TABLE OF CONTENTS
Fort Mississauga National Historic Site - Landscape
Fall 2019

1. **OWNER:**
   Parks Canada
   30 Victoria St
   Gatineau, QC., J8X 0B3

2. **PROJECT:**
   Fort Mississauga National Historic Site - Landscape
   Fort Mississauga National Historic Site
   223 Queen St, Niagara-on-the-Lake, Ontario, L0S 1J0

3. **PROFESSIONAL SEALS AND SIGNATURES**

   1. Professional seals and signatures are provided as required by the Ontario Building Code (latest edition), Ontario Regulation 403/97 **(350/06)**, Subsection 2.3.1 **Division C, Part 1, Subsection 1.2.2)** and all amendments thereto, for the Project stated above and apply only to those documents and specifications prepared by the respective Landscape Architect. The Professional seals and signatures stated above are as follows:

LANDSCAPE ARCHITECT OF RECORD:

WSP CANADA GROUP LIMITED

Address: 582 Lancaster Street West
Kitchener, ON., N2K 1M3

Ben Vander Veen **October 7, 2019**
Landscape Architect of Record Date

---------- END OF SECTION ----------

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 56 00 – Temporary Barriers and Enclosures.
2. WORK COVERED BY CONTRACT DOCUMENTS
   1. ~~Work of this Contract comprises general construction of~~ limestone trails, concrete pads, ~~retaining walls,~~ culverts, rip rap swales, site furniture, ~~golf safety net~~ and landscaping, located at 223 Queen St, Niagara-on-the-Lake, Ontario; and further identified as Fort Mississauga National Historic Site.
3. CONTRACT METHOD
   1. Construct Work under single, stipulated price contract.
4. WORK BY OTHERS
   1. Work of Project executed prior to start of Work of this Contract, and which is specifically excluded from this Contract:
      a. Spring/Summer 2019 Breakwall Project
         Contractor: Seawaves Development Services Inc.
   2. Work of Project which will be executed after completion of Work of this Contract, and which is specifically excluded from this Contract:
      a. Breakwall construction
      b. Breakwall access road/trail
5. FUTURE WORK
   1. Ensure that Work avoids encroachment into areas required for future work.
6. WORK SEQUENCE
   1. Construct Work in stages to accommodate Owner's continued use of premises during construction.
   2. Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
   3. Required stages:
      a. Removal and herbicide treatment of trees
      b. All other items
   4. Construct Work limited to west entrance to breakwall from Queen Street parking lot, breakwall vegetated slope. Fort Mississauga earthworks and Niagara-on-the-Lake Golf Course (limited to area directly adjacent to Fort Mississauga earthworks).
   5. Golf course in use during project works.
7. CONTRACTOR USE OF
   1. Limit use of premises for Work, for storage, and for access, to

PREMISES

allow:

a. Owner occupancy.
b. Work by other contractors.
c. Public usage.

2. Co-ordinate use of premises under direction of Departmental Representative.

3. At completion of operations condition of existing work: equal to or better than that which existed before new work started.

8. OWNER OCCUPANCY

1. Owner will occupy premises during entire construction period for execution of normal operations. Golf course users will be present directly adjacent to construction limits during daylight hours.

2. Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

9. OWNER FURNISHED ITEMS

1. Owner Responsibilities:

a. Review shop drawings, product data, samples, and other submittals. Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
b. Inspect deliveries jointly with Contractor.

2. Contractor Responsibilities:

a. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Departmental Representative.
b. Deliver supplier's bill of materials to Departmental Representative.
c. Arrange and pay for delivery to site in accordance with Progress Schedule.
d. Designate submittals and delivery date for each product in progress schedule.
e. Review shop drawings, product data, samples, and other submittals. Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
f. Receive and unload products at site.
g. Inspect deliveries jointly with Departmental Representative; record shortages, and damaged or defective items.
h. Handle products at site, including uncrating and storage.
i. Protect products from damage, and from exposure to elements.
j. Assemble, install, connect, adjust, and finish products.
k. Provide installation inspections required by public authorities.
l. Repair or replace items damaged by Contractor or subcontractor on site (under Contractor’s control).
m. Arrange for manufacturer's field services; arrange for and

deliver manufacturer's warranties and bonds to the Departmental Representative.

10. EXISTING SERVICES

1. Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
2. Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic and tenant operations.
3. Provide alternative routes for pedestrian and vehicular traffic.
4. Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
5. Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
6. Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
7. Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
8. Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
9. Record locations of maintained, re-routed and abandoned service lines.
10. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

11. DOCUMENTS REQUIRED

1. Maintain at job site, one copy each document as follows:
   a. Contract Drawings.
   b. Specifications.
   c. Addenda.
   d. Reviewed Shop Drawings.
   e. List of Outstanding Shop Drawings.
   f. Change Orders.
   g. Other Modifications to Contract.
   h. Field Test Reports.
   i. Copy of Approved Work Schedule.

j. Health and Safety Plan and Other Safety Related Documents.
k. Other documents as specified.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS	1. Section 01 56 00 - Temporary Barriers and Enclosures
2. ACCESS AND EGRESS	1. Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
3. USE OF SITE AND FACILITIES	1. Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative. Submit a plan, along with a staging map, identifying construction staging to facilitate site usage per special provisions. 2. Maintain existing services to golf course and provide for personnel and vehicle access. 3. Where security is reduced by work provide temporary means to maintain security. 4. Owner will not provide sanitary facilities for use by Contractor's personnel. Contractor to provide facilities if necessary. 5. Accept liability for damage, safety of equipment and overloading of existing equipment. 6. Closures: protect work temporarily until permanent enclosures are completed.
4. ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING	1. Execute work with least possible interference or disturbance to site operations, occupants, employees, public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
5. EXISTING SERVICES	1. Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission. 2. Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends. 3. Provide for personnel, pedestrian and vehicular traffic. 4. Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
6. SPECIAL REQUIREMENTS	1. Carry out noise generating Work Monday to Friday from 7:00am to 7:00pm hours.

2. Submit schedule to Departmental Representative prior to construction start.

3. Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

4. Keep within limits of work and avenues of ingress and egress.

5. Ingress and egress of Contractor vehicles at site is limited to 1 access points.

6. Buried artifacts, the remains and evidence of ancient persons and peoples, and any objects of historic value and worth, remains the property of the crown. Any and all such objects shall be protected and immediately brought to the knowledge of the Departmental Representative.

7. SECURITY

1. Where security has been reduced by Work of Contract, provide temporary means to maintain security.

8. SMOKING ENVIRONMENT

1. Comply with smoking restrictions. Smoking is not permitted.

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 21 00 – Allowances
   2. Section 03 30 00 – Cast-in-Place Concrete
   3. Section 32 11 16_01 – Granular Sub-Base
2. APPOINTMENT AND PAYMENT
   1. 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 the Departmental Representative to verify acceptability of corrected work.
3. CONTRACTOR'S RESPONSIBILITIES
   1. Provide labour, equipment and facilities to:
      a. Provide access to Work for inspection and testing.
      b. Facilitate inspections and tests.
      c. Make good Work disturbed by inspection and test.
      d. Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
   2. Notify Departmental Representative and Testing Agencies 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test. Notification to Departmental Representative and Testing Agency requires a response. Email with no response will not be considered an acceptable means of notification.
   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 the Departmental Representative.

PART 2 - PRODUCTS

NOT USED Not Used.

PART 3 - EXECUTION

NOT USED Not Used.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 33 00 - Submittal Procedures
   2. Section 01 52 00 - Construction Facilities
   3. Section 01 56 00 - Temporary Barriers and Enclosures
   4. Section 01 78 00 - Closeout Submittals

2. ADMINISTRATIVE
   1. Departmental Representative to schedule and administer project meetings throughout the progress of the work.
   2. Departmental Representative to prepare agenda for meetings.
   3. Departmental Representative to distribute written notice of each meeting five days in advance of meeting date to Contractor.
   4. Contractor to provide physical space and make arrangements for meetings.
   5. Departmental Representative to preside at meetings.
   6. Departmental Representative to record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
   7. Departmental Representative to reproduce and distribute copies of minutes within five days after meetings and transmit to meeting participants and affected parties not in attendance.
   8. Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

3. PRECONSTRUCTION MEETING
   1. Within 10 days after award of Contract, Departmental Representative to request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
   2. Departmental Representative, Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
   3. Departmental Representative to establish time and location of meeting and notify parties concerned minimum five days before meeting.
   4. Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
   5. Agenda to include:
      a. Appointment of official representative of participants in the Work.
      b. Schedule of Work.
      c. Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section

01 33 00 - Submittal Procedures.

d. Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
e. Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
f. Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
g. Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
h. Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
i. Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
j. Monthly progress claims, administrative procedures, photographs, hold backs.
k. Appointment of inspection and testing agencies or firms.
l. Insurances, transcript of policies.

6. PROGRESS MEETINGS

1. During course of Work and 4 weeks prior to project completion, schedule progress meetings weekly.

2. Contractor, major Subcontractors involved in Work, Contract Administrator and tentatively Departmental Representative are to be in attendance.

3. Departmental Representative to notify parties minimum five days prior to meetings.

4. Departmental Representative to record minutes of meetings and circulate to attending parties and affected parties not in attendance within five days after meeting.

5. Agenda to include the following:
   a. Review, approval of minutes of previous meeting.
   b. Review of Work progress since previous meeting.
   c. Field observations, problems, conflicts.
   d. Problems which impede construction schedule.
   e. Review of off-site fabrication delivery schedules.
   f. Corrective measures and procedures to regain projected schedule.
   g. Revision to construction schedule.
   h. Progress schedule, during succeeding work period.
   i. Review submittal schedules: expedite as required.
   j. Maintenance of quality standards.
   k. Review proposed changes for effect on construction schedule and on completion date.
   l. Other business.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 45 00 - Quality Control

2. ADMINISTRATIVE
   1. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
   2. Do not proceed with Work affected by submittal until review is complete.
   3. Present shop drawings, product data, samples and mock-ups in SI Metric units.
   4. Where items or information is not produced in SI Metric units converted values are acceptable.
   5. 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 considered rejected.
   6. Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
   7. Verify field measurements and affected adjacent Work are co-ordinated.
   8. Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.
   9. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved Departmental Representative review.
   10. Keep one reviewed copy of each submission on site.

