Specification

Prepared for
Government of Canada

Parking Lot Upgrade, St. Anthony Government of Canada Building
St. Anthony, NL

Solicitation No. M1010-5-0187

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END OF SECTION

PART 1 - GENERAL

1.1 PROFESSIONAL SEALS

.1 Architecture

.1 Paul Blackwood, NAA
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.2 Structural/Civil

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END OF SECTION

PART 1 - GENERAL

1.1 SECTION 01 11 00 SUMMARY OF WORK

1. The Work
    1. The work includes but is not limited to the addition of asphalt parking stalls and pavement markings, new concrete sidewalk, signage and stairs to the entrance of the building in the community of St. Anthony, NL.

1.2 SECTION 01 29 83 TESTING LABORATORY SERVICES

1. Appointment and Payment
    1. Departmental Representative will appoint and pay for services of testing laboratory except follows:
        1. Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
        2. Inspection and testing performed exclusively for Contractor's convenience.
        3. Mill tests and certificates of compliance.
        4. Tests specified to be carried out by Contractor under supervision of Departmental Representative.
    2. Where tests or inspections by designated testing laboratory reveal Work not in accordance with Contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
    3. Testing includes, but is not limited to, the following:
        1. Concrete Testing (Curb, Sidewalk, Stairs, Pole Base, etc.)
            1) Slump
            2) Air
            3) Temperature
            4) Compressive strength testing (casting of a set of three (3) cylinders)
        2. Compaction Testing of Class B Granulars (Sidewalk &Curb);
            1) Sample collection from site for laboratory testing (sieve and proctor)
            2) Compaction testing (nuclear density gauge)
        3. Compaction Testing on Asphalt Class A & B Granulars
            1) Sample collection from site for laboratory testing (sieve and proctor)
            2) Compaction testing using a nuclear density gauge for the designated asphalt areas
        4. Asphalt Testing & Sampling
            1) Monitoring of placement and thickness as well as rolling pattern
            2) Sample collection of (1) asphalt sample for laboratory testing (Marshall)
            3) Compaction testing using a nuclear density gauge for the access/parking areas

2. Contractor's Responsibilities
    1. Provide labour, equipment and facilities to:
        1. Provide access to Work for inspection and testing.
        2. Facilitate inspections and tests.
        3. Make good Work disturbed by inspection and test.
        4. Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
    2. Notify Departmental Representative 7 days minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
    3. Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
    4. Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

1.3 SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

1. Coordination of Trades

1. Coordinate and cross-reference the activities of all sub-Contractors on site. Seek immediate direction from the Departmental Representative of any conflicts in Work. Do not allow work of one trade to precede that is in conflict with the work of another trade.
2. While the specifications and drawings have been broken down into sections and design discipline, it is the Contractor who shall be solely responsible for the division of work between trades. Drawings and spec sections have not been prepared with the intention that they are the sole means of division of work between trades.

2. Job Meetings
   1. Hold one job meeting on site with various trades, the Superintendent, and the Departmental Representative. Record minutes of meeting and distribute to all applicable parties. Issue agendas and monthly reminders of meetings.
      1. Departmental Representative will supply venue for meetings.
   2. At the request of the Departmental Representative, hold conference calls with various trades, the Superintendent, and the Departmental Representative. Record minutes of conference call and distribute to all applicable parties. Issue agendas and monthly reminders of meetings.

1.4 SECTION 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

1. Photographs
   1. Submit photographs at all critical stages of project. Provide a minimum of 5 photos at each of the following stages:
      1. Excavation
      2. Backfill
      3. Rough Grading
      4. Finish Grading
      5. Asphalt
      6. Concrete
      7. Pavement Markings
      8. Installation of Railings
   2. Submit photos on weekly basis.
   3. Photos may be submitted either in electronic JPEG format via e-mail or disk or by submitting two sets of colour prints.

2. Schedule
   1. Submit schedule within 5 working days of Contract award. Schedule shall be bar type showing key activities, milestones and critical path.

1.5 SECTION 01 33 00 SUBMITTALS PROCEDURES

1. The following procedures shall be followed for all submittals requested.
   1. Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.
   2. Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
   3. Verify that field measurements and affected adjacent Work have been coordinated.
   4. Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative’s review of submittals.
   5. Submit shop drawings and product data electronically in a pdf format when size of the document is 11x17 or smaller. For larger drawings or plans submit three full sized copies.

6. Where samples are required: Submit one sample.
7. Allow ten days for Departmental Representative's review of each submission or as per the approved Schedule, whichever provides for the greatest amount of review time.
8. Upon completion of the Departmental Representative's review, submittals will be returned to the Contractor via e-mail as Adobe Acrobat PDF Files. No hard copies will be returned.

2. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

3. Keep one reviewed copy of each submission on site.

1.6 SECTION 01 41 00 REGULATORY REQUIREMENT

1. Undertake work to the requirements of the Contract documents, municipal and provincial regulations, and the National Building Code of Canada, latest edition plus any amendments up to time of tender closing. In any case of conflict or discrepancy the most stringent requirements shall apply.

1.7 SECTION 01 45 00 QUALITY CONTROL

1. The Departmental Representative may or may not employ independent quality reviews and testing, but in all cases it is the responsibility of the Contractor to comply with the Contract Documents.

2. The cost of Departmental Representative instigated testing will be borne by the Departmental Representative in event of conformance with Contract Documents and by the Contractor in event of non-conformance.

1.8 SECTION 01 51 00 TEMPORARY UTILITIES

1. Provide temporary utilities as required, with no cost to Departmental Representative.

1.9 SECTION 01 52 00 CONSTRUCTION FACILITIES

1. Provide sanitary facilities as required by regulation and maintain in good condition for duration of the project. Anchor portable toilets against being turned over by vandals and strong winds.

2. Maintain fax and computer e-mail equipment at either the job site or at the Contractor's head office. Computer equipment shall consist of full-time high-speed internet access and capacity to download and print off 11 x 17" Adobe Acrobat files.

3. Provide on-site security as may be required.

4. No access to the building on site will be permitted.

1.10 SECTION 01 61 00 COMMON PRODUCT REQUIREMENTS

1. Use only new products and materials unless otherwise noted.

2. Should any dispute arise as to the quality or fitness of products, decisions rests strictly with the Departmental Representative based upon requirements of the Contract Documents.

3. Quality
   1. Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

2. Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
3. Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
4. Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout site.
5. Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

4. Availability
   1. Within 10 days of Contract award, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
   2. In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

5. Storage, Handling and Protection
   1. Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
   2. Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
   3. Store products subject to damage from weather in weatherproof enclosures.
   4. Store cementitious products clear of earth or concrete floors, and away from walls.
   5. Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
   6. Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
   7. Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
   8. Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
   9. Touch-up damaged factory finished surfaces to Departmental Representative’s satisfaction. Use touch-up materials to match original. Do not paint over name plates.

6. Transportation
   1. Pay costs of transportation of products required in performance of Work.

7. Manufacturer's Instructions
   1. Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
   2. Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.
   3. Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

8. Quality of Work

1. Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.
2. Remove and replace work installed that does not meet the contract documents.

9. Co-Ordination
   1. Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
   2. Be responsible for coordination and placement of openings, sleeves and accessories.

10. Concealment
    1. Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

11. Remedial Work
    1. Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
    2. Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

12. Location of Fixtures
    1. Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
    2. Inform Departmental Representative of conflicting installation. Install as directed.

13. Fastenings
    1. Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
    2. Prevent electrolytic action between dissimilar metals and materials.
    3. Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
    4. Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
    5. Keep exposed fastenings to a minimum, space evenly and install neatly.
    6. Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

14. Fastenings - Equipment
    1. Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
    2. Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
    3. Bolts may not project more than one diameter beyond nuts.
    4. Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

15. Existing Utilities
    1. When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
    2. Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.11 SECTION 01 73 00 EXECUTION

1. Employ a land surveyor licensed to practise in the Province of Newfoundland and Labrador to set-out building and site work on property.

1.12 SECTION 01 74 00 CLEANING

1. Maintain the work site for the duration of the project in a neat and orderly fashion.

2. Prior to handover of the site to the Departmental Representative thoroughly clean the exterior of the building and the site. Work shall include but not be limited to:
    1. Polishing metal and glass surfaces where affected by the Work.
    2. Sweeping paved or concrete surfaces.
    3. Disposing of all surplus materials and debris from site.

1.13 SECTION 01 77 00 CLOSEOUT PROCEDURES

1. Request a substantial completion review when:
    1. The as-built drawings and operation and maintenance manuals have been submitted to and accepted by the Departmental Representative.
    2. The Contractor has undertaken his own detailed inspection of the Work and has undertaken the necessary remedial work.

2. Undertake remedial work after substantial completion at a time convenient to the Departmental Representative, which might be restricted to after hours.

1.14 SECTION 01 78 00 CLOSEOUT SUBMITTALS

1. As-built Drawings
    1. During the course of the Work maintain one set of drawings for the sole purpose of delineating construction deviations from the drawings for whatever reason. Immediately prior to Substantial Completion transcribe marks onto a new complete set of drawings in a neat and orderly fashion using a coloured marker.
    2. As-built documents to include bearings and elevations at all buried improvements such as catch basin inverts and storm sewer lines.
    3. Submit as-built drawings to Departmental Representative for review. Make any changes requested and resubmit as necessary.

2. Operation and Maintenance Manuals
    1. Submit copies of warranties, operation manuals, diagrams, certificates, and other similar items in a series of 3-ring binders. Provide three sets of hardcopies and two digital copies of all information on cd. Submit information on each different product in its own plastic sleeve. Provide project identification sheet, table of contents, tabs, and other similar items to facilitate easy of use. Submit binders to Departmental Representative immediately prior to Substantial Completion for review. Make any changes requested and resubmit as necessary.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE.

PART 3 - EXECUTION

3.1 NOT APPLICABLE.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcing.

.2 Section 03 30 00 - Cast-in-place Concrete.

1.2 REFERENCES

.1 Codes and Standards referenced in this section refer to the latest edition thereof.

.2 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
- .3 CSA O121, Douglas Fir Plywood.
- .4 CSA O151, Canadian Softwood Plywood.
- .5 CSA S269.1, Falsework for Construction Purposes.
- .6 CAN/CSA-S269.3, Concrete Formwork.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
- .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
- .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

.2 Form ties:
- .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.

.3 Form liner:
- .1 Plywood: medium density overlay Douglas Fir to CSA O121, Canadian Softwood Plywood to CSA O151, T and G thickness as indicated.

