

FORM 404



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

SECTION 404

TRENCHING, AND EXCAVATION FOR CATCH BASINS AND STORM SEWERS

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404.01 SCOPE

This specification covers the requirements for excavation for catch basins, and trenching for sanitary sewers, storm sewers, and sub-drains together with the requirements for backfilling and compacting material in trenches after the removal of pipe or after the placing of pipe and bedding. Also included is the hauling up to 1 km, of surplus or unsuitable excavation and trenching materials, the handling, and incorporation of suitable surplus excavation and trenching materials into fill construction in accordance with Section 204 "Grading of Fill" and the handling of unsuitable materials, the placing, and trimming of such unsuitable materials along embankment slopes or elsewhere, all as directed by the Engineer.

The requirements for placing bedding for storm sewers, sub-drains, and catch basins are covered separately under Section 410 "Select Bedding for Storm Sewers, Sub-Drains, and Catch Basins".

404.02 CLASSIFICATION OF EXCAVATION AND TRENCHING MATERIALS

Materials excavated under this heading will be classified as either "Solid Rock" or "Other Material", in accordance with Section 205 "Classification of Excavated Materials".

404.03 EXCAVATION AND TRENCHING

The use of mechanical excavation and trenching equipment will be permitted except where, in the opinion of the Engineer, their use will cause damage to structures below ground. The Contractor shall proceed with caution in the excavation and trenching work so that the exact location of all buried pipes, services,

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cables, and underground structures, both known and unknown may be determined, and he shall be responsible for the repair of such pipes, services, cables, and structures when broken or otherwise damaged.

All excavation and trenching material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provision made for street drainage, and natural water courses shall not be obstructed.

Should the Contractor excavate deeper than required, then excavation shall be refilled to the required excavation grade with approved material and compacted to at least 95% of Standard Proctor Density (ASTM D698-78), all at the Contractor's expense.

404.03.01 Excavation for Catch Basins

Excavations for catch basins shall be carried out at those locations and to the grades as staked by the Engineer. The size of the excavation shall be such as to facilitate the installation of the required catch basin structure in accordance with the requirements of Section 470 "Construction and Adjustment for Manholes, Catch Basins, and Ditch Inlets".

Where the material at excavation grade proves unstable then the excavation bottom shall be sub-excavated to such depth and replaced with such material and compacted as the Engineer may direct.

Should the excavation require blasting, the mouth of any pipe, any portion of pipe not backfilled and any catch basins shall be adequately protected. No blasting shall be performed within 6m of a pipe or catch basin previously placed.

404.03.02 Trenching for Sanitary Sewers, Storm Sewers and Sub-Drains

The trench shall be excavated true to the line staked by the Engineer.

The trench shall be excavated so as to facilitate the installation of the pipe in accordance with Form 1235 "Typical Storm Sewer Bedding and Backfill Details".

In Other Material ground, when trenching for a corrugated steel pipe sewer, the excavation shall be to the proposed invert elevations and be graded so as to provide a uniformly firm bed for the pipe. However, when trenching for a plastic pipe in Other Material ground, the excavation shall be to a depth of 150mm below the proposed invert elevations so as to make room for select bedding under the pipe.

In Solid Rock, regardless of whether corrugated steel or plastic pipe is to be used, the excavation shall be to a depth of 150mm below the proposed invert elevations so as to make room for select bedding under the pipe.

The width of the trench shall be such so as to facilitate the installation of the pipes and the placing of bedding in accordance with Section 420 "Supply and Installation of Pipe for Storm Sewers and Perforated Pipe for Sub-Drainage", and Section 410 "Select Bedding for Storm Sewers, Sub-Drains and Catch Basins" respectively.

The trench shall be excavated beginning at the lower end and proceeding towards the upper end.

Not more than 50m of trench shall be opened at any place in advance of the completed pipe line unless permission of the Engineer is obtained and for such distances as then specified.

Batter boards shall be set for line and grade for all trench grades of one percent or less. For grades greater than one percent, the Contractor will be permitted to use other means of establishing line and grade, subject to the prior approval of the Engineer. However, if the quality of the work is not maintained, the Engineer may direct that batter boards be set for all grades.