3. SHOP DRAWINGS AND PRODUCT DATA
   1. The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
   2. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

3. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

4. Allow 5 days for Consultant's review of each submission.

5. Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

6. Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

7. Accompany submissions with transmittal letter, in duplicate, containing:
    a. Date.
    b. Project title and number.
    c. Contractor's name and address.
    d. Identification and quantity of each shop drawing, product data and sample.
    e. Other pertinent data.

8. Submissions include:
    a. Date and revision dates.
    b. Project title and number.
    c. Name and address of:
        i. Subcontractor.
        ii. Supplier.
        iii. Manufacturer.
    d. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    e. Details of appropriate portions of Work as applicable:
        i. Fabrication.
        ii. Layout, showing dimensions, including identified field dimensions, and clearances.
        iii. Setting or erection details.
        iv. Capacities.
        v. Performance characteristics.
        vi. Standards.
        vii. Operating weight.
        viii. Wiring diagrams.
        ix. Single line and schematic diagrams.
        x. Relationship to adjacent work.

9. After Consultant review, distribute copies.

10. Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

11. Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

12. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
    a. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
    b. Testing must have been within 3 years of date of contract award for project.

13. Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.

14. Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

15. Certificates must be dated after award of project contract complete with project name.

    a. Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Consultant.
    b. Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
    c. Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

16. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

17. Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

18. If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation

of Work may proceed.

4. SAMPLES

1. Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.
2. Deliver samples prepaid to Consultant's business address or email.
3. Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
4. Where colour, pattern or texture is criterion, submit full range of samples.
5. Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
6. Make changes in samples which Consultant may require, consistent with Contract Documents.
7. Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

5. MOCK-UPS

1. Erect mock-ups in accordance with Section 01 45 00 - Quality Control.

6. CERTIFICATES AND TRANSCRIPTS

1. Immediately after award of Contract, submit Workers' Compensation Board status.
2. Submit transcription of insurance immediately after award of Contract.

7. PHOTOGRAPHIC DOCUMENTATION

1. Submit electronic copy of colour digital photography in jpg format, standard resolution monthly with progress statement and as directed by Departmental Representative.
2. Project identification: name and number of project and date of exposure indicated.
3. Number of viewpoints: 4 locations.
4. Viewpoints and their location as determined by Departmental Representative.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 33 00 - Submittal Procedures

2. REFERENCES
   1. Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
   2. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
      Material Safety Data Sheets (MSDS).
   3. Province of Ontario
      Occupational Health and Safety Act, R.S.O. 1990 Updated 2014.

3. ACTION AND INFORMATIONAL SUBMITTALS
   1. Make submittals in accordance with Section 01 33 00 - Submittal Procedures
   2. Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
      a. Results of site specific safety hazard assessment.
      b. Results of safety and health risk or hazard analysis for site tasks and operation [found in work plan].
   3. Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
   4. Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
   5. Submit copies of incident and accident reports.
   6. Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 – Sustainable Procedures.
   7. Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 days after receipt of comments from Departmental Representative.
   8. Departmental Representative review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
   9. On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

4.	SAFETY ASSESSMENT	1. Perform site specific safety hazard assessment related to project.
5.	MEETINGS	1. Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
6.	REGULATORY REQUIREMENTS	1. Do Work in accordance with Section 01 41 00 - Regulatory Requirements.
7.	GENERAL REQUIREMENTS	1. Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications. 2. Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
8.	RESPONSIBILITY	1. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work. 2. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
9.	COMPLIANCE REQUIREMENTS	1. Comply with Ontario Health and Safety Act, R.S.O. 2. Comply with Occupational Health and Safety Act for Province of Ontario, and Regulations made pursuant to the Act. 3. Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations (COSH) as well as any other regulations made pursuant to the Act. 4. In case of conflict or discrepancy between above specified requirements, the more stringent shall apply. 5. Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing
10.	UNFORSEEN HAZARDS	1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.
11.	POSTING OF DOCUMENTS	1. Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative
12.	CORRECTION OF NON-COMPLIANCE	1. Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

2. Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

3. Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

13. BLASTING

1. Blasting or other use of explosives is not permitted.

14. POWDER ACTUATED DEVICES

1. Use powder actuated devices only after receipt of written permission from Departmental Representative.

15. WORK STOPPAGE

1. Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1.	RELATED REQUIREMENTS	1. Section 01 21 00 - Allowances
2.	REFERENCES	1. Federal Government's General Conditions 'C'
3.	INSPECTION	1. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found not in accordance with Contract Documents, contractor shall pay cost of examination and replacement.
4.	INDEPENDENT INSPECTION AGENCIES	1. Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. 2. Allocated costs: to Section 01 21 00 – Allowances. 3. Provide equipment required for executing inspection and testing by appointed agencies. 4. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents. 5. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Owner. Pay costs for retesting and reinspection.
5.	ACCESS TO WORK	1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants. 2. Co-operate to provide reasonable facilities for such access.
6.	PROCEDURES	1. Notify appropriate agency Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made. 2. Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work. 3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
7.	REJECTED WORK	1. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents. 2. Make good other Contractor's work damaged by such removals or

replacements promptly.

3. If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

8. REPORTS
   1. Submit 2 copies of inspection and test reports to Departmental Representative.
   2. Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

9. TESTS AND MIX DESIGNS
   1. Furnish test results and mix designs as requested.
   2. Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

10. MOCK-UPS
    1. Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
    2. Construct in locations acceptable to Departmental Representative.
    3. Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
    4. Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
    5. If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
    6. Mock-ups may remain as part of Work, unless specification section identifies that mock-up must be removed.

11. MILL TESTS
    1. Submit mill test certificates as requested.

12. EQUIPMENT AND SYSTEMS
    1. Submit adjustment and balancing reports for mechanical, electrical systems.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1.	ACTION AND INFORMATIONAL SUBMITTALS	1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
2.	INSTALLATION AND REMOVAL	1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation. Contractor to meet with Departmental Representative to identify areas to be used for parking, layby and access/egress points. 2. Identify areas which have to be gravelled to prevent tracking of mud. 3. Indicate use of supplemental or other staging area. 4. Provide construction facilities in order to execute work expeditiously. 5. Remove from site all such work after use.
3.	HOISTING	1. Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists. 2. Hoists cranes to be operated by qualified operator.
4.	SITE STORAGE/LOADING	1. Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products. 2. Do not load or permit to load any part of Work with weight or force that will endanger Work.
5.	CONSTRUCTION PARKING	1. Parking will be permitted on site provided it does not disrupt performance of Work. 2. Provide and maintain adequate access to project site. 3. Clean runways and taxi areas where used by Contractor's equipment.
6.	EQUIPMENT, TOOL AND MATERIALS STORAGE	1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. 2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.
7.	SANITARY FACILITIES	1. Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

8. CONSTRUCTION SIGNAGE

1. Provide and erect project sign, within one week of signing Contract, in a location designated by Departmental Representative.

2. Construction sign of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

3. Sign design to be provided by Departmental Representative.

4. No other signs or advertisements, other than warning signs, are permitted on site.

5. Provide project identification site sign comprising, framing, and 1200 x 2400 mm signboard as detailed and as described below.
    a. Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
    b. Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
    c. Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
    d. Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
    e. Fasteners: hot-dip galvanized steel nails and carriage bolts.

6. Locate project identification sign as directed by Departmental Representative and construct as follows:
    a. Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
    b. Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

7. Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

8. Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

9. Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

10. Road signs require approval from the Town of Niagara.

9. PROTECTION AND

1. Provide access and temporary relocated roads as necessary to

MAINTENANCE OF TRAFFIC

maintain traffic.

2. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative

3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

4. Protect travelling public from damage to person and property.

5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

7. Construct access and haul roads necessary.

8. Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

9. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

10. Dust control: adequate to ensure safe operation at all times.

11. Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

12. Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

13. Provide snow removal during period of Work.

14. Remove, upon completion of work, haul roads designated by Departmental Representative.

10. CLEAN-UP

1. Remove construction debris, waste materials, packaging material from work site daily.

2. Clean dirt or mud tracked onto paved or surfaced roadways.

3. Store materials resulting from demolition activities that are salvageable.

4. Stack stored new or salvaged material not in construction facilities.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 74 21 – Construction/Demolitions Waste Management and Disposal.
2. REFERENCES
   1. Canadian General Standards Board (CGSB)
      a. CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
      b. CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
   2. Canadian Standards Association (CSA International)
      a. CSA-O121-M1978(R2003), Douglas Fir Plywood.
3. INSTALLATION AND REMOVAL
   1. Provide temporary controls in order to execute Work expeditiously.
   2. Remove from site all such work after use.
4. HOARDING
   1. Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
5. GUARD RAILS AND BARRICADES
   1. Provide secure, rigid guard rails and barricades around deep excavations.
   2. Provide as indicated.
6. ACCESS TO SITE
   1. Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
7. PUBLIC TRAFFIC FLOW
   1. Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.
8. FIRE ROUTES
   1. Maintain access to property including overhead clearances for use by emergency response vehicles.
9. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY
   1. Protect surrounding private and public property from damage during performance of Work.
   2. Be responsible for damage incurred.
10. PROTECTION OF BUILDING FINISHES
    1. Provide protection for finished and partially finished building finishes and equipment during performance of Work.
    2. Provide necessary screens, covers, and hoardings.
    3. Confirm with Departmental Representative locations and installation schedule three days prior to installation.
    4. Be responsible for damage incurred due to lack of or improper protection.
11. WASTE MANAGEMENT AND DISPOSAL
    1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 73 00 – Execution Requirements
2. REFERENCES
   1. Within text of each specifications section, reference may be made to reference standards.
   2. Conform to these reference standards, in whole or in part as specifically requested in specifications.
   3. If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
   4. Cost for such testing will be born by Contractor in event of conformance with Contract Documents or by Contractor in event of non-conformance.
3. QUALITY
   1. Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
   2. Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
   3. 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.
   4. Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
   5. Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
   6. 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. Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for 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, lumber and metals 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 will 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. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

2. Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

3. Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

9. CO-ORDINATION

1. Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

2. Be responsible for coordination and placement of openings, sleeves and accessories.

10. REMEDIAL WORK

1. Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate 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.