.4 Form release agent: chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps, non-toxic, biodegradable.

.5 Falsework materials: to CSA-S269.1.

.6 Sealant: to Section 07 92 10 - Joint Sealing.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Do not place shores and mud sills on frozen ground.

.3 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.4 Fabricate and erect formwork in accordance with CAN/CSA-S269.3, to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.5 Align form joints and make watertight. Keep form joints to minimum.

.6 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.7 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.8 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Ensure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.9 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.
.1 5 days for stairs.

.2 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.3 Re-use formwork subject to requirements of CSA-A23.1A23.2.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forming and Accessories.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 Codes and Standards referenced in this section refers to the latest edition thereof.

.2 American Concrete Institute (ACI)
- .1 ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.
- .2 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 American Society for Testing and Materials International (ASTM)
- .1 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .2 ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.4 Canadian Standards Association (CSA)
- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of test and Standard Practices for Concrete.
- .2 CSA-A23.3, Design of Concrete Structures.
- .3 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.
- .4 CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel /Structural Quality Steel.
- .5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .6 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SUBMITTALS

.1 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada. ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.2 Detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated.

PART 2 - PRODUCTS

.1 MATERIALS

.2 Substitute different size bars only if permitted in writing by Departmental Representative.

.3 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.4 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.

.5 Welded steel wire fabric: to ASTM A185/A185M. Provide in flat sheets only.

.6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

.7 Mechanical splices: subject to approval of Departmental Representative.

.8 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1A23.2, ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

1.2 MEASUREMENT PROCEDURES

.1 Cast-in-place concrete will not be measured but will be paid for as a fixed price item.

1.3 REFERENCES

.1 Codes and Standards referenced in this section refer to the latest edition thereof.

.2 American Society for Testing and Materials (ASTM)
- .1 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.

.3 Canadian Standards Association (CSA)
- .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CAN/CSA-A23.2, Methods of Test for Concrete.
- .3 CAN3-A266.4, Guidelines for the Use of Admixtures in concrete.
- .4 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .5 CSA-A3001, Cementitious Materials for Use in Concrete.

1.4 ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
- .1 Type GU or GUb - General use cement.

1.5 SUBMITTALS

.1 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

.2 Submit testing results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 Certificates:
- .1 Minimum 4 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.
.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.
.8 Waterstops.
.9 Waterstop joints.
.10 Joint filler.

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1/A23.2.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1/A23.2.

1.6 SOURCE QUALITY CONTROL

.1 Have all concrete produced and delivered by a ready-mix plant that is a member of the Atlantic Provinces Ready Mixed Concrete Association (APRMCA) and holds a current “Certificate of Ready Mixed Concrete Production Facilities” issued by the Association. Submit a copy of this certificate to the Departmental Representative for approval.

1.7 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures in accordance with Section 01 00 00 General Requirements; 01 45 00 - Quality Control for Departmental Representative approval for following items:
.1 Hot weather concrete.
.2 Cold weather concrete.
.3 Curing.
.4 Finishes.
.5 Formwork removal.
.6 Joints.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
.1 Modifications to maximum time limit must be agreed to Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Waste Management and Disposal:
.1 Divert unused concrete materials from landfill to local facility approved by Departmental Representative.
.2 Provide an appropriate area on the job site where concrete trucks can be safely washed.

.3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Departmental Representative.

.4 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial and National regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Portland cement: to CAN/CSA-A3001, Type GU.

.2 Water: to CAN/CSA-A23.1.

.3 Aggregates: to CSA-A23.1.

.4 Coarse aggregates to be normal density to CSA-A23.1/A23.2.

.5 Admixtures:

.1 Air entraining admixture: to ASTM C260.

.2 Chemical admixtures: to ASTM C494, Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.7 Polyethylene film: minimum mm thickness to ASTM C171.

.8 Bonding adhesive: as approved by Departmental Representative.

.9 Fly Ash: To CAN/CSA A23.5 or ASTM C618 Class F.

2.2 MIXES

.1 Proportion normal density concrete in accordance with CSA-A23.1/A23.2, Alternative 1 to give following quality and yield for all concrete.

.1 Cement:

.1 Type GU Portland cement.

.2 Minimum compressive strength at 28 days: as per drawing notes.

.3 Minimum cement content: 300 kg/m^3 of concrete.

.4 Class of exposure: as per drawing notes.

.5 Nominal size of coarse aggregate: 20 mm.

.6 Slump at time and point of discharge: 80 mm ± 30 mm.

.7 Air content: 6±1%.

.8 Chemical admixtures: admixtures in accordance with ASTM C494Fly Ash Content: 15 – 18%.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative approval before placing concrete. Provide 24 h notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:
- .1 Development of cold joints not allowed.
- .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Departmental Representative approval of proposed method for protection of concrete during placing and curing in adverse weather.

.7 Protect previous Work from staining.

.8 Clean and remove stains prior to application for concrete finishes.

.9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.10 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

.2 Anchor bolts.
- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.
- .2 With approval of Departmental Representative, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be manufacturers's recommendations.
- .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .4 Set bolts and fill holes with shrinkage compensating grout.
- .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.3 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.4 Finishing.

.1 Finish concrete in accordance with CSA-A23.1/A23.2.

.2 Use procedures acceptable to Departmental Representative or those noted in CSA-A23.1/A23.2, to remove excess bleed water. Ensure surface is not damaged.

.3 Wet cure using polyethylene sheets placed over sufficiently hardened concrete to prevent damage. Overlap adjacent edges 150 mm and tightly seal with sand on wood planks. Weigh sheets down to maintain close contact with concrete during the entire curing period.

.4 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.

.5 Provide coarse broomfinish for exterior walks, ramps, pads.

.6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

.5 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.

.2 When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form, isolation, construction and expansion joints as indicated. Install joint filler.

.4 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3.3 SITE TOLERANCE

.1 Concrete tolerance in accordance with CSA-A23.1, Straight Edge Method F_F =30, F_L = 20.

3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CSA-A23.1/A23.2, and Section 01 00 00 General Requirements; 01 45 00 - Quality Control.

.2 Departmental Representative will pay for costs of tests as specified in Section 01 00 00 General Requirements. Costs of retesting due to deficient work will be paid for by contractor, by credit change order.

.3 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.4 Non-destructive Methods for Testing Concrete shall be in accordance with CSA-A23.1/A23.2.

.5 Provide Certificate of Field Quality Inspection and Testing to Departmental Representative for inclusion in Commissioning Manual.

.6 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve the Contractor of his contractual responsibility.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Topsoil materials.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 45 00 Quality Control.

.3 Section 01 00 00 General Requirements; 01 78 00 Close-Out Submittals

.4 Section 31 05 16 - Aggregate Materials.

.5 Section 31 22 13 - Rough Grading.

.6 Section 31 22 19 - Finish Grading.

.7 Section 31 23 18 - Trenching.

.8 Section 31 23 23 - Backfilling.

.9 Section 32 92 23 - Sodding.

1.3 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.3 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).

.4 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.5 ASTM D2487-06e1 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.4 SUBMITTALS FOR REVIEW

.1 Source Quality Control

.1 Inform Departmental Representative of proposed source of topsoil to be supplied and provide access for sampling. Acceptance of topsoil subject to inspection and/or soil analysis test results. Do not commence work until topsoil accepted by Departmental Representative.

1.5 QUALITY ASSURANCE

.1 Perform Work in accordance with Newfoundland and Labrador Municipal Water, Sewer and Roads Master Construction Specifications. Maintain one (1) copy of document on site.

PART 2 - PRODUCTS

2.1 SUBSOIL MATERIALS

.1 Subsoil Type: Unsuitable Material (USM) shall be all excavated material other than Solid Rock which is unsuitable to be placed in the subgrade.

.2 Subsoil Type: Other Material (OM) which shall include all excavated material not classified as Solid Rock or Unsuitable Material.

2.2 TOPSOIL MATERIALS

.1 Topsoil:
- .1 A “Loamy Sand” to “Sandy Loam” as classified by the Canadian System of Soil Classification.
- .2 Friable, fertile and free of subsoil, roots, vegetation, debris and stones greater than 40 mm in diameter
- .3 pH level of 6.8.
- .4 The soil must have a 3-7% range in organic matter by dry weight.

2.3 SOURCE QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00 Quality Control.

.2 Testing and Analysis of Topsoil Material: Perform to ASTM D698.

.3 If tests indicate materials do not meet specified requirements, change material and retest.

.4 Provide materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 SOIL REMOVAL

.1 Remove lumped soil, boulders, and rock.

.2 Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.2 STOCKPILING

.1 Stockpile materials on site at locations designated by Departmental Representative.

.2 Stockpile in sufficient quantities to meet Project schedule and requirements.

.3 Separate differing materials with dividers or stockpile apart to prevent mixing.

.4 Prevent intermixing of soil types or contamination.

.5 Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

.1 Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Aggregate materials.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements. 01 33 00 - Submittal Procedures.

.2 Section 01 00 00 General Requirements; 01 45 00 - Quality Control.

.3 Section 31 05 13 - Soil Materials.

.4 Section 31 22 13 - Rough Grading.

.5 Section 31 22 19 - Finish Grading.

.6 Section 31 23 18 - Trenching.

.7 Section 31 23 23 - Backfilling.

.8 Section 32 11 23 - Aggregate Base Course.

1.3 REFERENCES

.1 AASHTO M147-65(2004) - Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

.2 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.3 ASTM C136-06 - Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.5 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).

.6 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.7 ASTM D2487-10 - Classification of Soils for Departmental Representativeing Purposes (Unified Soil Classification System).

.8 ASTM D4318-10 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.9 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles or Flat and Elongated Particles in Coarse Aggregate.

1.4 SUBMITTALS FOR REVIEW

.1 Aggregate will be subject to continual sampling during production. Provide Departmental Representative with ready access to source and processed material for purpose of sampling and testing.

1.5 SUBMITTALS FOR INFORMATION

.1 Source of materials is to be incorporated into work or stockpiled requires approval of Departmental Representative prior to commencing work. Provide gradation analysis and other laboratory testing results as directed by Departmental Representative.

.2 If, in opinion of Departmental Representative, materials from the proposed source do not meet, or cannot reasonably be processed to meet specified requirements, procure an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Should a change of material source be proposed during work, advise Departmental Representative sufficiently in advance of such change to allow sampling and testing.