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Where the material at excavation grade proves unstable then the excavation bottom shall be sub-excavated to such depth and replaced with such material and compacted as the Engineer may direct.

Should the excavation or trench require blasting, the mouth of any pipe, any portion of pipe not backfilled and any catch basins shall be adequately protected. No blasting shall be performed within 6m of a pipe or catch basin previously placed.

404.04 SHEATHING AND SHORING

Protection of the works and all work done under this section shall comply with the relevant requirements of "The Occupational Health and Safety Act, including all Amendments", Province of Newfoundland and Labrador.

Where, due to the nature of the work, the Contractor sheathes, shores, or braces the excavation and/or trenches then such sheathing, shoring, or bracing shall be supplied, installed, maintained, removed or left in place as part of the work, all at the Contractor's expense.

All works behind the sheathing shall be filled with native backfill or other material, as the Engineer directs, and compacted as the sheathing is placed.

The Contractor has the option of removing the sheathing before backfilling, or leaving it in place, provided, however, no sheathing shall be left in place within one metre of subgrade.

In trench work, sheathing shall not be removed until any required bedding has been placed and compacted.

404.05 PROVISION FOR TRAFFIC AND PEDESTRIANS

The Contractor shall provide, place, and maintain such barricades, construction signs, torches, red lanterns, and guards as are required to protect persons from injury and to avoid property damage during the progress of the work.

The Contractor shall at all times provide access to adjacent properties during the work. Such required bridging shall be provided, placed, and maintained by the Contractor.

Should the Contractor have to divert traffic over channelling, curbs and sidewalks, etc., he must protect the same from damage and any such damage must be made good.

In the event of a stoppage of work, excavations shall not be left open for a period exceeding two weeks. The Contractor shall refill such excavations and shall provide the required protection for pipe and manholes already installed, on instructions of the Engineer.

Re-excavation shall be at the Contractor's expense, unless the stoppage was beyond his control.

404.06 BACKFILL MATERIAL

Materials excavated from trenches, and as excavation for catch basins will be used for trench 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 trench backfilling.

Frozen materials shall not be acceptable as backfill material.

404.07 BACKFILLING AND COMPACTION

No backfill material shall be placed until any required pipes and bedding have been placed to the satisfaction of the Engineer.

Backfill material shall be carefully placed in the trench so as not to cause damage or movement to any pipes in the trench.

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Backfill and cover material 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 a minimum of 95% of the Standard Proctor Density (ASTM D698-78).

In rock backfill material where Standard Proctor tests can not be carried out, compaction shall be continued until a compaction is achieved that is equivalent to that obtained in 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 Contractor shall remove all surplus or unsuitable trench and catch basin excavation material.

Surplus excavation materials that are suitable shall be incorporated into fill construction, as directed by the Engineer and in accordance with the requirements of Section 204 "Grading of Fill".

Unsuitable excavation material, or surplus excavation material for which no use can be found, shall be placed and trimmed along embankment slopes or in waste areas, as directed by the Engineer.

The Contractor shall be liable for any damages arising from default or neglect in backfilling operations.

404.08 MEASUREMENT FOR PAYMENT

Measurement for payment will be by means of nominal volume of trench excavation, plus nominal volume of catch basin excavation, being made up of either excavated *Solid* Rock or excavated Other Material, as classified in Section 404.02 "Classification of Excavation and Trenching Materials".

The nominal volume of excavation shall be measured in cubic metres rounded to the nearest whole number.

During excavation operations whenever the character of the material changes from Other Material to Solid Rock, then the Contractor shall excavate the overlying Other Material, and notify the Engineer in order that proper measurements of depth may be made. No allowance will be made for material excavated before such measurements 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 Solid Rock trenching and/or excavation as the case may be.

Excavation lower than the required grade or beyond the width pay limit, or as a result of side slips caused by whatever reason, shall not be included in measurement for payment.