11. 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 by Departmental Representative.

12. 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.

13. 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.

14. PROTECTION OF WORK IN PROGRESS

1. Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

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, building occupants, 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.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 74 21 - Construction/Demolition Waste Management and Disposal
2. PROJECT CLEANLINESS
   1. Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Departmental Representative or other Contractors.
   2. Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
   3. Clear snow and ice from access to building, bank/pile snow in designated areas only or remove from site.
   4. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
   5. Provide on-site containers for collection of waste materials and debris.
   6. Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
   7. Dispose of waste materials and debris at designated dumping areas off site.
   8. Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.
   9. Store volatile waste in covered metal containers and remove from premises at end of each working day.
   10. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
   11. Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
3. FINAL CLEANING
   1. When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
   2. Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
   3. Prior to final review remove surplus products, tools, construction machinery and equipment.

4. Remove waste products and debris including that caused by Departmental Representative or other Contractors.

5. Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

6. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

7. Clean and polish stainless steel.

8. Remove stains, spots, marks and dirt from fixtures, furniture and decorative work.

9. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

10. Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

11. Remove dirt and other disfiguration from exterior surfaces.

12. Sweep and wash clean paved areas.

13. Clean drainage systems.

4. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. WASTE MANAGEMENT GOALS
   1. Accomplish maximum control of solid construction waste.
   2. Preserve environment and prevent pollution and environment damage.
2. RELATED REQUIREMENTS
   1. Section 01 33 00 – Submittal Procedures
3. DEFINITIONS
   1. Class III: non-hazardous waste - construction renovation and demolition waste.
   2. Inert Fill: inert waste - exclusively asphalt and concrete.
   3. Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
   4. Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
   5. Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
   6. Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
      a. Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
      b. Returning reusable items including pallets or unused products to vendors.
   7. Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
   8. Separate Condition: refers to waste sorted into individual types.
   9. Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
4. STORAGE, HANDLING AND PROTECTION
   1. Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
   2. Unless specified otherwise, materials for removal do not become Contractor's property.
   3. Protect, stockpile, store and catalogue salvaged items.

4. Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

5. Protect surface drainage, mechanical and electrical from damage and blockage.

6. Separate and store materials produced during dismantling of structures in designated areas.

7. Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
    a. On-site source separation is recommended.
    b. Remove co-mingled materials to off-site processing facility for separation.

1. Provide waybills for separated materials.

5. DISPOSAL OF WASTES

1. Do not bury rubbish or waste materials.

2. Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.

3. Remove materials from deconstruction as deconstruction/disassembly Work progresses.

6. USE OF SITE AND FACILITIES

1. Execute work with least possible interference or disturbance to normal use of premises.

7. SCHEDULING

1. Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

1. APPLICATION

1. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

2. CLEANING

1. Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

2. Clean-up work area as work progresses.

3. Source separate materials to be reused/recycled into specified sort areas.

3. DIVERSION OF MATERIALS

1. From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by

Departmental Representative, and consistent with applicable fire regulations.

a. Mark containers or stockpile areas.
b. Provide instruction on disposal practices.

2. On-site sale of salvaged, reusable or recyclable materials is not permitted.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   a. Section 01 74 11 – Cleaning
   b. Section 01 74 21 - Construction/Demolition Waste Management and Disposal

2. REFERENCES
   a. Owner's General Conditions

3. ADMINISTRATIVE REQUIREMENTS
   1. Acceptance of Work Procedures:
      a. Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
         i. Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
         ii. Request Departmental Representative inspection.
      b. Departmental Representative's Inspection:
         i. Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
         ii. Contractor to correct Work as directed.
      c. Completion Tasks: submit written certificates in English that tasks have been performed as follows:
         i. Work: completed and inspected for compliance with Contract Documents.
         ii. Defects: corrected and deficiencies completed.
         iii. Equipment and systems: tested, adjusted and fully operational.
         iv. Operation of systems: demonstrated to Departmental Representative's personnel.
      d. Final Inspection:
         i. When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
         ii. When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
      e. Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
      f. Commencement of Lien and Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

g. Final Payment:
    i. When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
    ii. When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

h. Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

4. FINAL CLEANING

2. Clean in accordance with Section 01 74 11 - Cleaning.
    a. Remove surplus materials, excess materials, rubbish, tools and equipment.

3. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 31 19 - Project Meetings
   2. Section 01 33 00 - Submittal Procedures
   3. Section 01 45 00 - Quality Control

2. REFERENCES
   1. Canadian Environmental Protection Act (CEPA)
      a. SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

3. ADMINISTRATIVE REQUIREMENTS
   1. Pre-warranty Meeting:
      a. Convene meeting one week prior to contract completion with Contractor and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
         i. Verify Project requirements.
         ii. Review manufacturer's installation instructions and warranty requirements.
      b. Departmental Representative to establish communication procedures for:
         i. Notifying construction warranty defects.
         ii. Determine priorities for type of defects.
         iii. Determine reasonable response time.
      c. Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
      d. Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

4. ACTION AND INFORMATIONAL SUBMITTALS
   1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures
   2. Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four hard and digital final copies of operating and maintenance manuals in English.
   3. Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
   4. Provide evidence, if requested, for type, source and quality of products supplied.

5. FORMAT
   1. Organize data as instructional manual.
   2. Binders: vinyl, hard covered, 3 'D' ring, loose leaf [219 x 279] mm with spine and face pockets.
   3. When multiple binders are used correlate data into related consistent groupings.
      a. Identify contents of each binder on spine.

4. Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

5. Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.

6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

7. Text: manufacturer's printed data, or typewritten data.

8. Drawings: provide with reinforced punched binder tab.
    a. Bind in with text; fold larger drawings to size of text pages.

6. CONTENTS - PROJECT RECORD DOCUMENTS

1. Table of Contents for Each Volume: provide title of project;
    a. Date of submission; names.
    b. Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
    c. Schedule of products and systems, indexed to content of volume.

2. For each product or system:
    a. List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

3. Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

4. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

5. Typewritten Text: as required to supplement product data.
    a. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

7. AS -BUILT DOCUMENTS AND SAMPLES

1. Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:
    a. Contract Drawings.
    b. Specifications.
    c. Addenda.
    d. Change Orders and other modifications to Contract.
    e. Reviewed shop drawings, product data, and samples.
    f. Field test records.
    g. Inspection certificates.

h. Manufacturer's certificates.

2. Store record documents and samples in field office apart from documents used for construction.
   a. Provide files, racks, and secure storage.

3. Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
   a. Label each document "PROJECT RECORD" in neat, large, printed letters.

4. Maintain record documents in clean, dry and legible condition.
   a. Do not use record documents for construction purposes.

5. Keep record documents and samples available for inspection by Departmental Representative.

8. RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

1. Record information on set of black line opaque drawings, provided by Departmental Representative.

2. Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

3. Record information concurrently with construction progress.
   a. Do not conceal Work until required information is recorded.

4. Contract Drawings and shop drawings: mark each item to record actual construction, including:
   a. Measured depths of elements of foundation in relation to finish first floor datum.
   b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   c. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
   d. Field changes of dimension and detail.
   e. Changes made by change orders.
   f. Details not on original Contract Drawings.
   g. References to related shop drawings and modifications.

5. Specifications: mark each item to record actual construction, including:
   a. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
   b. Changes made by Addenda and change orders.

6. Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

7. Provide digital photos, if requested, for site records.

8. FINAL SURVEY

1. Submit final site survey certificate in accordance with Section 01 45 00 – Submittal Procedures, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

9. EQUIPMENT AND SYSTEMS

1. For each item of equipment and each system include description of unit or system, and component parts.
    a. Give function, normal operation characteristics and limiting conditions.
    b. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
2. Panel board circuit directories: provide electrical service characteristics, controls, and communications.
3. Include installed colour coded wiring diagrams.
4. Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
    a. Include regulation, control, stopping, shut-down, and emergency instructions.
    b. Include summer, winter, and any special operating instructions.
5. Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
6. Provide servicing and lubrication schedule, and list of lubricants required.
7. Include manufacturer's printed operation and maintenance instructions.
8. Include sequence of operation by controls manufacturer.
9. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
10. Provide installed control diagrams by controls manufacturer.
11. Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
13. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
14. Include test and balancing reports as specified in Section 01 45 00 - Quality Control.

10. MATERIALS AND FINISHES

1. Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
    a. Provide information for re-ordering custom manufactured products.

2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

3. Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

4. Additional requirements: as specified in individual specifications sections.

11. MAINTENANCE MATERIALS

1. Spare Parts:
    a. Provide spare parts, in quantities specified in individual specification sections.
    b. Provide items of same manufacture and quality as items in Work.
    c. Deliver to site; place and store.
    d. Receive and catalogue items.
        i. Submit inventory listing to Departmental Representative.
        ii. Include approved listings in Maintenance Manual.
    e. Obtain receipt for delivered products and submit prior to final payment.

2. Extra Stock Materials:
    a. Provide maintenance and extra materials, in quantities specified in individual specification sections.
    b. Provide items of same manufacture and quality as items in Work.
    c. Deliver to site; place and store.
    d. Receive and catalogue items.
        i. Submit inventory listing to Departmental Representative.
        ii. Include approved listings in Maintenance Manual.
    e. Obtain receipt for delivered products and submit prior to final payment.