.4 Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

.5 Sustainable Design:

.1 Manufacturer's Certificate: Certify that Products meet or exceed Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

1.6 SOURCE QUALITY CONTROL

.1 Source of materials to be incorporated into work or stockpiles requires approval.

.2 Inform Departmental Representative of proposed source of aggregates and provide access for sampling prior to commencing production.

.3 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.4 Should a change of material source be proposed, advise Departmental Representative 4 weeks in advance of proposed change to allow sampling and testing.

.5 Acceptance of material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if its field performance is found to be satisfactory.

1.7 QUALITY ASSURANCE

.1 Perform Work in accordance with Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications. Maintain one (1) copy of document on site.

PART 2 - PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
  .1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  .1 Natural sand.
  .2 Manufactured sand.
  .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
  .1 Crushed rock or slag.
  .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  .3

PART 3 - EXECUTION

3.1 PROCESSING

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

3.2 HANDLING

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

3.3 STOCKPILING

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:
- .1 Max 1.0 m for coarse aggregate and base course materials.
- .2 Max 2.0 m for fine aggregate and sub-base materials.
- .3 Max 1.5 m for other materials.

.8 Complete each layer over entire stockpile area before beginning next layer.

.9 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.10 Do not cone piles or spill material over edges of piles.

.11 Do not use conveying stackers.

.12 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.4 STOCKPILE CLEANUP

.1 Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Removal of surface debris.

.2 Removal of paving.

.3 Removal of trees, shrubs and other plant life.

.4 Topsoil excavation.

1.2 RELATED SECTIONS

.1 Section 31 22 13 - Rough Grading.

1.3 REGULATORY REQUIREMENTS

.1 Conform to applicable code for environmental requirements, and disposal of debris.

.2 Coordinate clearing, Work with utility companies.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Verify that existing plant life designated to remain is tagged or identified.

.2 Identify a waste area for placing removed materials.

3.2 PROTECTION

.1 Locate, identify, and protect utilities that remain, from damage.

.2 Protect trees, plant growth, and features designated to remain, as final landscaping.

.3 Protect bench marks, survey control points, and existing structures from damage or displacement.

3.3 CLEARING

.1 Clear areas required for access to site and execution of Work.

.2 Remove trees and shrubs within limits of work. Remove stumps, main root ball, root system and surface rock.

.3 Clear undergrowth and deadwood without disturbing subsoil.

3.4 REMOVAL

.1 Remove debris, rock, and extracted plant life from site.

.2 Remove paving as indicated on drawings. Neatly saw cut edges at right angle to surface.

3.5 TOPSOIL EXCAVATION

.1 Do not excavate wet topsoil.

.2 Stockpile in area designated on site to depth not exceeding 2.5 m and protect from erosion.

.3 Remove excess topsoil not intended for reuse, from site.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Removal of topsoil and subsoil.

.2 Cutting, grading, filling, rough contouring, compacting the site for site structures, building pads, parking area and access roads.

1.2 RELATED SECTIONS

.1 Section 01 00 General Requirements; 01 45 00 - Quality Control.

.2 Section 31 05 13 - Soil Materials.

.3 Section 31 05 16- Aggregate Materials.

.4 Section 31 12 13 - Site Clearing.

.5 Section 31 22 19 - Finish Grading.

.6 Section 31 23 16 - Excavating.

.7 Section 31 23 18 - Trenching.

.8 Section 31 23 23 - Backfilling.

1.3 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and an 457 mm (18 inch) Drop.

.2 ASTM C136-06 - Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.4 ASTM D1556-07 - Test Method for Density and Weight Unit of Soil in Place by the Sand-Cone Method.

.5 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).

.6 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.7 ASTM D2419-09 - Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.8 ASTM D2434-68(2006) - Test Method for Permeability of Granular Soils (Constant Head).

1.4 QUALITY ASSURANCE

.1 Perform Work to Government of Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

1.5 EXISTING CONDITIONS

.1 Examine subsurface investigation report which is available for inspection from Departmental Representative.

.2 Known underground and surface utility lines and buried objects are as indicated on site plan.

1.6 PROTECTION

.1 Protect and/or transplant existing fencing trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Backfill material: in accordance with Section 31 23 23 - Backfilling

.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

.1 Identify required lines, levels, contours, and datum.

.2 Stake and flag locations of known utilities.

.3 Locate, identify, and protect utilities that remain, from damage.

.4 Notify Newfoundland Power to remove and relocate utilities if required.

.5 Protect above and below grade utilities that remain.

.6 Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

.7 Protect any bench marks, survey control point, and paving, from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

.1 Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

.2 Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

.3 When excavating through roots, perform work by hand and cut roots with sharp axe.

.4 Remove subsoil from site.

3.4 FILLING

.1 Install Work in accordance with Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

.2 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.3 Fill areas to contours and elevations with unfrozen materials.

.4 Place fill material on continuous layers and compact.

.5 Maintain optimum moisture content of fill materials to attain required compaction density.

.6 Slope grade away from building minimum 2%, unless noted otherwise.

.7 Make grade changes gradual. Blend slope into level areas.

.8 Compact filled and disturbed areas to corrected maximum dry density to ASTM D698, as follows:
.1 90% under landscaped areas.
.2 100% under paved and walk areas.

.9 Remove surplus fill material and material unsuitable for fill, grading or landscaping from site.

3.5 TOLERANCES

.1 Top Surface of Subgrade: Plus or minus 30 mm from required elevation.

3.6 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00 Quality Control

.2 Inspection and testing of soil compaction will be carried out by testing laboratory designated by Departmental Representative. Reference to Section 01 00 00 General Requirements; 01 45 00 Quality Control.

.3 Submit testing procedure, frequency of tests, to Departmental Representative for approval.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Final grade topsoil for finish landscaping.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 29 83

.2 Section 01 00 00 General Requirements; 01 45 00 - Quality Control.

.3 Section 31 05 13 - Soil Materials.

.4 Section 31 22 13 - Rough Grading: Site contouring.

.5 Section 31 23 18 - Trenching: Backfilling trenches.

.6 Section 31 23 23 - Backfilling: Backfilling at building areas.

.7 Section 32 12 16 - Asphalt Paving.

.8 Section 32 92 23 – Sodding: Finish ground cover.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Topsoil: As specified in Section 31 05 13 – Soil Materials.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify building and trench backfilling have been inspected.

.2 Verify substrate base has been contoured and compacted.

3.2 SUBSTRATE PREPARATION

.1 Eliminate uneven areas and low spots.

.2 Remove debris, roots, branches, stones, in excess of 13 mm in size. Remove subsoil contaminated with petroleum products.

.3 Scarify surface to depth of 75 mm where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

.1 Place topsoil in areas where sodding is required to a nominal depth of 150 mm. Place topsoil during dry weather.

.2 Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

.3 Remove roots, weeds, rocks, and foreign material while spreading.

.4 Manually spread topsoil close to building to prevent damage.

.5 Lightly compact placed topsoil.

.6 Remove surplus subsoil and topsoil from site.

.7 Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

.1 Top of Topsoil: Plus or minus 13 mm.

3.5 PROTECTION OF FINISHED WORK

.1 Protect landscaping and other features remaining as final work.

.2 Protect existing structures, fences, sidewalks, utilities, paving and curbs.

3.6 SCHEDULES

.1 Sod: 50 mm thick.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Excavating for building foundations.

.2 Excavating for slabs-on-grade, and paved and landscaped areas.

.3 Excavating for site structures.

1.2 RELATED SECTIONS

.1 Section 31 22 13 - Rough Grading

.2 Section 31 23 18 - Trenching.

.3 Section 31 23 17 - Rock Removal.

.4 Section 31 23 16 - Excavating

.5 Section 31 23 23 - Backfilling.

1.3 EXISTING CONDITIONS

.1 Buried services:
- .1 Before commencing work verify location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .4 Prior to commencing excavation work, notify applicable Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.
- .5 Confirm locations of buried utilities by careful test excavations.
- .6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .8 Record location of maintained, re-routed and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:
- .1 Conduct, with Departmental Representative condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by work.
- .2 Protect existing buildings and surface features from damage while work is in progress. In event of damage, immediately make repair to approval of Departmental Representative.
- .3 Where required for excavation, cut roots or branches as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Section 01 00 00 General Requirements; 01 73 00: Execution

.2 Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

.1 Identify required lines, levels, contours, and datum locations.

.2 Locate, identify, and protect utilities that remain from damage.

.3 Notify utility companies to remove and relocate utilities.

.4 Protect plant life, lawns, rock outcroppings and other features remaining as a portion of final landscaping.

.5 Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

.6 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.7 Strip topsoil from within limits of excavation and stockpile as directed by Departmental Representative, for re-spreading after backfilling or for reinstatement in other parts of the work.

.8 Cut pavement or sidewalk neatly along limits of proposed excavation or as specified in order that surface may break evenly and cleanly.

3.3 DEWATERING

.1 Keep excavations free of water while work is in progress.

.2 Protect open excavations against flooding and damage due to surface runoff.

.3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction. Comply with all requirements of the Department of Environment and other regulatory agencies having jurisdiction regarding disposal of water from excavations.

.4 Submit for Departmental Representative's review, details of proposed dewatering methods, such as dikes or well points.

.5 Provide flocculation tanks, settling basins or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

.6 Do not dewater during placing of concrete, or for a period of at least 24 hours thereafter, unless from a pump separated from concrete work by a watertight wall or other effective means.

.7 Construct all sub-drains, sump holes, wells or the like required for dewatering the excavations so as not to endanger in any way the stability of the Works, and on completion of the work completely backfill and consolidate these excavations

3.4 EXCAVATION

.1 Advise Departmental Representative in advance of excavation operations to enable original cross-sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions indicated.

.3 Cut pavement or sidewalk neatly in a line along limits of proposed excavation or as specified in order that surface may break evenly and cleanly. The width removed along the normal trench for the installation of the pipe shall not exceed the width of the trench specified by more than 500 mm on each side of the trench. The width and length of the area removed for the installation of sign foundations or other structures shall not exceed the maximum linear dimensions of such structures by more than 500 mm on each side. Wherever, in the opinion of the Departmental Representative, existing conditions make it necessary or advisable, remove additional pavement, as directed by the Departmental Representative, and receive extra compensation provided such additional work is not shown in the drawings or specified. Removal or damage to pavement or surfaces beyond these limits, shall be replaced or repaired at the expense of the Contractor.