404.08.01 Measurement for Payment in Excavation for Catch Basins

Nominal volume of catch basin excavation shall be defined as the volume given by the product of: width given by outside width of the catch basin plus 0.6m, times breadth given by outside breadth of the catch basin plus 0.6m, times the depth of the excavation measured vertically from the ground surface (after "Excavation of Cut" operations have been completed) to the accepted excavation grade.

404.08.02 Measurement for Payment in Trenching for Sanitary Sewers, Storm Sewers and Sub-Drains.

Nominal volume of sewer and sub-drain trench excavation material shall be computed by an adaption of the Average End Area method of computation, in which end areas are taken to be the product of; the depth of the excavation measured vertically in metres from the ground surface

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(after "Excavation of Cut" operations have been completed) to the accepted excavation grade, times the nominal width of excavation.

The nominal width of excavation shall be taken to be 1.0 m, or the nominal pipe diameter in metres plus 0.6 m, whichever is greater.

Lengths used in the average end area method of volume computation shall not include those distances of width of catch basin plus 0.6 m, included as part of the calculation of nominal volume of catch basin excavation.

Where perforated pipe is to be placed in the same trench as a storm sewer, then the width of excavation to be used in the nominal volume of trench excavation computation shall be only the storm sewer nominal diameter in metres plus 0.6 m.

404.09 BASIS OF PAYMENT

404.09.01 Basis of Payment in Excavation for Catch Basins

Payment shall be at the contract price in Excavation for Catch Basins (a) Solid Rock or (b) 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 excavation, handling, unwatering, sheathing and shoring; provision for accommodation of traffic and pedestrians; placing and compacting backfill; for the hauling up to the 1km freehaul limit, placing, compaction, and trimming of excess excavated materials placed within and the removal and disposal of excess excavated material placed outside the contract limits; and for all repair work required under Section 404.03 "Excavation and Trenching" and Section 404.05 "Provision for Traffic and Pedestrians".

The Contractor shall be deemed to have allowed in his prices for excavation by hand when the proximity of other structures or other considerations render this necessary.

Should additional backfill materials be required to complete backfilling, then, these 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 in Excavation for Catch Basins.

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

404.09.02 Basis of Payment in Trenching

Payment shall be at the contract price in Trenching (a) Solid Rock or (b) Other Material, as the case may be, hauled 1 km or under. The basis of payment for trenching shall include trenching for sanitary sewers, storm sewers, and sub-drains without specification to the particular kind.

Such payment shall be full compensation for all work herein described together with the labour, materials, and equipment use required for trenching, handling, unwatering, sheathing and shoring; provision for accommodation of traffic and pedestrians; placing and compacting backfill; for the hauling up to 1 km freehaul limit; placing, compaction, and trimming of excess excavated materials placed within and the removal and disposal of excess excavated material placed outside the contract limits; and for all repair work required under Section 404.03 "Excavation and Trenching" and Section 404.05 "Provision for Traffic and Pedestrians".

The Contractor shall be deemed to have allowed in his prices for excavation by hand when the proximity of other structures or other considerations render this necessary.

Should additional backfill materials be required to complete backfilling, then, these 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 in Trenching.

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

404.09.03 Basis of Payment in Trenching and Excavation for Catch Basins

Payment shall be at the contract price in Trenching and Excavation for Catch Basins (a) Solid Rock or (b) Other Material, as the case may be, hauled 1 km or under. The basis of payment in trenching and excavation for catch basins shall include both trenching and excavation for catch basins without specification to the particular kind.

Such payment shall be full compensation for all work herein described together with the labour, materials, and equipment use required for both trenching and excavation, handling, unwatering, sheathing and shoring; provision for accommodation of traffic and pedestrians; placing and compacting backfill; for the hauling up to the 1km freehaul limit, placing, compaction, and trimming of excess excavated materials placed within and the removal and disposal of excess excavated material placed outside the contract limits; and for all repair work required under Section 404.03 "Excavation and Trenching" and Section 404.05 "Provision for Traffic and Pedestrians".

The Contractor shall be deemed to have allowed in his prices for excavation by hand when the proximity of other structures or other considerations render this necessary.

Should additional backfill materials be required to complete backfilling, then, these 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 in Trenching and Excavation for Catch Basins and Storm Sewers.

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