3. Special Tools:
    a. Provide special tools, in quantities specified in individual specification section.
    b. Provide items with tags identifying their associated function and equipment.

c. Deliver to site; place and store.
d. Receive and catalogue items.
    i. Submit inventory listing to Departmental Representative.
    ii. Include approved listings in Maintenance Manual.

12. DELIVERY, STORAGE AND HANDLING

1. Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

2. Store in original and undamaged condition with manufacturer's seal and labels intact.

3. Store components subject to damage from weather in weatherproof enclosures.

4. Store paints and freezable materials in a heated and ventilated room.

5. Remove and replace damaged products at own expense and for review by Departmental Representative.

13. WARRANTIES AND BONDS

1. Develop warranty management plan to contain information relevant to Warranties.

2. Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative’s approval.

3. Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

4. Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

5. Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

6. Assemble approved information in binder and in PDF file format, submit upon acceptance of work and organize binder as follows:
    a. Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
    b. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
    c. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
    d. Verify that documents are in proper form, contain full information, and are notarized.
    e. Co-execute submittals when required.

f. Retain warranties and bonds until time specified for submittal.

7. Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

8. Conduct joint 1 year warranty inspection, measured from time of acceptance, by Departmental Representative.

9. Include information contained in warranty management plan as follows:
    a. Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
    b. Listing and status of delivery of Certificates of Warranty for extended warranty items, to include lightning systems.
    c. Provide list for each warranted equipment, item, feature of construction or system indicating:
        i. Name of item.
        ii. Model and serial numbers.
        iii. Location where installed.
        iv. Name and phone numbers of manufacturers or suppliers.
        v. Names, addresses and telephone numbers of sources of spare parts.
        vi. Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
        vii. Cross-reference to warranty certificates as applicable.
        viii. Starting point and duration of warranty period.
        ix. Summary of maintenance procedures required to continue warranty in force.
        x. Cross-Reference to specific pertinent Operation and Maintenance manuals.
        xi. Organization, names and phone numbers of persons to call for warranty service.
        xii. Typical response time and repair time expected for various warranted equipment.
    d. Contractor's plans for attendance at 1 year post-construction warranty inspections.
    e. Procedure and status of tagging of equipment covered by extended warranties.
    f. Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

10. Respond in timely manner to oral or written notification of

required construction warranty repair work.

11. Written verification to follow oral instructions. Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

14. WARRANTY TAGS

1. Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

2. Attach tags with copper wire and spray with waterproof silicone coating.

3. Leave date of acceptance until project is accepted for occupancy.

4. Indicate following information on tag:
    a. Type of product/material.
    b. Model number.
    c. Serial number.
    d. Contract number.
    e. Warranty period.
    f. Inspector's signature.
    g. Construction Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

PART 1 - GENERAL

1. SUMMARY

1. Section Includes.
    a. Methods and procedures for demolishing, salvaging, recycling and removing sitework items designated to be removed in whole or in part, and for backfilling resulting trenches and excavations.

2. Related Requirements

    a. Section 01 35 29_06 - Health and Safety.
    b. Section 01 74 21 - Construction - Demolition Waste Management and Disposal
    c. Section 31 00 99 - Earthworks for Minor Works.

2. REFERENCES

1. Canadian Council of Ministers of the Environment (CCME).

2. Department of Justice Canada (Jus).
    a. Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
    b. Canadian Environmental Protection Act, 1999 (CEPA), c. 33.

3. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    a. Material Safety Data Sheets (MSDS).

4. Transport Canada (TC).
    a. Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

3. DEFINITIONS

1. Demolition: rapid destruction of building following removal of hazardous materials.

2. Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

4. ACTION AND INFORMATIONAL SUBMITTALS

1. Submittals in accordance with Section 01 33 00 - Submittal Procedures.

2. Product Data: submit WHMIS MSDS - Material Safety Data Sheets.

3. Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

5. QUALITY ASSURANCE

1. Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.

2. Site Meetings
    a. Arrange for site visit with Departmental Representative to

examine existing site conditions adjacent to demolition work, prior to start of Work.
b. Hold project meetings weekly.
c. Ensure Contractor, Departmental Representative attend.

3. Health and Safety.

a. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

6. DELIVERY, STORAGE AND HANDLING

1. Storage and Protection.
a. Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
b. Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
c. Remove and store materials to be salvaged, in manner to prevent damage.
d. Store and protect in accordance with requirements for maximum preservation of material.
e. Handle salvaged materials as new materials.

2. Waste Management and Disposal.
a. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
b. Divert excess materials from landfill to site approved by Departmental Representative.
c. Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
d. Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

7. SITE CONDITIONS

1. Site Environmental Requirements.
a. Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
b. Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
i. Ensure proper disposal procedures are maintained throughout the project.
c. Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
d. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.
e. Protect trees, plants and foliage on site and adjacent

properties where indicated.

2. Existing Conditions.
   a. Remove contaminated or hazardous materials as defined by authorities having jurisdiction from site, prior to start of demolition Work, and dispose of in safe manner in accordance with TDGA and other applicable regulatory requirements.

PART 2 - PRODUCTS

1. EQUIPMENT

1. Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

1. PREPARATION

1. Locate and protect utilities. Preserve active utilities traversing site in operating condition.

2. Notify and obtain approval of utility companies before starting demolition.

2. REMOVAL OF HAZARDOUS WASTES

1. Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3. REMOVAL OPERATIONS

1. Remove items as indicated.

2. Do not disturb items designated to remain in place.

3. Removal of Pavements, Curbs and Gutters:
   a. Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.
   b. Protect adjacent joints and load transfer devices.
   c. Protect underlying and adjacent granular materials.

4. Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

5. Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

6. Decommission water wells and monitoring wells in accordance with Municipal and Provincial guidelines and/or regulations.

7. Remove designated trees during demolition.
   a. Obtain written approval of Departmental Representative prior

to removal of trees not designated.

8. Dispose and/or transplant trees designated for removal at the Contractor's discretion, unless otherwise identified by Departmental Representative to be healthy.
    a. Grind, chip, or shred other vegetation for mulching and composting, or use as [mill pulp] [or] [process fuel].

9. Stockpile topsoil for final grading and landscaping.
    a. Provide erosion control and seeding if not immediately used.

10. Disposal of Material.
    a. Dispose of materials not designated for salvage or reuse on site at authorized facilities.

11. Backfill.
    a. Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

4. STOCKPILING

1. Label stockpiles, indicating material type and quantity.

2. Designate appropriate security resources/measures to prevent vandalism, damage and theft.

3. Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

4. Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

5. REMOVAL FROM SITE

1. Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

2. Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

3. Transport material designated for alternate disposal using approved receiving organizations and in accordance with applicable regulations.

4. Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

6. RESTORATION

1. Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

2. Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

7. CLEANING

1. Remove debris, trim surfaces and leave work site clean, upon completion of Work

2. Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 35 29_06 - Health and Safety.
   2. Section 03 20 00 - Concrete Reinforcing.
   3. Section 03 30 00 - Cast-In-Place Concrete.

2. REFERENCES
   1. Canadian Standards Association (CSA International)
      a. CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
      b. CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
      c. CSA O121-M1978(R2003), Douglas Fir Plywood.
      d. CSA O151-04, Canadian Softwood Plywood.
      e. CSA O153-M1980(R2003), Poplar Plywood.
      f. CAN/CSA-O325.0-92(R2003), Construction Sheathing.
      g. CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
      h. CSA S269.1-1975(R2003), Falsework for Construction Purposes.
      i. CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada
   2. Underwriters' Laboratories of Canada (ULC)
      a. CAN/ULC-S701-[05], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

3. ACTION AND INFORMATIONAL SUBMITTALS
   1. Submittals in accordance with Section 01 33 00 - Submittal Procedures.
   2. Submit shop drawings for formwork and falsework.
      a. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
   3. Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29_06 – Health and Safety.
   4. Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.
   5. Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

4. DELIVERY, STORAGE AND HANDLING
   1. Waste Management and Disposal:
      a. Separate waste materials for reuse and recycling in accordance with Section 01 47 21 - Construction/Demolition Waste Management and Disposal.
      b. Place materials defined as hazardous or toxic in

designated containers.
c. Divert wood materials from landfill to a recycling, reuse or composting facility as approved by Departmental Representative.
d. Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.
e. Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

PART 2 - PRODUCTS

1. MATERIALS

1. Formwork materials:
   a. For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
   b. For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
   c. Rigid insulation board: to CAN/ULC-S701.

2. Form ties:
   a. 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 diameter in concrete surface.
   b. For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

3. Form liner:
   a. Plywood: Canadian Softwood Plywood to CSA O151, Poplar to CSA O153, square edge, 25mm thick.

4. Form release agent: non-toxic, biodegradable, low VOC.

5. Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

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

PART 3 - EXECUTION

1. FABRICATION ERECTION

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

2. Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

3. Fabricate and erect falsework in accordance with CSA S269.1.

4. Refer to architectural drawings for concrete members requiring architectural exposed finishes.

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

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

7. 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.

8. Align form joints and make watertight.
    a. Keep form joints to minimum.

9. Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.

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

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

12. Construct forms for architectural concrete, and place ties as indicated.
    a. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

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

14. Line forms for following surfaces:
    a. Outer face of outside and vertical edge of bridge sidewalk slab.
    b. Soffit of girders and underside of bridge decks if exposed.
    c. Secure lining taut to formwork to prevent folds.
    d. Pull down lining over edges of formwork panels.
    e. Ensure lining is new and not reused material.
    f. Ensure lining is dry and free of oil when concrete is poured.
    g. Application of form release agents on formwork surface is prohibited where drainage lining is used.
    h. If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
    i. Cost of textile lining is included in price of concrete for

corresponding portion of Work.