.4 Remove concrete, masonry, paving, walks, and rubble and other obstructions encountered during excavation.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

.6 Unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.7 Dispose of waste material as indicated in Section 01 00 00 General Requirements; 01 74 00 Cleaning. The Departmental Representative shall define waste material.

.8 Do not obstruct flow of surface drainage or natural watercourses.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Obtain Departmental Representative approval of completed excavation.

.11 Remove unsuitable material from trench bottom to extent and depth directed by Departmental Representative.

.12 Where required due to unauthorized over-excavation, correct as follows:
- .1 Fill under bearing surfaces and footings with concrete specified for footings.
- .2 Fill under other areas with approved fill compacted to minimum of 100% corrected maximum dry density, maximum dry density to ASTM D698-78, method D.

.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.14 No extra payment shall be made for measures ordered by the Departmental Representative to correct problems caused by unauthorized over-excavation.

.15 No extra payment shall be made for construction methods required to keep the trench stable, free from disturbance, or dry, nor for crushed stone or other granular material used to facilitate drainage or dewatering during construction of the pipeline or for any extra excavation related thereto.

.16 The use of mechanical excavators will be permitted except where their use in the opinion of the Departmental Representative, will cause damage to property or structures above or below ground which property or structures must be preserved in accordance with the contractor. Hand excavation when the proximity of existing structures or other consideration render this necessary are deemed to be included in the Price for trench excavation and backfill..

.17 Keep all surface materials which, in the opinion of the Departmental Representative, are suitable for re-use in restoring the surface separate from the general excavation material.

.18 Stockpile suitable material required for trench backfill in approved location.

3.5 RESTORATION

.1 Remove waste materials and debris, trim slopes, and correct defects noted by Departmental Representative.

.2 Replace topsoil as indicated or directed by Departmental Representative.

.3 Reinstate pavement and sidewalks, lawns to condition and elevation which existing before excavation.

.4 Clean and reinstate areas affected by work as directed by Departmental Representative.

.5 Reinstate areas affected by equipment outside of planned area to condition which existed prior to commencement of work and leave site in rake-clean condition as directed.

3.6 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control

.2 Provide for visual inspection of bearing surfaces.

3.7 PROTECTION OF FINSIHED WORK

.1 Prevent displacement or loose soil from falling into excavation; maintain soil stability.

.2 Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Excavating trenches for utilities from as indicated on construction drawings.

.2 Compacted fill from top of utility bedding to subgrade elevations.

.3 Backfilling and compaction.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements. 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 45 00 - Quality Control.

.3 Section 01 00 00 General Requirements, 01 52 00 - Construction Facilities.

.4 Section 01 00 00 General Requirements, 01 78 00 – Closeout Submittals

.5 Section 03 30 00 - Cast-in-place Concrete.

.6 Section 31 05 13 - Soil Materials.

.7 Section 31 05 16 - Aggregate Materials.

.8 Section 31 22 13 - Rough Grading.

.9 Section 31 22 19 - Finish Grading.

.10 Section 31 23 16 – Excavating.

.11 Section 31 23 23 - Backfilling.

1.3 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 ASTM C136-06 - Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

.4 ASTM D1556-07 - Test Method for Density and Weight Unit of Soil in Place by the Sand-Cone Method.

.5 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.6 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

1.4 DEFINITIONS

.1 Utility: Any buried pipe, duct, conduit, or cable.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 00 00 General Requirements; 01 31 00: Project Managing and Coordination.

.2 Coordination:
- .1 Coordinate with other work having a direct bearing on work of this section.
- .2 Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

1.6 EXISTING CONDITIONS

.1 Buried services:
- .1 Before commencing work verify location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .4 Prior to commencing excavation work, notify applicable Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.
- .5 Confirm locations of buried utilities by careful test excavations.
- .6 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
- .7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .8 Record location of maintained, re-routed and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:
- .1 Conduct, with Departmental Representative condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by work.
- .2 Protect existing buildings and surface features from damage while work is in progress. In event of damage, immediately make repair to approval of Departmental Representative.
- .3 Where required for excavation, cut roots or branches as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Marking Tape:
- .1 Heavy gauge polyethylene, 150 mm wide indicating the service buried.
- .2 Detectable metallic underground tape, indicating the service buried, not less than 75 mm wide.

.2 Type 1 bedding: clean, hard durable crushed gravel or stone, free from shale clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136-84a and ASTM C117-87 and giving a smooth curve without sharp breaks when plotted on a semi-log chart.

ASTM sieve designation	% Passing
25.000 mm	100
19.000 mm	75 – 100
12.500 mm	-
9.500 mm	50 – 100
4.750 mm	30 – 70
2.000 mm	20 – 45
0.425 mm	10 – 25
0.180mm	-
0.075 mm	3 - 8

.3 Type 2 bedding: clean, hard, durable sand, gravel or crushed stone, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136-84a and ASTM C117-87 and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart:

ASTM sieve designation	% Passing
9.5 mm	100
4.75 mm	50 – 100
2.00 mm	30 – 90
0.075 mm	0 - 10

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that survey bench mark, control point, and intended elevations for the Work are as shown on drawings.

3.2 PREPARATION

.1 Identify required lines, levels, contours, and datum locations.

.2 Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

.3 Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

.4 Maintain and protect above and below grade utilities which are to remain.

.5 Cut out soft areas of subgrade not capable of compaction in place. Backfill with Backfill Material and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 DEWATERING

.1 Keep excavations free of water while work is in progress.
- .1 Protect open excavations against flooding and damage due to surface runoff.
- .2 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction. Comply with all requirements of the Department of Environment and other regulatory agencies having jurisdiction regarding disposal of water from excavations.
- .3 Submit for Departmental Representative's review, details of proposed dewatering methods, such as dikes or well points.
- .4 Provide flocculation tanks, settling basins or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.
- .5 Do not dewater during placing of concrete, or for a period of at least 24 hours thereafter, unless from a pump separated from concrete work by a watertight wall or other effective means.
- .6 Construct all sub-drains, sump holes, wells or the like required for dewatering the excavations so as not to endanger in any way the stability of the Works, and on completion of the work completely backfill and consolidate these excavations

3.4 EXCAVATION

.1 Advise Departmental Representative in advance of excavation operations to enable original cross-sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions indicated.

.3 Cut pavement or sidewalk neatly in a line along limits of proposed excavation or as specified in order that surface may break evenly and cleanly. The width removed along the normal trench for the installation of the pipe shall not exceed the width of the trench specified by more than 500 mm on each side of the trench. The width and length of the area removed for the installation of gate valves, specials, manholes, or other structures shall not exceed the maximum linear dimensions of such structures by more than 500 mm on each side. Wherever, in the opinion of the Departmental Representative, existing conditions make it necessary or advisable, remove additional pavement, as directed by the Departmental Representative, and receive extra compensation provided such additional work is not shown in the drawings or specified. Removal or damage to pavement or surfaces beyond these limits, shall be replaced or repaired at the expense of the Contractor.

.4 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

.6 Unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.7 Do not obstruct flow of surface drainage or natural watercourses.

.8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.9 Obtain Departmental Representative approval of completed excavation.

.10 Remove unsuitable material from trench bottom to extent and depth directed by Departmental Representative.

.11 Where required due to unauthorized over-excavation, correct as follows:
.1 Fill under bearing surfaces and footings with concrete specified for footings.
.2 Fill under other areas with approved fill compacted to minimum of 100% corrected maximum dry density, maximum dry density to ASTM D698-78, method D.

.12 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.13 No extra payment shall be made for measures ordered by the Departmental Representative to correct problems caused by unauthorized over-excavation.

.14 No extra payment shall be made for construction methods required to keep the trench stable, free from disturbance, or dry, nor for crushed stone or other granular material used to facilitate drainage or dewatering during construction of the pipeline or for any extra excavation related thereto.

.15 The use of mechanical excavators will be permitted except where their use in the opinion of the Departmental Representative, will cause damage to property or structures above or below ground which property or structures must be preserved in accordance with the contractor. Hand excavation when the proximity of existing structures or other consideration render this necessary are deemed to be included in the Price for trench excavation and backfill .

.16 Keep all surface materials which, in the opinion of the Departmental Representative, are suitable for re-use in restoring the surface separate from the general excavation material.

.17 Stockpile suitable material required for trench backfill in approved location.

3.5 TRENCH BOTTOM PREPARATION

.1 Draw the attention of the Departmental Representative to the nature and condition of the excavated surfaces which are to receive the foundations of the works. If in the opinion of the Departmental Representative, the foundation is unsuitable to receive the structure as shown on the Drawings, the Departmental Representative will issue written instructions for extra excavation, special filling or other extra work required to secure a proper foundation.

.2 Where required due to removal of unsuitable material and/or unauthorized over excavation, bring bottom of excavation to design grade with approved granular material or rock underbedding as directed by the Departmental Representative.

3.6 PRE-INSTALLATION INSPECTION

.1 Excavations require inspection and approval prior to commencement of installation of pipe bedding and operations.

3.7 BACKFILLING

.1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.

.2 Areas to be backfilled and/or backfill material shall be free from debris, snow, ice, water or frozen ground. Do not use backfill material which is frozen or contains ice, snow or debris.

.3 Backfill trenches to contours and elevations with unfrozen fill materials.

.4 Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

.5 Bedding: Place and compact materials in equal continuous layers not exceeding 150 mm compacted depth.

.6 Backfill Material: Place and compact material in equal continuous layers not exceeding 300 mm compacted depth.

.7 Employ a placement method that does not disturb or damage foundation perimeter drainage, or utilities in trench.

.8 Maintain optimum moisture content of fill materials to attain required compaction density.

.9 Remove surplus fill materials from site.

.10 Leave fill material stockpile areas completely free of excess fill materials.

3.8 TOLERANCES

.1 Top Surface of Backfilling Under Paved Areas and Landscaped Areas. Plus or minus 25 mm from required elevations.

.2 Top Surface of General Backfilling: Plus or minus 25 mm from required elevations.

3.9 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control.

3.10 PROTECTION OF FINISHED WORK

.1 Protect installed work.

.2 Prevent displacement or loose soil from falling into excavation; maintain soil stability.

.3 Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

.4 Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Site filling and backfilling.

.2 Fill under paved and landscaped areas.

.3 Fill for over-excavation.

.4 Consolidation and compaction as scheduled.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 - Submittal Procedures.

.2 Section 01 00 00 General Requirements; 01 45 00 - Quality Control.

.3 Section 01 00 00 General Requirements; 01 78 00 – Close Out Submittals

.4 Section 31 05 13 - Soil Materials.

