents continuously agitated until the material can be drawn free flowing and lump

free from the mixing unit at a temperature not exceeding that recommended by the manufacturer. The kettle shall be equipped with a thermometer to measure membrane temperature.

No membrane shall be applied until the surface conditioner has cured completely. The hot applied rubberized asphalt membrane shall be applied at the temperature recommended by the manufacturer, to the clean conditioner coated concrete deck, so as to form a uniform single coat having a minimum thickness of 4mm and a maximum thickness of 5mm. The average thickness shall not be less than 4.5mm.

The operation shall be such that discontinuities in the membrane are avoided and any joints lapped 150mm. The membrane shall extend up the face of curbs, dams at expansion joints and deck drains to the height of the top of the hot mix asphaltic surface course and into the chase where this has been provided.

Membrane application temperature shall be not less than 175°C and not greater than 212°C. Overheated material may gel or become stringy and shall be rejected. The membrane shall be applied in such a manner to eliminate entrapped air, be of uniform thickness and essentially free of pinholes and blisters.

914.04.04 Application Of Rubber Membrane

In the areas indicated on the drawings, at all cracks and construction joints the rubber membrane shall be placed directly over the hot applied rubberized asphalt membrane while it is still tacky. The rubber membrane shall extend up the face of the curbs or barrier walls to the top of the hot mix asphaltic pavement, or into the chase where this has been provided. The rubber membrane shall then be covered with a 3mm thick layer of hot applied rubberized asphalt membrane as shown on the plans. At the horizontal and vertical surfaces, the rubber membrane shall be shaped to fit the interface, ensuring that air is not entrapped, fishmouths shall be eliminated.

914.04.05 Application Of Protection Board

Protection boards shall be laid on the asphalt membrane while the surface is still warm and tacky. Materials or substances shall not be applied to either the membrane surface or the protection board to remove the tackiness prior to installation of the protection board. Protection boards may be butt jointed if the asphaltic paving immediately follows completion of waterproofing operations. Otherwise, protection boards shall be placed with edges overlapping a maximum of 25mm both longitudinally and transversely. The overlap pattern shall be consistently applied in one direction such that the quality of paving will not be reduced. The overlap pattern shall be such as to facilitate paving operations in the downgrade direction. The protection board edge shall be within 6mm of all curbs, drain verticals and expansion joint verticals.

No traffic or equipment shall be permitted upon the hot applied rubberized asphalt membrane until the protection board has been placed and the membrane has cooled to ambient temperature. The membrane, when wet, presents a surface which is hazardous to traffic.

914.04.06 Application Of Protection Board Tack Coat

The diluted SS-1h/RS-1K emulsion tack coat material shall be applied at the rate of 0.5 litre per square metre.

Tack coat material shall be applied to the protection board cover with approved equipment which will provide a uniform application at the required rate. The tack coat shall be applied only when the protection board cover is dry, clean and when the air temperature is above 5°C. The tack coat on the protection board cover shall be placed just sufficiently ahead of paving to allow for adequate curing.

914.04.07 Paving Operations

The Contractor shall schedule his operations so that hot mix paving shall be carried out as soon as the membrane has cooled to ambient temperature. Hot mix asphalt concrete shall be placed within 24 hours after waterproofing is complete. Paving equipment shall not be permitted upon the tack coat until it has fully cured. Asphaltic paving of bridge decks shall be in accordance with Section 922 of the Specifications Book, "Asphaltic Paving Of Bridge Decks".

914.04.08 Forming And Filling Grooves With Joint Sealing Compound

Along each curb and for the full length of each curb and barrier wall, or where indicated in the contract drawings, the Contractor shall form a rectangular groove 15mm wide and 20mm deep. This groove shall be made using 20mm asphalt impregnated strips placed against the curb prior to the placing of the hot mix asphaltic concrete.

The boards shall be coated with an approved bond breaker and shall be removed after the mix has been fully compacted. The Contractor may use an alternative method of forming the grooves with the approval of the Engineer.

Immediately prior to pouring the compound, the groove shall be dry and then cleaned of any dust or debris by an oil-free compressed air jet.

The joint sealing compound shall be poured in place after the asphaltic pavement reaches ambient air temperature.

The joint sealing compound shall be heated in a kettle of the indirect heating or double boiler type with a built-in agitator and equipped with an indicating thermometer to measure the temperature of the melted compound. The compound shall be cut into small pieces to facilitate uniform melting and shall be melted slowly with a constant stirring. The compound shall not be heated in excess of the pouring temperature recommended by the manufacturer. The Contractor may be required to demonstrate with the equipment proposed for use that it will consistently produce a joint sealing compound of proper pouring consistency.

Pouring shall be done by the use of hand pouring pots, mechanical methods, or any other method which will give satisfactory results. The pouring equipment shall be designed such that a minimum of time will elapse during pouring operations so the compound will be placed in a workmanlike manner. Shields shall be provided to prevent the compound from being spilled on the concrete curb and on the newly placed bituminous surface.

Sufficient compound shall be poured into the groove so that upon completion of the work the surface of the compound will be flush with the surface of the pavement when the air temperature at time of pouring is 27°C or over, or 5mm below the surface of the pavement when the temperature is below 27°C. If the compound subsides to a level below the surface of the pavement, a second pouring will be required. When more than one pouring is required to fill the groove, succeeding pours will be made immediately.

Damage such as stones embedded in the joint sealing compound by construction traffic and Contractor's operation shall be repaired by the Contractor at his expense.

Traffic will not be permitted upon the surface course during the operation of forming and filling the grooves.

914.04.09 Sealing Surface Of Asphaltic Concrete Adjacent To Curbs

After the grooves at curbs have been filled and before it has become contaminated with dirt or debris, the surface shall be spray or brush painted with a uniform continuous, liberal application of undiluted SS-1h/RS-1K emulsion at the rate as per manufacturer's instructions or as directed by the Engineer, for a width of 600mm adjacent to all curbs, or barrier walls or where otherwise specified, to completely seal the surface.

914.05 SAMPLING

The Department's representatives may at their discretion require that sufficient quantities of the surface conditioner, hot poured rubberized asphalt membrane, joint sealing compound, or SS-1h/RS-1K emulsion be obtained from the materials being used on the project as might be required for immediate analysis or future testing purposes.

914.06 MEASUREMENT FOR PAYMENT

The area treated with hot applied rubberized asphalt membrane will be measured in square metres and will for payment purposes be considered the product of the width of the bridge deck measured perpendicular to faces of curb and side walk and the length of the bridge measured in plan between centre lines of abutment bearings. No allowance will be made in the measurement for the turnup at the curb line or for any overlaps.

914.07 BASIS OF PAYMENT

Payment for bridge deck waterproofing with hot applied rubberized asphalt membrane shall be made at the contract unit price per square metre and shall be full compensation for the preparation of the concrete deck surface, the supply and application of surface conditioner, hot applied rubberized asphalt membrane, rubber membrane, protection boards, tack coat for protection boards, joint sealing compound, the forming and filling of the grooves, the supply and application of undiluted SS-1h/RS-1K emulsion seal coat, for the handling and controlling of traffic and for all other items incidental to the satisfactory completion of work as determined by the Engineer.