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

2. REMOVAL AND RESHORING

1. Leave formwork in place for following minimum periods of time after placing concrete.
    a. 7 days for footings and abutments.

2. Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

3. Provide 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.

4. Space reshoring in each principal direction at not more than 3000 mm apart.

5. Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 03 20 00 - Concrete Reinforcing
   2. Section 03 10 00 - Concrete Forming and Accessories
2. PRICE AND PAYMENT PROCEDURES
   1. Measurement and Payment:
      a. Cast-in-place concrete will not be measured but will be paid for as fixed price item.
3. REFERENCES
   1. Abbreviations and Acronyms:
      a. Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
         i. Type GU or GUb - General use cement.
      b. Fly ash:
         i. Type F - with CaO content less than 8%.
   2. Reference Standards:
      a. ASTM International
         i. ASTM C 260-06, Standard Specification for Air-Entraining Admixtures for Concrete.
         ii. ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
         iii. ASTM C 494/C 494M-08a, Standard Specification for Chemical Admixtures for Concrete.
         iv. ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
         v. ASTM D 412-06ae1, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
         vi. ASTM D 624-00(2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
         vii. ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
         viii. ASTM D 1752-04a, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
      b. Canadian General Standards Board (CGSB)
         i. CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
         ii. CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

c. CSA International
   i. CSA A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
   ii. CSA A283-06, Qualification Code for Concrete Testing Laboratories.
   iii. CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

4. ADMINISTRATIVE REQUIREMENTS

1. Pre-installation Meetings: convene pre-installation meeting 3 days prior to beginning concrete works.
   a. Ensure key personnel, Departmental Representative, testing laboratories attend.
      i. Verify project requirements.

5. ACTION AND INFORMATIONAL SUBMITTALS

1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

2. Provide testing and inspection 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. Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

4. Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

5. Provide digital copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

6. QUALITY ASSURANCE

1. Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

2. Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
   a. Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements

3. Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

7. DELIVERY, STORAGE AND HANDLING

1. Delivery and Acceptance Requirements:
   a. Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

i. Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative[laboratory representative] and concrete producer as described in CSA A23.1/A23.2.
ii. Deviations to be submitted for review by Departmental Representative.

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

2. Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

1. DESIGN CRITERIA

1. Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2. PERFORMANCE CRITERIA

1. Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

3. MATERIALS

1. Cement: to CSA A3001, Type GU.

2. Blended hydraulic cement: Type GUb to CSA A3001.

3. Water: to CSA A23.1.

4. Aggregates: to CSA A23.1/A23.2.

5. Admixtures:
   a. Air entraining admixture: to ASTM C 260.
   b. Chemical admixture: to ASTM C 494. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

6. Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
   a. Compressive strength: 35 MPa at 28 days.

7. Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 35 MPa at 28 days.

8. Post-Tensioning Ducts: to CSA A23.1/A23.2.

9. Curing compound: to CSA A23.1/A23.2 white and ASTM C 309, Type 1-chlorinated rubber.

10. Premoulded joint fillers:
    a. Bituminous impregnated fiber board: to ASTM D 1751.
    b. Sponge rubber: to ASTM D 1752, Type I, flexible grade.
    c. Standard cork: to ASTM D 1752, Type II.

11. Weep hole tubes: plastic.

12. Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

4. MIXES

1. Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
    a. Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
    b. Provide concrete mix to meet following plastic state requirements:
        i. Uniformity: 90%.
        ii. Workability: free of surface blemishes and segregation.
    c. Provide concrete mix to meet following hard state requirements:
        i. Durability and class of exposure: C-1, C-2, A-2, C-3.
        ii. Compressive strength at 28-day age: 32 Mpa minimum.
        iii. Aggregate size 19 mm maximum.
    d. Provide quality management plan to ensure verification of concrete quality to specified performance.
    e. Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

PART 3 - EXECUTION

1. PREPARATION

1. Obtain Departmental Representative’s written approval before placing concrete.
    a. Provide 24 hours minimum notice prior to placing of concrete.

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

3. During concreting operations:
    a. Development of cold joints not allowed.
    b. 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's 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. In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
    a. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.

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

2. INSTALLATION/ APPLICATION

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

2. Sleeves and inserts:
    a. Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Departmental Representative.
    b. Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
    c. Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.
    d. Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
    e. Confirm locations and sizes of sleeves and openings shown on drawings.
    f. Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

3. Anchor bolts:
    a. Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
    b. Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from

Departmental Representative.
    i. Formed holes: 100 mm minimum diameter.
    ii. Drilled holes: to manufacturers' recommendations.
c. Protect anchor bolt holes from water accumulations, snow and ice build-ups.
d. Set bolts and fill holes with epoxy grout.
e. Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

4. Drainage holes and weep holes:
    a. Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
    b. Install weep hole tubes and drains as indicated.

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

6. Finishing and curing:

    a. Finish concrete to CSA A23.1/A23.2.
    b. Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
    c. Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete: Broom finish. Provide written declaration that compounds used are compatible.
    d. Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

7. Water stops:
    a. Install water stops to provide continuous water seal.
    b. Do not distort or pierce water stop in way as to hamper performance.
    c. Do not displace reinforcement when installing water stops.
    d. Use equipment to manufacturer's requirements to field splice water stops.
    e. Tie water stops rigidly in place.
    f. Use only straight heat sealed butt joints in field.
    g. Use factory welded corners and intersections unless otherwise approved by Departmental Representative.

8. Joint fillers:
    a. Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
    b. When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

c. Locate and form expansion joints as indicated.
d. Install joint filler.
e. 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. SURFACE TOLERANCE

1. Concrete tolerance to CSA A23.1

4. FIELD QUALITY CONTROL

SPEC NOTE: Use the following paragraph for accurate records of poured concrete and testing, and co-ordinate with PART 1 - ACTION AND INFORMATIONAL SUBMITTALS as specified below.

1. Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
   a. Concrete pours.
   b. Slump.
   c. Air content.
   d. Compressive strength at 7 and 28 days.
   e. Air and concrete temperature.

2. Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.
   a. Ensure testing laboratory is certified to CSA A283.

3. Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

4. Departmental Representative will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

5. Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

5. CLEANING

1. Clean in accordance with Section 01 74 11 - Cleaning.

2. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

   a. Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.
   b. Provide appropriate area on job site where concrete trucks can be safely washed.
   c. Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
   d. Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in

other location where it will pose health or environmental hazard.

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

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. None

2. REFERENCES
   1. ASTM International
      a. ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
      b. ASTM A 269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
      c. ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   2. CSA International
      a. CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
      b. CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
      c. CSA S16-09, Design of Steel Structures.
      d. CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
      e. CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
   3. Environmental Choice Program
      a. CCD-047-98(R2005), Architectural Surface Coatings.
      b. CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
   4. Green Seal Environmental Standards (GS)
      a. GS-11-2008, 2nd Edition, Paints and Coatings.
   5. Health Canada / Workplace Hazardous Materials Information System (WHMIS)
      a. Material Safety Data Sheets (MSDS).
   6. The Master Painters Institute (MPI)
      a. Architectural Painting Specification Manual - current edition.

3. ACTION AND INFORMATIONAL SUBMITTALS
   1. Submit in accordance with Section 01 33 00 - Submittal Procedures.
   2. Product Data:
      a. Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing,

bolts and include product characteristics, performance criteria, physical size, finish and limitations.

b. Submit electronic copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
    i. For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

3. Shop Drawings:
    a. Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
    b. Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

4. QUALITY ASSURANCE

1. Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

2. Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

5. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

3. Storage and Handling Requirements:
    a. Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    b. Replace defective or damaged materials with new.

PART 2 - PRODUCTS

1. MATERIALS

1. Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.

2. Steel pipe: to ASTM A 53/A 53M standard weight, galvanized finish.

3. Welding materials: to CSA W59.

4. Welding electrodes: to CSA W48 Series.

5. Bolts and anchor bolts: to ASTM A 307.

6. Stainless steel tubing: to ASTM A 269, Type 302 seamless welded with AISI No. 4 finish.

7. Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2. FABRICATION

1. Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

2. Use self-tapping shake-proof round headed screws on items requiring assembly by screws or as indicated.

3. Where possible, fit and shop assemble work, ready for erection.

4. Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

3. FINISHES

1. Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.

4. ISOLATION COATING

1. Isolate aluminum from following components, by means of bituminous paint:
   a. Dissimilar metals except stainless steel, zinc, or white bronze of small area.
   b. Concrete, mortar and masonry.
   c. Wood.

5. SHOP PAINTING

1. Primer: VOC limit 250 g/L maximum to CCD-047a.

2. Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

3. Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

4. Clean surfaces to be field welded; do not paint.

6. PIPE RAILINGS

1. Steel pipe to shapes and sizes as indicated.

2. Galvanize exterior pipe railings after fabrication. Shop coat prime interior railings after fabrication.

PART 3 - EXECUTION

1. EXAMINATION

1. Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
   a. Visually inspect substrate in presence of Departmental Representative.
   b. Inform Departmental Representative of unacceptable conditions immediately upon discovery.
   c. Proceed with installation only after unacceptable conditions

have been remedied and after receipt of written approval to proceed from Departmental Representative.

2. ERECTION

1. Do welding work in accordance with CSA W59 unless specified otherwise.

2. Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

3. Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

4. Exposed fastening devices to match finish and be compatible with material through which they pass.

5. Supply components for work by other trades in accordance with shop drawings and schedule.

6. Make field connections with bolts to CSA S16 or Weld field connection.

7. Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

8. Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
    a. Primer: maximum VOC limit 250 g/L to GS-11.

9. Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
    a. Primer: maximum VOC limit 250 g/L to GS-11.

3. CLEANING

1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    a. Leave Work area clean at end of each day.

2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    a. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

4. PROTECTION

1. Protect installed products and components from damage during construction.

2. Repair damage to adjacent materials caused by metal fabrications installation.

PART 1 - GENERAL

1. PRICE AND PAYMENT PROCEDURES

1. Measurement and Payment:
    a. Measurement for supply and installation of sign and sign supports will be based on each complete sign installation.