.5 Section 31 05 16 - Aggregate Materials.

.6 Section 31 22 13 - Rough Grading.

.7 Section 31 23 16 - Excavating.

.8 Section 31 23 18 – Trenching.

.9 Section 03 30 00 - Cast-in-place Concrete.

1.3 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

.3 ASTM D1556-07 - Test Method for Density and Weight Unit of Soil in Place by the Sand-Cone Method.

.4 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.5 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

1.4 SUBMITTALS FOR INFORMATION

.1 Inform Departmental Representative at least 4 weeks prior to commencing work, of proposed source of fill materials and provide access for sampling.

.2 Submit 70 kg samples of type of fill specified including representative samples of excavated material.

.3 Ship samples as directed by Departmental Representative in tightly closed containers to prevent contamination.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Marking Tape:
- .1 Heavy gauge polyethylene, 150 mm wide indicating the service buried.
- .2 Detectable metallic underground tape, indicating the service buried, not less than 75 mm wide.

.2 Backfill Material: Well graded gravel or Crushed stone consisting of durable crushed rock approximately 100 mm maximum size and consisting of angular fragment obtained by breaking and crushing solid or natural rock, reasonably free from thin, flat elongated or other objectionable pieces and fines. Material not to contain any organic soil or objectionable matter with not more than 10% by mass passing the #63 Canadian Metric sieve, including parties adhering to larger stone particles.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

.3 Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

.4 Verify structural ability of unsupported walls to support imposed loads by the fill.

3.2 PREPARATION

.1 Compact subgrade to density requirements for subsequent backfill materials.

.2 Cut out soft areas of subgrade not capable of compaction in place. Backfill with backfill material and compact to density equal to or greater than requirements for subsequent fill material.

.3 Scarify and proof roll subgrade surface to a depth of 300 mm to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

.1 Backfill areas to contours and elevations with unfrozen materials.

.2 Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

.3 Backfill Material: Place and compact materials in equal continuous layers not exceeding 150 mm compacted depth.

.4 Structural Fill: Place and compact material in equal continuous layers not exceeding 300 mm compacted depth to 100% standard Proctor density.

.5 Employ a placement method that does not disturb or damage other work.

.6 Maintain optimum moisture content of backfill materials to attain required compaction density.

.7 Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

.8 Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

.9 Slope grade away from building minimum 2%, unless noted otherwise.

.10 Make gradual grade changes. Blend slope into level areas.

.11 Remove surplus backfill materials from site.

.12 Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

.1 Top Surface of Backfilling Under Paved Areas: Plus or minus 25 mm from required elevations.

.2 Top Surface of General Backfilling: Plus or minus 25 mm from required elevations.

3.5 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control

.2 Compaction testing will be performed to ASTM D698 .

.3 If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

.4 Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.6 PROTECTION OF FINISHED WORK

.1 Protect installed work.

.1 Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULES

.1 Fill Under Grass Areas:
.1 Fill Type Topsoil, 150 mm below finish grade, compacted to 90% Standard Proctor Density.

.2 Fill Under Landscaped Areas:
.1 Fill Type Topsoil, 150 mm below finish grade, compacted to 90% Standard Proctor Density.

.3 Fill Under Asphalt and Concrete:
.1 Compact subsoil to 100% of its maximum dry density.

.2 Fill Type Backfill Material to 376 mm below finish paving elevation, compacted to 100% standard proctor Density.

.4 Fill to Correct Over-excavation:

.1 Backfill Material flush to required elevation, compacted to 100% Standard Proctor Density

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Street pavement surface cleaning.

.2 Sidewalk surface cleaning.

1.2 RELATED SECTIONS

.1 Section 32 12 16 - Asphalt Paving.

.2 Section 32 17 24 - Painted Pavement Markings.

1.3 REGULATORY REQUIREMENTS

.1 Conform to applicable code for removed material disposal requirements.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Conform to all relative environment regulations for removed material disposal and waste material disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Surface Cleaning Agent:
  .1 Suitable for abrasives, solvents or chemical agents used for removal of paint, oil, chewing gum, animal feces, rubber deposits and other common foreign substances.
  .2 Proprietary products specially designed for pavement cleaning, subject to approval of Departmental Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

3.2 PREPARATION

.1 Areas to be Cleaned: Designated on drawings and/or by Departmental Representative on site.

3.3 PAVEMENT SURFACE CLEANING

.1 Remove joint or pavement repair sealing compound that has protruded above surface.
  .1 Remove to existing pavement surface level in areas designated.
  .2 Dispose of removed material as directed by law.

.2 Remove by approved methods, the following substances from designated areas:
  .1 Dust, surface dirt, and foreign matter.
  .2 Paint and foreign contaminants.

.3 Loose or bonded foreign materials.
.4 Oil and grease.
.5 Chewing gum.
.6 Animal feces.

.3 Use rotary brooms, supplemented by hand broom as required.

.4 Keep surface drainage of liquids clear of loose and waste materials.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Aggregate base course.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements, 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements, 01 45 00 - Quality Control

.3 Section 01 00 00 General Requirements, 01 78 00 - Close Out Submittals

.4 Section 31 05 16 - Aggregate Materials.

.5 Section 31 22 13 - Rough Grading.

.6 Section 31 22 19 - Finish Grading.

.7 Section 31 23 18 - Trenching.

.8 Section 31 23 23 - Backfilling.

.9 Section 32 12 16 - Asphalt Paving.

1.3 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.3 ASTM D1556-07 - Test Method for Density and Weight Unit of Soil in Place by the Sand-Cone Method.

.4 ASTM D1557-09 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu ft (2,700 kN-m/cu m)).

.5 ASTM D2167-08 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

1.4 SUBMITTALS FOR INFORMATION

.1 Provide Departmental Representative with access to source and processed material for sampling and testing.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular base material (Class ‘A”) to following requirements:

.1 Gradation to be within following limits when tested to ASTM C136-84a and ASTM C117-87. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11-87.

ASTM Sieve Designation	% Passing
19.0 mm	100
9.51 mm	55 – 80
4.76 mm	35 – 60
1.20 mm	17 – 35
0.300 mm	7 – 20
0.075 mm	3 – 6 (Pit Source)
	3 – 8 (Rock Source)

.2 Liquid Limited ASTM D423-66 (1972) Maximum 25
.3 Plasticity Index ASTM D424-59 (1971) Maximum 0
.4 Los Angeles Abrasion ASTM C131-81 Max. % loss by weight: 35
.5 Crushed Fragments: 50% 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 retained on the 4.76 mm sieve.
.6 CBR: A.ASHTO T193-72 Min 100 when compacted to 100% of AASHTO T180-74 Method D.

.2 Granular sub-base material (Class “B”) to following requirements:

.1 Gradation to be within following limits when tested to ASTM C136-82 and ASTM C117-80. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, having a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11-87.

ASTM Sieve Designation	% Passing
50.8 mm	75 – 100
15.9 mm	45 – 80
4.76 mm	25 – 55
1.20 mm	12 – 35
0.300 mm	7 – 20
0.075 mm	3 – 6 (Pit Source)
	# - 8 (Rock Source)

.2 Other Properties as follows:
  .1 Liquid Limit ASTM D423-66 (1972) Maximum 25
  .2 Plasticity Index ASTM D424-59 (1971) Maximum 0
  .3 Los Angeles Abrasion ASTM C131-81 Max % Loss by Weight 35.
  .4 Crushed fragments: 50% 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 retained on the 4.76 mm sieve 5CBR: AASHTO T193-72 Minimum 100 when compacted to 100% of AASHTO T180-74 Method D.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

.1 Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

.2 Do not place fill on soft, muddy, or frozen surfaces.

3.3 INSPECTION OF UNDERLYING SUB-BASE OR SUB-GRADE

.1 The Contractor shall prepare the road surface in accordance with Section 31 22 13 to the satisfaction of the Departmental Representative before commencing placement of any selected granular base course materials.

3.4 TOLERANCES

.1 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 Departmental Representative, the methods and techniques used by the Contractor cannot overcome contamination or segregation, then the Departmental Representative may direct a modification in these methods which may require the use of an approved spreader box or other acceptable device.

3.5 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control.

.2 Compaction testing will be performed to ASTM D698 .

.3 If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Asphaltic concrete paving, wearing binder or base course.

.2 Surface sealer.

.3 Aggregate base course.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 78 00 – Close Out Submittals

.3 Section 32 17 24 – Painted Pavement Markings,

.4 Section 31 22 13 - Rough Grading.

.5 Section 31 23 23 - Backfilling.

.6 Section 32 11 23 - Aggregate Base Course,

.7 Section 32 13 15 - Concrete Sidewalks, Curbs, and Gutters,

1.3 REFERENCES

.1 ASTM D946/D946M-09a - Penetration-Graded Asphalt Cement for Use in Pavement Construction

.2 AI (Asphalt Institute) - MS-2 - Mix Design Methods for Asphalt (6th Edition).

.3 AI (Asphalt Institute) - MS-4-2007 – The Asphalt Handbook.

.4 AI (Asphalt Institute) - MS-19 - Basic Asphalt Emulsion Manual (2nd Edition).

.5 AI (Asphalt Institute) - MS-22 - Construction of Hot Mix Asphalt Pavements (2nd Edition).

1.4 SUBMITTALS FOR INFORMATION

.1 Submit asphalt concrete mix design to Departmental Representative for approval.

.2 Materials to be tested by testing laboratory approved by Departmental Representative.

.3 Submit test certificates showing suitability of materials at least 4 weeks prior to commencing work.

.4 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing work.

1.5 QUALITY ASSURANCE

.1 Perform Work to Government of Newfoundland & Labrador Municipal Water, Sewer and Road Master Construction Specifications.

.2 Mixing Plant: Conform to AI MS-4 Manual and Government of Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

.3 Obtain materials from same source throughout.

1.6 REGULATORY REQUIREMENTS

.1 Conform to applicable code for paving work on public and private property.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not place asphalt when ambient air or base surface temperature is less than 4 degrees C, or surface is wet or frozen.

.2 Place bitumen mixture when temperature is not more than 8 C degrees below bitumen suppliers bill of lading and not more than maximum specified temperature.

PART 2 - PRODUCTS

2.1 ASPHALT CEMENT

.1 Unless otherwise specified, asphalt cement shall conform to the requirements of the Canadian Standards Board Specification Can/CGSB-16.3 M 89 entitled “Asphalt Cement For Road Purposes”. The penetration grade of the asphalt cement shall be 150/200, Group B. Asphalt cement conforming to the current version of the Provincial Department of Transportation & Works Specifications Book Section 330 is also acceptable.