2. REFERENCES

1. American Association of State Highway and Transportation Officials (AASHTO)
    a. Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).

2. ASTM International
    a. ASTM A 276-08a, Standard Specification for Stainless Steel Bars and Shapes.
    b. ASTM B 209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
    c. ASTM B 210M-05, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes Metric.
    d. .4 ASTM B 211M-03, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire Metric.

3. Canadian General Standards Board (CGSB)
    a. CGSB 62-GP-9M-80, Prefabricated Markings, Positionable, Exterior, for Aircraft Ground Equipment and Facilities.
    b. CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.

4. CSA International
    a. CSA G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
    b. CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
    c. CAN/CSA-O80 Series-08, Wood Preservation.
    d. CSA O121-08, Douglas Fir Plywood.
    e. CSA W47.2-M1987 (R2008), Certification of Companies for Fusion Welding of Aluminum.

5. Forest Stewardship Council (FSC)
    a. FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
    b. FSC-STD-20-002-2004, Structure and Content of Forest

Stewardship Standards V2-1.
c. FSC Accredited Certification Bodies.

6. The Master Painters Institute (MPI)
   a. Architectural Painting Specification Manual - current edition.

3. ACTION AND INFORMATIONAL SUBMITTALS

1. Submit in accordance with Section 01 33 00 - Submittal Procedures.

2. Product Data:
   a. Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.

4. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

2. Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

3. Storage and Handling Requirements:
   a. Store materials off ground and in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
   b. Replace defective or damaged materials with new.

PART 2 - PRODUCTS

1. DESIGN CRITERIA

1. Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

2. MATERIALS

1. Sign supports:
   a. Standard tubular supports for small signs: to ASTM B 210M.

   b. Vertical tubular supports and connecting diagonal members: to ASTM B 210M.
   c. Truss members: to ASTM B 210M.
   d. Aluminum tubular members: belt ground satin finish.
   e. Base plates for ground mounted signs: to ASTM B 209M.

Base plates for overhead supports: to ASTM B 209M.

f. Tubular support caps for ground mounted signs: to ASTM B 210M or fabricated from aluminum plate as specified in ASTM B 209M. Castings for overhead signs: to ASTM B 211M.
g. Aluminum flanges: to ASTM B 211M.
h. Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for overhead sign installations: fabricate from 304 stainless steel as specified in ASTM A276.
i. Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.

2. Signboards:
   a. Aluminum sheet: to ASTM B 209M, precut to required dimensions.
      i. Thickness for signboards up to [750] mm wide: [1.6] mm minimum.
      ii. Thickness for signboards [750-1200] mm wide: [2.1] mm minimum.
      iii. Thickness for refurbishing existing sign panels: [1.0] mm minimum.
   b. Aluminum extrusions: to ASTM B 211M, [150] mm or [300] mm panels suitable for bolting together.
   c. T-shape stiffeners for signboards: to ASTM B 210M.
   d. Connecting straps and brackets: to ASTM B 209M.
   e. Aluminum materials: to ASTM B 209M.
   f. Primer for plywood: to MPI #5 [VOC limit of [350] g/L to [SCAQMD Rule 1113]].
   g. Primer for aluminum: to MPI # 8 [, VOC limit of [250] g/L to [GSES GS-11]].

   h. Silk screen ink:
      i. Transparent or opaque colours: selected by Consultant or as indicated.
   i. Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
   j. Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.
   k. Clear varnish protective coat: MPI-EXT 6.4H [VOC limit of [350] g/L to [SCAQMD Rule 1113]].

3. FABRICATION

1. Supports:
   a. Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted.
   b. Welds to be of same strength as adjacent member or casting.
   c. Reinforce in area of electrical hand holes to equal strength of full section member.
   d. Remove sharp edges and burrs.

2. Signboards:
    a. Aluminum blanks:
        i. Degrease, etch and bonderize with chemical conversion coating.
        ii. Clean surfaces with xylene thinner. Dry.
        iii. For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
        iv. For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with MPI-EXT 5.4A.

3. Sign identification:
    a. Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

PART 3 - EXECUTION

1. INSTALLATION

1. Sign bridge:
    a. Erect sign bridge as indicated. Permissible tolerance: 12 mm maximum departure from vertical.

2. Sign support:
    a. Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
    b. Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.
    c. Close open aluminum tubes and posts with aluminum cap. Cut oblong holes in shoe bases to drain condensation. Install aluminum bolt cover on each base plate restraining nut.
    d. Erect posts plumb and square to details as indicated.
    e. Single channel steel posts:
        i. Drive to required depth without damage to posts.
        ii. If rock or concrete is encountered, drill hole to required depth and set post in sand.
        iii. In finished concrete surfaces, backfill with concrete or grout. Protect from adverse conditions until cured.
    f. Join truss sections with wrought aluminum flanges welded to chords with inside and outside fillet welds. Build in camber to truss and monotube bridge supports to allow for deflection due to dead load of sign support, signboards, appurtenances; and an additional 1:300 camber.

3. Signboard:
    a. Fasten signboards to supporting posts and brackets as indicated.
    b. Fasten lane markers to signboard.
    c. Use strapping with crimped or bolted connections where signs fastened to utility poles.
    d. Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.

2. REPAIR/RESTORATION

1. Prepare new message on 1.0 minimum mm aluminum sheet.

2. Install new message on existing signboard in place, or remove existing signboard and install new message before re-erection.

3. Rivet new message to existing using 3 mm blind rivets at 300 mm centre to centre maximum around each portion of sheeting and with four, 6 mm diameter stainless steel bolts at corners.

3. CORRECTING DEFECTS

1. Correct defects, identified by Departmental Representative and Consultant, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Departmental Representative and Consultant.

4. CLEANING

1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
    a. Leave Work area clean at end of each day.

2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 -

    a. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

5. PROTECTION

1. Protect installed products and components from damage during construction.

2. Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 32 11 23 - Aggregate Base Courses
2. REFERENCES
   1. ASTM International
      a. ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).
   2. CSA International
      a. CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
   3. Ontario Provincial Standard Specifications (OPSS)
      a. OPSS 1004-05, Material Specification for Aggregates-Miscellaneous.
      b. OPSS SP 110F13-03, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
3. ACTION AND INFORMATIONAL SUBMITTALS
   1. Submit in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

1. MATERIALS
   1. Granular A, B Type I, B Type II, Select Subgrade to OPSS SP 110F13. Sand to OPSS 1004.
   2. Unshrinkable fill: concrete to CSA A23.1/A23.2.

PART 3 - EXECUTION

1. EXAMINATION
   1. Verification of Conditions:
      a. Before commencing work verify locations of buried services on and adjacent to site.
   2. Evaluation and Assessment:
      a. Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.
      b. Testing of materials and compaction of backfill, fill and unshrinkable fill will be carried out by testing laboratory designated by Consultant.
      c. Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill and fill

materials proposed for use.

d. Not later than 48 hours before backfilling or filling with approved material, notify Consultant so that compaction tests can be carried out by designated testing agency.
e. Before commencing work, conduct, with Departmental Representative condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

2. PREPARATION

1. Temporary Erosion and Sedimentation Control:

a. Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with sediment and erosion control drawings.
b. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
c. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2. Protection of in-place conditions:
   a. Protect excavations from freezing.
   b. Keep excavations clean, free of standing water, and loose soil.
   c. Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
   d. Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
   e. Protect buried services that are to remain undisturbed.

3. Removal:
   a. Remove obsolete buried services within 2 m of foundations. Cap cut-offs.
   b. Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
   c. Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
   d. Remove trees, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material and debris within areas designated on drawings.
   e. Do not remove stumps and tree roots. Trees and other woody vegetation in designated removal area to be razed to grade and treated with Glysophate herbicide to avoid revegetation.

3. EXCAVATION

1. Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.

2. Topsoil stripping:

a. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
b. Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
c. Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
d. Stockpile in locations as directed by Departmental Representative.

3. Excavate as required to carry out work, in all materials met.
   a. Do not disturb soil or rock below bearing surfaces. Notify Consultant when excavations are complete.
   b. If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
   c. Fill excavation taken below depths shown without Consultant's written authorization with concrete of same strength as for footings.

4. Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

5. Excavate for slabs and paving to subgrade levels.
   a. Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

4. SITE QUALITY CONTROL

1. Fill material and spaces to be filled to be reviewed by Departmental Representative and Geotechnical Consultant.

5. BACKFILLING

1. Start backfilling only after review and receipt of written approval of fill material and spaces to be filled from Departmental Representative.

2. Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

3. Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

4. Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material compacted as specified for fill.

5. Placing:
   a. Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.
   b. Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

6. Compaction: compact each layer of material to following densities for

material to ASTM D 698:
   a. To underside of basecourses: 98%.
   b. Basecourses: 98%.
   c. Elsewhere: 90%.

7. Under slabs and paving:
   a. As per drawings

8. In trenches:
   a. Up to 300 mm above pipe or conduit: sand placed by hand.
   b. Over 300 mm above pipe or conduit: native material approved by Consultant.

9. Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

10. Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.

11. Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

6. GRADING

1. Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Consultant. Grade to be gradual between finished spot elevations as indicated.

7. CLEANING

1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
   a. Dispose of cleared and grubbed material off site daily.

2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 03 30 00 - Cast-In-Place Concrete
   2. Section 32 12 16 - Asphalt Paving.
   3. Section 32 14 13 - Precast Concrete Unit Paving.
   4. Section 32 13 13 – Concrete Paving
   5. Section 32 16 15 – Concrete Walks, Curbs and Gutters

2. REFERENCES
   1. American Society for Testing and Materials (ASTM)
      a. ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

3. SAMPLES
   1. Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
   2. Provide Departmental Representative with access to source and processed material for sampling.

4. WASTE MANAGEMENT AND DISPOSAL
   1. Divert unused granular materials from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

1. 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 D 4791.
      a. Greatest dimension to exceed five times least dimension.
   3. Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
      a. Natural sand.
      b. Manufactured sand.
      c. 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:
      a. Crushed rock.
      b. Gravel [and crushed gravel] composed of naturally formed particles of stone.
      c. Light weight aggregate, including slag and expanded shale.
   5. ~~Aggregate salvaged from the existing construction access route to be used as granular subgrade for trail extension if salvaged material~~

meets testing requirements.

2. SOURCE QUALITY CONTROL

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

2. 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.

3. Advise Departmental Representative 4 weeks in advance of proposed change of material source.

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

PART 3 - EXECUTION

1. PREPARATION

1. Topsoil stripping

    a. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
    b. Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
    c. Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.
    d. Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.

2. Processing
    a. Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
    b. 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.
    c. Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
    d. When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

3. Handling
    a. Handle and transport aggregates to avoid segregation, contamination and degradation.

4. Stockpiling
    a. Stockpile aggregates on site in locations as indicated unless

directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

b. Stockpile aggregates in sufficient quantities to meet Project schedules.
c. Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
d. 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.
e. Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
f. Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within [48] h of rejection.
g. Stockpile materials in uniform layers of thickness as follows:
    i. Max 1.5 m for coarse aggregate and base course materials.
    ii. Max 1.5 m for fine aggregate and sub-base materials.
    iii. Max 1.5 m for other materials.
h. Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
i. Do not cone piles or spill material over edges of piles.
j. Do not use conveying stackers.
k. During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

2. CLEANING

1. Contractor to remove unused aggregate from site.

PART 1 - GENERAL

1. MEASUREMENT PROCEDURES
   1. Fixed price payments will be made for:
      a. Clearing.
      b. Close cut clearing.
      c. Clearing isolated trees.

2. REFERENCES
   1. U.S. Environmental Protection Agency (EPA)/Office of Water
      a. EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

3. DEFINITIONS
   1. Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
   2. Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
   3. Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
   4. Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, [and trees smaller than 50 mm trunk diameter] and disposing of fallen timber and surface debris.
   5. Grubbing consists of excavation and disposal of stumps and roots and boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

4. QUALITY ASSURANCE
   1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
   2. Safety Requirements: worker protection.
      a. Workers must wear [gloves] [respirators] [dust masks] [long sleeved clothing] [eye protection] [protective clothing] when applying herbicide materials.
      b. Workers must not eat, drink or smoke while applying herbicide material.
      c. Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

5. STORAGE AND PROTECTION
   1. Prevent damage to [fencing] [trees] [landscaping] [natural features] [bench marks] [existing buildings] [existing pavement] [utility lines] [site appurtenances] [water courses] [root systems of trees] which

are to remain.
   a. Repair damaged items to approval of Departmental Representative
   b. Replace trees designated to remain, if damaged, as directed by Departmental Representative

6. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

1. MATERIALS

1. Soil Material for Fill:
   a. Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
   b. Remove and store soil material for reused.

PART 3 - EXECUTION

1. TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control drawings, sediment and erosion control plan, specific to site that complies with requirements of authorities having jurisdiction.

2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2. PREPARATION

1. Inspect site and verify with Departmental Representative and Consultant, items designated to remain.

2. Locate and protect utility lines: preserve in operating condition active utilities traversing site.
   a. Notify Departmental Representative and Consultant immediately of damage to or when unknown existing utility lines are encountered.
   b. When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative and Consultant in ample time to minimize interruption of service.

3. Notify utility authorities before starting clearing and grubbing.

4. Keep roads and walks free of dirt and debris.

3. APPLICATION

1. Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

4. CLEARING

Clearing should be considered in conjunction with the following description. The microclimate conditions can be modified positively by: planning landscape integral with energy strategy; planning shade walls and paved areas adjacent to the building; using deciduous trees for summer shading; using coniferous trees for wind shielding; planting shrubs to reduce heat build up; consolidating or relocating paved areas; and using ponds and water fountains.

1. Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

2. Clear as directed by the Departmental Representative and Consultant, by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

3. Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative and Consultant.

4. Cut off unsound branches on trees designated to remain as directed by Departmental Representative and Consultant.

5. Apply herbicide in accordance with manufacturer's label to top surface of stumps designated not to be removed.

5. CLOSE CUT CLEARING

1. Close cut clearing to ground level to within 25 mm of ground surface.

2. Perform close cut clearing by hand so that existing cultural/historical resources are not damaged.

3. Cut off branches down trees overhanging area cleared as directed by Departmental Representative and Consultant.

4. Cut off unsound branches on trees designated to remain as directed by Departmental Representative and Consultant.

6. ISOLATED TREES

1. Cut off isolated trees as directed by Departmental Representative and Consultant at height of not more than 300 mm above ground surface.

2. Prune individual trees as indicated.

3. Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to

heights as indicated.

4. Cut limbs and branches to be trimmed close to bole of tree or main branches.

7. UNDERBRUSH CLEARING
   1. Clear underbrush from areas as indicated at ground level to within 50 mm of ground surface.

8. GRUBBING
   1. Grubbing will not be performed during project works

9. REMOVAL AND DISPOSAL
   1. Remove cleared and grubbed materials off site to disposal area.
   2. Chip or mulch and stockpile spread cleared and grubbed vegetative material and dispose offsite as directed by Departmental Representative.
   3. Remove diseased trees and invasive (Siberian Elm, Buckthorn, Dog Strangling Vine) identified by Departmental Representative and dispose of this material to approval of Departmental Representative

10. FINISHED SURFACE
    1. Leave ground surface in condition suitable for immediate grading operations stripping of topsoil to approval of Departmental Representative

11. CLEANING
    1. Proceed in accordance with Section 01 74 11 - Cleaning.
    2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1. REFERENCES
   1. U.S. Environmental Protection Agency (EPA)/Office of Water
      a. EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

PART 3 - EXECUTION

1. TEMPORARY EROSION AND SEDIMENTATION CONTROL
   1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
   2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
   3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
2. STRIPPING OF TOPSOIL
   1. Ensure that procedures are conducted in accordance with applicable Provincial, Territorial, and Municipal requirements.
   2. Remove topsoil before construction procedures commence to avoid compaction of topsoil.
   3. Handle topsoil only when it is dry and warm.
   4. Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by alternative disposal or composting.
   5. Remove brush from targeted area by non-chemical means and dispose of through alternative disposal or mulching.
   6. Strip topsoil by scraper to depths as indicated Consultant. Strip topsoil only once area cleared of archaeological restrictions.
      a. Avoid mixing topsoil with subsoil.
   7. Pile topsoil by mechanical hoe in berms in locations as directed by Departmental Representative

a. Stockpile height not to exceed 2.5 – 3 m.

8. Dispose of unused topsoil for later use.

9. Protect stockpiles from contamination and compaction.

10. Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

3. PREPARATION OF GRADE

1. Verify that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until instructed by Departmental Representative.
   a. Grade area only when soil is dry to lessen soil compaction.
   b. Grade soil with scrapers establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

4. PLACING OF TOPSOIL

1. Place topsoil only after Departmental Representative has accepted subgrade.

2. Spread topsoil during dry conditions by mechanical hoe in uniform layers not exceeding 150mm, over unfrozen subgrade free of standing water.

3. Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.

4. Cultivate soil following spreading procedures.

5. SUB-SOILING

1. Apply sub-soil, following spreading and cultivating procedures to designated areas to improve drainage and agricultural potential of soil.

2. Work sub-soil area following natural grade contour lines, with vibrating sub-soiler to depth of 40 cm.

3. Cross sub-soil the area following the first pass.

4. Cultivate the soil with a chain harrow to de-clod the soil.

6. CLEANING

1. Proceed in accordance with Section 01 74 11 - Cleaning.

2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 05 16 - Aggregate Materials
   2. Section 31 00 99 – Earthworks for Minor Works
   3. Section 02 41 13 - Selective Site Demolition

2. REFERENCES
   1. American Society for Testing and Materials International (ASTM)
      a. ASTM C 117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
      b. ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      c. ASTM D 422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
      d. ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (600 kN-m/m ³).
      e. ASTM D 4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
      b. CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
   3. Canadian Standards Association (CSA International)
      a. CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

3. DEFINITIONS
   1. Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
      a. Rock solid material in excess of 1.00 m ³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
      b. Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
   2. Unclassified excavation: excavation of deposits of whatever character encountered in Work.
   3. Topsoil:
      a. Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
      b. Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material

larger than 25 millimeters in any dimension.

4. Waste material: excavated material unsuitable for use in Work or surplus to requirements.

5. Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

6. Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

7. Unsuitable materials:
    a. Weak, chemically unstable, and compressible materials.
    b. Frost susceptible materials:
        i. Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.

        ii. Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

8. Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

4. ACTION AND INFORMATIONAL SUBMITTALS

1. Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

2. Quality Control: in accordance with Section 01 45 00 - Quality Control:
    a. Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
    b. Submit for review by Consultant proposed dewatering and heave prevention methods as described in PART 3 of this Section.
    c. Submit to Consultant written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
    d. Submit to Consultant written notice when bottom of excavation is reached.
    e. Submit to Consultant testing and inspection results and report as described in PART 3 of this Section.

3. Preconstruction Submittals:
    a. Submit construction equipment list for major equipment to be used in this section prior to start of Work.
    b. Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority and location plan of relocated and abandoned services.

5. QUALITY ASSURANCE

1. Qualification Statement: submit proof of insurance coverage for

professional liability.

2. Submit design and supporting data at least 2 weeks prior to beginning Work.

3. Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.

4. Keep design and supporting data on site.

5. Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

6. Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.
7. Health and Safety Requirements:
    a. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

6. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2. Divert excess aggregate materials from landfill to local facility for reuse as directed by Departmental Representative.