.2 The Contractor shall obtain from the manufacturer and furnish to the Departmental Representative/Architect, in tabular or graphic form, the temperature – viscosity relationship of the asphalt cement to be used.

.3 The Contractor shall supply the asphalt cement.

2.2 COARSE AGGREGATES

.1 Coarse Aggregates shall consist of hard, durable crushed stone particles of crushed gravel particles reasonably uniform in quality throughout and free from soft or disintegrated pieces. The portion of the material retained on the 4.76 mm sieve shall be known as coarse aggregate.

.2 Gravel shall be washed if necessary to have clean surface free from coatings of foreign matter.

.3 Coarse Aggregates shall conform to the physical requirements shown in Table 1.

TABLE 1: Physical Requirements for Coarse Aggregates

Los Angeles Abrasion* (Loss % Maximum)	ASTM C131-81	35
Absorption (% Maximum)	ASTM C127-84	2
Bulk Specific Gravity (Minimum)	ASTM C127-84	2.20
Soundness-Magnesium Sulphate – (5 cycle Max)	ASTM C88-83	15
Crushed Particles (% Minimum)		70
Flat and Elongated** Pieces (% Maximum)		10
Loss by Washing (% Maximum Passing 0.075 mm sieve)	ASTM C117-87	2

*Material with an abrasion ratio higher than 0.265, for 100-500 revolutions shall not be used without the written permission of the Departmental Representative.

**Flat and elongated pieces are those whose greatest dimension exceeds four times their least dimension.

.4 In addition to the requirements of Table 1, coarse aggregate proposed for use in surface course pavement will not be acceptable if more than 1% of the particles (expressed as a percentage of the weight of material retained on the 4.786 sieve), absorbs more than 5% by weight of water.

.5 The aggregates shall be of such nature that a thorough coating of asphalt cement will not strip off upon contact with water as determined by the Standard Method of Test for Coating and Stripping of Bitumen-Aggregate Mixtures (ASTM D1664-85).

.6 Irrespective of compliance with the physical requirements of Table 1, any aggregate may be accepted or rejected on the basis of past field performance.

.7 Coarse aggregate shall be supplied by the Contractor.

2.3 FINE AGGREGATES

.1 Fine aggregate shall consist of clean, tough, rough-surfaced grains, free from clay, loam and other foreign matter. As delivered to the mixer it shall be free from clayey lumps or loosely bonded aggregations, and the individual particles shall be free from adhering dust. The portion of the material passing the 4.76 mm sieve shall be known as fine aggregate.

.2 The aggregate shall be of such nature that a thorough coating of asphalt cement will not strip off upon contact with water as determined by the Standard Method of Test for Coating and Stripping of Bitumen-Aggregate Mixtures (ASTM D 1664-85).

.3 The physical requires in Table 1 for Coarse Aggregates shall also apply to fine aggregates for abrasion, absorption, bulk specify gravity and soundness.

.4 Any aggregate may be accepted or rejected on the basis of past field performance.

.5 Fine aggregates shall be supplied by the Contractor.

2.4 BLENDING SAND

.1 Blending sand shall consist of clean, tough, rough surfaced grains, free from clay, loam, or any foreign matter.

.2 The gradation of the blending sand shall be such that when used in the asphalt mix, the resulting mix shall meet the requirements of Tables 2 and 3 of this section. In any case, the blending sand shall have 100% (by dry weight) passing the 12.5 mm sieve and at least 50% (by dry weight) passing the 4.25 mm sieve. Blending sand shall be supplied by the Contractor.

2.5 MINERAL FILLER

.1 Where sufficient material passing the 0.075 mm sieve is not available in the aggregate the Contractor shall supply mineral filler approved by the Departmental Representative at no extra cost.

.2 Mineral filler shall consist of thoroughly dry stone dust, Portland cement, or other artificially or naturally powdered material dust, 65% to 100% of which will pass a 0.075 mm sieve.

2.6 COMPOSITION OF MIXTURE

.1 The mixture shall consist of uniformly graded fine and coarse aggregate and thoroughly mixed with asphalt cement as specified. Blending sand, mineral filler and chemical additives shall be added when required.

.2 Unless otherwise specified, the aggregates shall be combined in such proportions as to produce a mixture conforming to the grading and asphalt content requirements of Table 2.

TABLE 2: Asphalt Aggregate Mixtures

	Percent Passing by Dry Weight		
Sieve Size	Base Course	Surface Course	Leveling Course
19.0 mm	100	100	100
12.5 mm	80-100	97-100	100
4.76 mm	35-75	55-75	55-75
2.00 mm	20-60	35-55	35-55
0.425 mm	10-35	18-30	18-30
0.075 mm	0-8	0-8	0-8
Asphalt Content (% by weight of total mixture)	5.0-7.0	5.5-7.5	5.5-7.5

.3 Once an acceptable aggregate gradation is achieved in the crushing operation, the tolerances for subsequent production are as follows:

Tolerance for Production of Asphalt Aggregate

Aggregate Passing 4.76 sieve	5%
Aggregate Passing 2.00 mm sieve & 4.25 mm sieve	4%
Aggregate Passing 0.075 mm sieve	2%

.4 Aggregate gradation and asphalt cement content of the mixture shall be as specified in the approved mix design. Asphalt cement contents varying from that specified in the mix design by more than 0.25% shall be unacceptable.

.5 Asphaltic Levelling Course shall consist of asphaltic surface course asphaltic concrete, except on those projects where there is not item for Asphaltic Surface Course, in which case Asphaltic Base Course may be used instead.

2.7 PHYSICAL REQUIREMENTS FOR MIXTURE

.1 The aggregates and the asphalt cement shall be mixed in such proportion as to satisfy the criteria contained in Table 3. These criteria are based on the Standard Marshall Test Procedures and using a compactive effort of 75 blows on each face of the specimen, or other compactive effort found necessary during the mix design.

TABLE 3: Physical Requirements

Base and Surface Course Paving Mixtures

	Min.	Max.
Marshall Stability kg. at 60°C	550	-
Marshall Flow Index units of 0.25 mm	10	17
% Air Voids	3	5
% Voids in Compacted Mineral Aggregate	15	-

2.8 EQUIPMENT

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers for parking lots and driveway:
- .1 Minimum drum diameter: 750mm.
- .2 Maximum amplitude of vibration (machine setting): 0.5mm for lifts less than 40mm thick.

.4 Haul trucks: of sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
- .1 Boxes with tight metal bottoms.
- .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
- .3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.5 Suitable hand tools.

2.9 SOURCE QUALITY CONTROL AND TESTS

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control.

.2 Submit proposed mix design of each class of mix for review prior to beginning of work.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

3.2 SUBGRADE SURFACE PREPARATION AND INSPECTION

.1 Verify grades of subgrade drains and other items set in paving area for conformity with elevations and sections before placing granular base material.

.2 Obtain approval of subgrade by Departmental Representative before placing granular base.

3.3 GRANULAR BASE AND GRANULAR SUBBASE

.1 Place granular base and sub-base material on clean unfrozen surface, free from snow and ice.

.2 Place granular base and sub-base to compacted thicknesses as indicated. Do not place frozen material.

.3 Place in layers not exceeding 150 mm compacted thickness. Compact to density not less than 98% maximum dry density in accordance with ASTM D698.

.4 Finished base surface to be within 10 mm of specified grade, but not uniformly high or low

3.4 ASPHALT- PRIMER

.1 Emulsified asphalt:
- .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved by Departmental Representative.
- .2 Apply diluted asphalt emulsion at rate directed by Departmental Representative but do not exceed 5 L/m^2.
- .3 Apply on damp surface unless otherwise directed by Departmental Representative.

.2 Do not apply prime when air temperature is less than 5˚C or when rain is forecast within 2 hours.

.3 If asphalt prime fails to set within 24 hours, spread sand blotter material in amounts required to absorb excess material. Sweep and remove excess blotter material.

3.5 PREPARATION - TACK COAT

.1 Obtain Departmental Representative's approval of existing surface before applying asphalt tack coat. Clean surface as required.

.2 Tack coat shall only be placed on surfaces that are clean and dry and then only when the atmospheric temperature is at least 10°C.

.3 Should the surface to be treated be dirty, then the Contractor shall thoroughly clean the surface by means of a power broom, or equivalent.

.4 Tack Coat shall be placed on surfaces that have been approved by the Departmental Representative.

.5 The Contractor shall plan his work so that no more tack coat than is necessary for the days paving operation is applied at one time.

.6 To avoid nuisance and possible property damage to the travelling public, the Contractor shall install portable traffic lights or other means of directing one-way traffic while working on the adjacent part of the road.

.7 The type RC-70 tack coat shall be applied at a temperature between 38°C and 80°C and at a rate of 0.25 L/m² on old pavement. Care must be exercised not to exceed the recommended application rate. However, on pavement which was placed during the previous construction season the rate of application shall be as directed by the Departmental Representative. The rate will not exceed the rate for old pavement.

.8 The type RS-1k tack coast shall be applied at a temperature between 38°C and 80°C and at a rate of 0.15 L/m² o old pavement. Care must be exercised not to exceed the recommended application rate. However, on pavement which was placed during the previous construction season the rate of application shall be as directed by the Departmental Representative. The rate will not exceed the rate for old pavement.

.9 The type SS-1h emulsion shall be diluted with an equal volume of water prior to the application. The diluted Ss-1h emulsion shall be applied at a rate of 0.5 L/m² of diluted emulsion on old pavement. Both the mixing temperature and the application temperature shall be between 20°C and 50°C. Care must be exercise not to exceed the recommended application rate. However, on pavement which was placed during the previous construction season the rate of application shall be as directed by the Departmental Representative. The rate will not exceed the rate for old pavement.

3.6 PLACING ASPHALT COURSES

.1 The base on which paving is to take place shall be cleaned of all loose or foreign material before paving may take place.

.2 The asphaltic mixture shall be laid only upon a base which is dry or at least free from standing water, and when weather conditions are suitable. No paving shall take place during rain.

.3 No course shall be placed upon a previously laid course less than 12 hours after final compaction of the latter, except with the permission of the Departmental Representative in circumstances where in his opinion this requirement would be impractical.

.4 No hot mix shall be placed unless the air temperature at the surface of the road is 7°C or above without the written permission of the Departmental Representative.

.5 The temperature of the mixture immediately after spreading and prior to initial rolling shall not be less than 125°C.

.6 The width of succeeding courses shall be adjusted by an offset of width of from 150 mm to 300 mm so that longitudinal joints do not coincide.

.7 The longitudinal joints in the surface course shall correspond to the demarcation between driving lanes, speed change lanes, tapers, etc. indicated in the contract or as directed by the Departmental Representative.

.8 Immediately after any course is laid and before roller compaction is started the surface and edges shall be checked and any irregularities adjusted by the addition or removal of mixture.

.9 All pavers which are equipped with a tampering device or other mechanical apparatus designed to aid compaction of the mixture shall have such devices operating continuously when the mixture is being placed

unless otherwise directed. Where screed extensions are used, such extensions shall be designed so that the tamping or vibratory action of the screed is effectively transferred to the extensions in such manner as to provide a uniform degree of initial compaction across the full width of the freshly laid mat.

.10 To ensure continuous operation of the pavers they shall operate at whatever speed necessary to match the output of the plant provided that a consistent and satisfactory mat is being laid. However, in no case shall the speed of the paver exceed 0.7 km/h.

.11 When two or more pavers are in echelon, pavers following the lead paver shall use the joint shoes, designed for the purpose, which shall ride on the previously placed undisturbed mat. Pavers are considered to be paving in echelon when the lead paver is not more than 60 m in advance of an adjacent succeeding paver.

.12 Mixtures may be spread by hand only in places inaccessible to the paver. Hand placing shall be from a steel dump board by means of hot shovels. Hand spreading shall be with rakes of suitable design. The mixture shall be spread to the depth required to give the compacted design thickness after rolling.

.13 No loads of mixtures shall leave the plant so late in the day as to preclude the spreading and compacting of the mixture during daylight.

.14 End of Paving Season for Asphaltic Concrete:

.1 The season for laying asphaltic base course shall end on the 15th of November each year, unless extended by the Departmental Representative.

.2 The season for laying asphaltic surface course shall end on the 15th of October, unless extended by the Departmental Representative.

.15 Joints:

.1 All joints shall be made in such a manner as to ensure a thorough and continuous bond and to provide a smooth riding surface.

.2 All foreign material and all loose material, shall be removed from all faces against which joints are to be made. All cold faces against which joints are to be made shall be cut back to full depth to expose a fresh vertical face, and painted with a continuous thin coating of hot asphalt cement.

.3 Longitudinal joints shall be rolled immediately upon placement of the fresh mixture and before the adjacent strip has completely cooled. The joint shall be set-up with the back of a rake or lute at proper height and grade to receive the required compression under rolling.

.4 The depth of the newly laid mat shall be adjusted to allow for compaction.

.5 The paver shall overlap the existing mat by at least 50 mm.

.6 On surface courses the method of making joints shall be such that the excess material is not scattered on the surface of the freshly laid mat. Such excess material shall be carefully removed and disposed of as directed.

.7 Transverse joint shall be checked with a straight edge immediately after initial rolling. Any irregularity in the pavement surface at the joint shall immediately be corrected by the addition of or removal of mixture. When possible, the transverse joints shall be initially rolled in a direction perpendicular to the direction of paving.

.16 General Requirements for Compaction:

.1 The mixture shall be compacted to a density of 97% of the density of the laboratory compacted mixture based on the criteria given in 2.7 Physical Requirements for Mixture.

.2 It is an express condition of this specification that all mixtures be compacted to the specified density immediately following placement. If, during the course of the paving operation, measured insitu densities fall below the specified minimum, the Contractor shall revise his operation by slowing the rate

of progress of the pavers, by using additional rollers or by any other means necessary to achieve the specified degree of compaction.

.3 Rollers should normally operate with the drive wheel forward in the direction of paving. In all cases, the production and placing of mixture shall be controlled so that all rolling shall be completed before sunset.

3.7 SEAL COAT

.1 Apply seal coat to surface course to AI MS-19.

3.8 TOLERANCES

.1 Section 01 00 00 General Requirements; 01 73 00: Execution

.2 Flatness: Maximum variation of 10 mm measured with 3 m straight edge.

.3 Scheduled Compacted Thickness: Within 10.

.4 Variation from True Elevation: Within 10 mm

3.9 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00: Quality Control

3.10 PROTECTION OF FINISHED WORK

.1 Immediately after placement, protect pavement from mechanical injury for one (1) day or until surface temperature is less than 38 degrees C.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Asphaltic concrete pavement sealing.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 78 00 – Close Out Procedures

.3 Section 32 12 16: Asphalt Paving

1.3 REFERENCES

.1 AI (Asphalt Institute) MS-19 - Basic Asphalt Emulsion Manual.

1.4 QUALITY ASSURANCE

.1 Perform Work to Government of Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Do not place asphalt seal coat when ambient air or base surface temperature is less than 4 degrees C, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fine Aggregate: As specified in Section 31 05 16 – Aggregate Materials.

.2 Fine Aggregate: In accordance with Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

.3 Seal Coat: AI MS-19fog type.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify existing base conditions before starting work.

.2 Verify that compacted asphalt pavement is ready to receive seal coat.

3.2 SEAL COAT

.1 Apply seal coat to surface course in accordance with Government of Newfoundland & Labrador Municipal Water, Sewer and Roads Master Construction Specifications.

3.3 PROTECTION OF FINISHED WORK

.1 Immediately after placement, protect sealed pavement from mechanical injury for one (1) day or until surface temperature is less than 38 degrees C.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Formed and reinforced concrete sidewalks, street side curbs and gutters.

.2 Paraplegic ramps.

1.2 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 30 00 - Cast-in-Place Concrete.

.4 Section 31 23 16 - Excavating.

.5 Section 31 23 23 – Backfilling.

1.3 REFERENCES

.1 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.2 CSA-A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete.

1.4 TESTING

.1 Testing of concrete to CAN3-A23.1 and requirements of Section 03 30 00 – Cast-in-Place Concrete.

1.5 ENVIRONMENTAL CONDITIONS

.1 If temperature is below 5 degrees C or if Departmental Representative anticipates a temperature drop below this value within the next 24 hours, take all necessary measures to protect concrete from freezing.

.2 Do not place concrete on frozen Base.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Section 31 05 16: Aggregate Materials

.2 Granular Base: Sections 31 23 16 – Excavating, and 31 23 23 – Backfilling, for excavating, fill and compaction.

.3 Forms: Section 03 10 00.

.4 Reinforcement: Section 03 20 00.

.5 Concrete Mix and Materials: Section 03 30 00.

.6 Curing Compound: Section 03 30 00.

.7 Joint filler: Section 03 30 00.

.8 Wire Mesh to CSA G30.5-M 1983 (R1991)

.9 Form Release Agent: Non-staining mineral type, chemically active containing compounds that react to provide a water soluble soap for ease of release.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Do grade preparation work in accordance with Sections 31 23 16 – Excavating, 31 23 18 – Trenching and 31 23 23 – Backfilling

.2 Construct embankments using excavated material free from organic matter or other objectionable materials. Dispose of surplus and unsuitable excavated material off site.

.3 Place fill in maximum 150 mm layers and compact to at least 95% of maximum density to ASTM D698.

.4 Ensure that Sub Grade, Granular Sub Base and Granular Base preparation has been inspected and approved by Departmental Representative before commencing work.

3.2 GRANULAR SUB BASE

.1 Obtain Departmental Representative's approval of subgrade before placing granular sub base.

.2 Place granular sub-base material to lines, widths, and depths as indicated.

.3 Compact granular sub base to at least 100% of maximum dry density to ASTM D698.

3.3 FORMING

.1 Form vertical surfaces to full depth using forming material that will not deform under loading by plastic concrete.

.2 Securely position forms to required lines and grades.

.3 Coat forms with form release agent.

.4 Obtain approval of forms before placing concrete.

.5 Install metal fabrication as required.

3.4 CONCRETE

.1 Obtain Departmental Representative's approval of granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.3 Finish exposed surface to a smooth, uniform finish, free of open texturing and exposed aggregate. Do not work more mortar to the surface that required. Do not use neat cement as a dryer to facilitate finishing.

.4 Wood float finish surface to provide no-skid texture.

.5 Immediately after floating, give sidewalk surface uniform finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.

.6 Provide edging as indicated with 10 mm radius edging tool.

.7 Cure and protect concrete in accordance with CAN3-A23.1.

3.5 TOLERANCES

.1 Finish surfaces to within 3mm in 3m as measured with 3m straightedge placed on surface.

3.6 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m.

.2 Install expansion joints at intervals of 6 m.

.3 Install expansion joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.4 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

.5 Install joint filler in expansion joints as indicated.

3.7 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

.2 Install joint filler in isolation joints as indicated.

3.8 CURING

.1 Cure concrete by adding moisture continuously to CSA-A23.1, to exposed finished surfaces for minimum one (1) day after placing, or by sealing moisture by a surface curing compound approved by Departmental Representative.

.2 Apply curing compound evenly to form continuous film to compound manufacturer's requirements.

3.9 PARAPLEGIC RAMPS

.1 Install paraplegic ramp as indicated on construction drawings.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Painted pavement markings

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 78 00 Close Out Submittals

.3 Section 32 01 11 – Pavement Surface Cleaning

.4 Section 32 12 16 – Asphalt Paving

1.3 REFERENCES

.1 CAN/CGSB-1.5-M91 - Low Flash Petroleum Spirits Thinner.

.2 CGSB-1-GP-71-96 - Method of Testing Paints and Pigments.

.3 CAN/CGSB-1.74-2001 - Alkyd Traffic Paint.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 00 00 General Requirements; 01 31 00 Project managing and coordination.

.2 Coordination:
- .1 Coordinate with other work having a direct bearing on work of this section.
- .2 Coordinate with installation of surrounding surfaces, and signage and supports.

1.5 SUBMITTALS FOR REVIEW

.1 Samples: Submit to the following material quantities four (4) weeks prior to commencing work.
- .1 Quantity: Two (2) samples of each type and colour.
- .2 Size: One (1) L.
- .3 Sampling: CGSB-1-GP-71.
- .4 Mark samples with:
  - .1 Project name and location.
  - .2 Paint manufacturer name and address.
  - .3 Paint Name.
  - .4 CGSB-specification number.
  - .5 Formulation and batch number.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Apply paint only when ambient temperature is above 10 degrees C and no rain is forecast, unless approved otherwise by Departmental Representative.

1.7 WARRANTY

.1 Provide a two (2) year warranty to include coverage for failure to meet specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint: Alkyd traffic paint, to CAN/CGSB-1.74.
  .1 Colours: Yellow, White and Blue.

.2 Thinner: Petroleum spirits, low flash to CAN/CGSB-1.5.

.3 Glass beads: Overlay type to CAN/CGSB-1.74.

2.2 EQUIPMENT REQUIREMENTS

.1 Paint Applicator:
  .1 Pressure distributor.
  .2 Capable of applying paint in single and dashed lines.
  .3 Ensure uniform application.
  .4 Equip with positive shut-off.

.2 Apply reflective glass beads as an overlay on freshly applied paint.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Assure pavement surface free of surface water, snow, frost, ice, dust, oil, and other foreign materials.

.2 Provide adequate warning signs and traffic devices to prevent fresh-paint tracking by traffic.

3.2 APPLICATION

.1 Lay out pavement markings prior to applying paint, to approval of Departmental Representative.

.2 Apply traffic paint evenly at rate of 3 square metres per litre

.3 Do not thin paint unless approved by Departmental Representative.

.4 Symbols and letters to conform to dimensions indicated.

.5 Paint lines of uniform colour and density with clean edges.

.6 Thoroughly clean distributor tank before refilling with paint of different colour.

3.3 TOLERANCES

.1 Painted Markings:
  .1 Maximum Variation from Required Line Width Dimensions: Plus or minus 12 mm.
  .2 Maximum Variation from Required Length Dimensions: Plus or minus 12 mm.
  .3 Remove Incorrect Markings.

3.4 CLEANING

.1 Section 01 00 00 General Requirements; 01 74 00 Cleaning.

.2 Remove all debris, rubbish, and excess material.

3.5 PROTECTION OF FINISHED WORK

.1 Protect installed work.

.2 Protect pavement markings from any disfigurement, until dry.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Preparation and placing of subsoil.

.2 Fertilizing.

.3 Sod installation.

.4 Maintenance.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 – Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 78 00 00 – Close Out Submittals

.3 Section 31 05 13 - Soil Materials.

.4 Section 31 22 19 - Finish Grading.

.5 Section 31 23 18 - Trenching.

.6 Section 31 23 23 - Backfilling.

1.3 REFERENCES

.1 ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.

1.4 DEFINITIONS

.1 Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 00 00 General Requirements; 01 31 00 Project Management and Coordination

.2 Coordination:
.1 Coordinate with other work having a direct bearing on work of this section.

.3 Sequencing: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.6 SUBMITTALS FOR INFORMATION

.1 Obtain approval of samples by Departmental Representative.

1.7 CLOSEOUT SUBMITTALS

.1 Maintenance Contracts:
  .1 Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for two (2) cuttings.

1.8 QUALITY ASSURANCE

.1 Sod: Minimum age of eighteen (18) months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

.2 Submit sod certification for grass species and location of sod source.

1.9 REGULATORY REQUIREMENTS

.1 Comply with regulatory agencies for fertilizer and herbicide composition.

.2 Provide certificate of compliance from authority having jurisdiction indicating approval of fertilizer and/or herbicide mixture.

1.10 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 00 00 General Requirements; 01 61 00 Common Product Requirements.

.2 Deliver sod in rolls. Protect exposed roots from dehydration.

.3 Do not deliver more sod than can be laid within twenty-four (24) hours.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
  .1 Number one Named Cultivars: Nursery Sod grown from certified seed.
  .2 Turf Grass Nursery Sod Quality:
    .1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.
    .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
    .3 Mowing height limit: 35 to 65 mm.
    .4 Soil portion of sod: 6 to 15 mm in thickness.

.2 Sod establishment support:
  .1 Geotextile fabric: biodegradable, 25 mm square mesh.
  .2 Wooden pegs: 17 x 8 x 250 mm.

.3 Water:
  .1 Potable, free of impurities.

.4 Fertilizer:
  .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".

.2 Fertilizer shall be 6-12-12 grade, uniform in composition, free flowing and suitable for application with approved equipment delivered to the site in bags or other convenience containers, each fully labelled, conforming to the applicable local government laws, and bearing the name, trademark or tradename and warranty of the producer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that prepared soil base is ready to receive the work of this section.

3.2 PREPARATION OF SUBSOIL

.1 Prepare subsoil and eliminate uneven areas and low spots.

.2 Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

.3 Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.

.4 Remove contaminated subsoil.

.5 Scarify subsoil to a depth of 100 mm where topsoil is to be placed.

.6 Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.3 PLACING TOPSOIL

.1 Spread topsoil to a minimum depth of 150 mm over area to be sodded.

.2 Place topsoil during dry weather and on dry unfrozen subgrade.

.3 Remove vegetable matter and foreign non-organic material from topsoil while spreading.

.4 Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

.5 Install edging at periphery of sodded areas in straight lines to consistent depth.

3.4 FERTILIZING

.1 Fertilize during establishment and warranty periods to following program agreed to by Departmental Representative.

3.5 LAYING SOD

.1 Lay sod within 24 hours of being lifted.

.2 Lay sod sections in rows, longitudinally, along contours of slopes, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.4 Sods and hydroseeding placed in the Fall will not be accepted until the following June.

.5 No topsoil, sod or seed shall be placed before May 1st or after November 1st of any year.

3.6 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

.2 Start laying sod at bottom of slopes.

.3 Lay sod sections longitudinally, along contours of slopes as indicated.

.4 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catchbasins and within 1 m of drainage channels and ditches to following pattern:

.1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
.2 Not less than 9 pegs per square metre.
.3 Not less than 12 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.
.4 Drive pegs to 20 mm above soil surface of sod sections.

3.7 MAINTENANCE

.1 Mow grass at regular intervals to maintain at a maximum height of 50 mm. Do not cut more than 1/3 of grass blade at any one mowing.

.2 Neatly trim edges and hand clip where necessary.

.3 Immediately remove clippings after mowing and trimming.

.4 Water to prevent grass and soil from drying out.

.5 Roll surface to remove minor depressions or irregularities.

.6 Control growth of weeds. Apply herbicides in accordance with manufacturer's written instructions. Remedy damage resulting from improper use of herbicides.

.7 Immediately replace sod to areas which show deterioration or bare spots.

.8 Protect sodded areas with warning signs during maintenance period.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 HDPE pipe culvert, joints and accessories.

.2 Bedding and slope protection at pipe end.

1.2 RELATED SECTIONS

.1 Section 01 00 00 General Requirements; 01 33 00 - Submittal Procedures

.2 Section 01 00 00 General Requirements; 01 78 00 – Close Out Submittals

.3 Section 31 23 16 - Excavating: Excavating for culvert piping.

.4 Section 31 23 16 - Excavating: Backfilling over piping, granular pipe covering up to underside of fill under paving.

.5 Section 03 30 00 - Cast-in-place Concrete: Concrete grout fill to adjacent construction.

1.3 PRICE AND PAYMENT PROCEDURES

.1 Pipe Culvert: By the total linear metre invert length of pipe and the diameter in Includes excavating; removing soft subsoil, bedding fill, compacting; pipe, fittings and accessories assembled.

1.4 REFERENCES

.1 AASHTO T180-09 - Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.2 CSA B182.6-M92 – Profile Polyethylene Sewer Pipe and Fittings

.3 ASTM F667-12 Standard Specification for 3 through 24 inch Corrugated Polyethylene Pipe and Fittings.

.4 ASTM D698-07e1 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/cu ft (600 kN-m/cu m)).

.5 ASTM D6938-10 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 00 00 General Requirements; 01 31 00 Project Management and Coordination.

1.6 SUBMITTALS FOR REVIEW

.1 Product Data: Provide data on pipe, fittings and accessories.

1.7 SUBMITTALS FOR INFORMATION

.1 Installation Data: Manufacturer's special installation requirements.

1.8 CLOSEOUT SUBMITTALS

.1 Accurately record actual locations of pipe runs, connections, and invert elevations.

.2 Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.9 REGULATORY REQUIREMENTS

.1 Conform to applicable code for materials and installation of the work of this section.

PART 2 - PRODUCTS

2.1 HDPE

.1 Substitutions: Not permitted.

.2 HDPE:
.1 Corrugated Double Wall Pipe. Pipes to have smooth inner work.
.2 Shape: Circular with a nominal diameter of 450 mm. Pipes may be bell and spigot style or plain end.

.3 Coupling Bands: As recommended by manufacturer.

2.2 BEDDING AND COVER MATERIALS

.1 Bedding: Type 1 Bedding as specified in Section 31 23 18. Cover: Backfill Materials, as specified in Section 31 23 23.

2.3 ACCESSORIES

.1 Pipe Ends Treatment: Flat stone to nominal size of 300 – 400 mm with hand laid sod.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

.1 Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

.1 Excavate culvert trench to 300 mm below pipe invert, as specified in Section 31 23 18 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

.2 Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 150 mm compacted depth, compact to 100%.

.3 Backfill around sides and to top of pipe with fill, tamped in place and compacted to 100%.

.4 Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

.1 Install pipe and accessories to manufacturer's written instructions

.2 Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

.3 Shore pipe to required position; retain in place until after compaction of adjacent fills. Ensure pipe remains in correct position and to required slope.

.4 Repair surface damage to pipe protective coating with two coats of compatible bituminous paint coating.

.5 Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 300 mm.

.6 Install culvert end treatment as noted on drawings.

.7 Refer to Section 31 23 18 for trenching requirements. Do not displace or damage pipe when compacting.

3.5 PIPE ENDS

.1 Place fill at pipe ends, at embankment slopes as indicated.

3.6 ERECTION TOLERANCES

.1 Lay pipe to alignment and slope gradients noted on Drawings; with maximum variation from true slope of 3 mm in 3 m

.2 Maximum Variation From Intended Elevation of Culvert Invert: 3 mm

.3 Maximum Offset of Pipe From True Alignment: 25 mm.

3.7 FIELD QUALITY CONTROL

.1 Section 01 00 00 General Requirements; 01 45 00 Quality Control.

.2 Request inspection prior to and immediately after placing aggregate cover over pipe.

.3 Compaction testing will be performed in accordance with ASTM D698.

.4 If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.8 PROTECTION OF FINISHED WORK

.1 Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

3.9 SCHEDULES

.1 Culverts Within Site Area: CDW; sizes noted on drawings, flat stone at pipe ends.

END OF SECTION