7. EXISTING CONDITIONS

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

underground lines.

i. Confirm locations of recent excavations adjacent to area of excavation.

2. Existing buildings and surface features:
   a. 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.
   b. Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative

PART 2 - PRODUCTS

1. MATERIALS

1. Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
   a. Crushed, pit run or screened stone, gravel or sand.
   b. Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117 . Sieve sizes to CAN/CGSB-8.1 and/or CAN/CGSB-8.2.

2. Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

3. Unshrinkable fill: proportioned and mixed to provide:
   a. Maximum compressive strength of 0.4 MPa at 28 days.
   b. Maximum cement content of 25 kg/m ^{3} with 40% by volume fly ash replacement: to CSA-A3001, Type GU.
   c. Minimum strength of 0.07MPa at 24 h.
   d. Concrete aggregates: to CSA-A23.1/A23.2.
   e. Cement: Type GU.
   f. Slump: 160 to 200 mm.

4. Geotextiles: to Section 31 32 19.01 - Geotextiles.

PART 3 - EXECUTION

1. TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings or requirements of authorities having jurisdiction, whichever is more stringent.

2. Inspect, repair, and maintain erosion and sedimentation control

measures during construction until permanent vegetation has been established.

3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2. SITE PREPARATION

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

2. Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly [in accordance with Section 02 41 13 - Selective Site Demolition.

3. PREPARATION/¸ PROTECTION

1. Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.

2. Keep excavations clean, free of standing water, and loose soil.

3. Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

4. Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

5. Protect buried services that are required to remain undisturbed.

4. STOCKPILING

1. Stockpile fill materials in areas designated by Departmental Representative.
    a. Stockpile granular materials in manner to prevent segregation.

2. Protect fill materials from contamination.

3. Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

5. EXCAVATION

1. Advise Consultant at least 7 days in advance of excavation operations for initial cross sections to be taken.

    a. Excavate to lines, grades, elevations and dimensions as indicated on drawings.
    b. Excavation must not interfere with bearing capacity of adjacent foundations.
    c. Do not disturb soil within branch spread of trees or shrubs that are to remain.
    d. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

2. For trench excavation, 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.

3. Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

4. Restrict vehicle operations directly adjacent to open trenches.

5. Dispose of surplus and unsuitable excavated material off site.

6. Do not obstruct flow of surface drainage.

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

8. Notify Departmental Representative when bottom of excavation is reached for review.

9. Obtain Departmental Representative approval, through Geotechnical Consultant, of completed excavation.

10. Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Geotechnical Consultant.

11. Correct unauthorized over-excavation as follows:
    a. Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.
    b. Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

12. Hand trim, make firm and remove loose material and debris from excavations.
    a. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
    b. Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

13. Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

6. FILL TYPES AND COMPACTION

1. Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
    a. Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.
    b. Place unshrinkable fill in areas as indicated.

7. BACKFILLING

1. Vibratory compaction equipment.

2. Do not proceed with backfilling operations until completion of following:
    a. Consultant has reviewed and approved installations.
    b. Consultant has reviewed and approved of construction below finish grade.
    c. Inspection, testing, approval, and recording location of underground utilities.
    d. Removal of concrete formwork.
    e. Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

3. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

4. Do not use backfill material which is frozen or contains ice, snow or debris.

5. Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

6. Backfilling around installations:

    a. Place bedding and surround material as specified elsewhere.
    b. Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
    c. Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0m.
    d. Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
        i. Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Consultant.

7. Place unshrinkable fill in areas as indicated.

8. Consolidate and level unshrinkable fill with internal vibrators.

9. Install drainage system in backfill as indicated on drawings.

8. RESTORATION

1. Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.

2. Replace topsoil as indicated.

3. Reinstate lawns to elevation which existed before excavation.

4. Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

5. Clean and reinstate areas affected by Work as directed by Departmental Representative.

6. Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

7. Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 00 99 - Earthworks for Minor Works
   2. Section 32 11 23 - Aggregate Base Courses
   3. Section 31 23 33.01 - Excavating Trenching and Backfilling

2. REFERENCES
   1. American Society for Testing and Materials International, (ASTM)
      a. ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
      b. ASTM D 4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
      c. ASTM D 4716-01, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
      d. ASTM D 4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-4.2 No. 11.2-M89(April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
      b. CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
         i. No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
         ii. No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
         iii. No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
         iv. No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
         v. No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
   3. Canadian Standards Association (CSA International)
      a. CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
      b. CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
   4. Ontario Provincial Standard Specifications (OPSS)
      a. OPSS 1860-March 1998, Material Specification for Geotextiles.

3. ACTION AND INFORMATIONAL SUBMITTALS
   1. Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
   2. Submit to Consultant following samples at least [4] weeks prior to

beginning Work.
   a. Minimum length of 2 m of roll width of geotextile.
   b. Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seam.

3. Submit to Consultant copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

4. DELIVERY, STORAGE AND HANDLING

1. During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

5. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

2. Remove from site and dispose of all packaging materials at appropriate recycling facilities.

3. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard] packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

4. Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

1. MATERIAL

1. Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
   a. Width: 2 m minimum.
   b. Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

2. Physical properties:
   a. Thickness: to CAN/CGSB-148.1, No.3, minimum 2 mm.
   b. Tensile strength and elongation (in any principal direction): to ASTM D 4595.
      i. Tensile strength: minimum 160 N, wet condition.
      ii. Elongation at break: maximum %.
      iii. Seam strength: minimum equal to or greater than tensile strength of fabric.
   c. Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
      i. Breaking force: minimum 100 N, wet condition.
      ii. Elongation at future: minimum %.

3. Hydraulic properties:
   a. Apparent opening size (AOS): to ASTM D 4751, 0.2 micrometres.
   b. Filtration opening size (FOS): to CAN/CGSB-148.1 No.10.
   c. Permitivity: to ASTM D 4491, 1.5 pers.

4. Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.

PART 3 - EXECUTION

1. INSTALLATION

1. Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins.
2. Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
3. Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
4. Overlap each successive strip of geotextile 600 mm over previously laid strip.
5. Pin successive strips of geotextile with pins at 500mm intervals at midpoint of lap.
6. Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
7. After installation, cover with overlying layer within 4 h of placement.
8. Replace damaged or deteriorated geotextile to approval of Departmental Representative.
9. Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling

2. CLEANING

1. Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3. PROTECTION

1. Vehicular traffic not permitted directly on geotextile.

PART 1 - GENERAL

1.	RELATED REQUIREMENTS	1. Section 31 23 33.01 - Excavating Trenching and Backfilling
2.	REFERENCES	1. American Society for Testing and Materials International, (ASTM) a. ASTM D 1248-[02], Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable. b. ASTM D 4101-[02a], Standard Specification for Polypropylene Injection and Extrusion Materials. c. ASTM D 4218-[96(R2001)], Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique. d. ASTM D 5262-[97], Standard Test Method for Evaluating the Unconfined Tension Creep Behaviour of Geosynthetics. e. ASTM D 6637-[01], Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.
3.	ACTION AND INFORMATIONAL SUBMITTALS	1. Submit samples in accordance with Section 01 33 00 - Submittal Procedures. 2. Submit to Departmental Representative following samples at least 1 week prior to beginning Work. a. One 1 m length from full roll width of geogrid material.
4.	DELIVERY, STORAGE AND HANDLING	1. During delivery and storage, protect geogrids from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.
5.	WASTE MANAGEMENT AND DISPOSAL	1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal. 2. Remove from site and dispose of all packaging materials at appropriate recycling facilities. 3. Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] packaging material for recycling in accordance with Waste Management Plan. 4. Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

1.	MATERIAL	1. Geogrid: open grid polymer having [uniaxial] [biaxial] orientation,

free of striations, roughness, pinholes, blisters, undispersed raw materials or any sign of contamination by foreign matter.
   a. Polymer: polypropylene: to ASTM D 4101 with inhibitors added to resist deterioration by ultra-violet and heat exposure.

2. Geogrid physical properties:
   a. Peak tensile strength: to ASTM D 6637.

PART 3 - EXECUTION

1. INSTALLATION

1. Place geogrid material by unrolling onto graded surface in manner and locations indicated and retain in position in accordance with manufacturer's written recommendations.

2. Place geogrid on sloping surfaces in one continuous length from toe of slope to upper extent of geogrid.

3. Overlap each successive strip of geogrid [600] mm over previously laid strip.

4. Join successive strips of geogrid as recommended by manufacturer.

5. Protect geogrid from displacement, damage or deterioration before and during placement of overlay soil layers.

6. After installation, cover with overlay layer within 10 days of placement.

7. Replace damaged or deteriorated geogrid to approval of Departmental Representative

8. Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.

2. CLEANING

1. Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3. PROTECTION

1. Vehicular traffic not permitted directly on geogrid.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 32 19.01 - Geotextiles
2. REFERENCES
   1. American Society for Testing and Materials (ASTM)
      a. ASTM C 144-[99], Standard Specification for Aggregate for Masonry Mortar.
      b. ASTM C 618-[00], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
   2. Canadian Standards Association (CSA)
      a. CAN/CSA-A23.1-[00], Concrete Materials and Methods of Concrete Construction.
      b. CAN/CSA-A3000-[98], Cementitions Materials Compendium.
3. WASTE MANAGEMENT AND DISPOSAL
   1. Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
   2. Collect and separate [plastic] [paper packaging] [corrugated cardboard] in accordance with Waste Management Plan.
   3. Place materials defined as hazardous or toxic in designated containers.
   4. Fold up metal banding, flatten and place in designated area for recycling.
   5. Divert left over aggregate materials from landfill to local quarry for reuse as approved by Departmental Representative.
   6. Divert left over geotextiles to local plastic recycling program as approved by Departmental Representative.

PART 2 - PRODUCTS

1. STONE
   1. Hard, dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
      a. Hand placed rip-rap:
         i. Minimum size of individual stones 10 dm^3.
         ii. Not less than 75% of total volume of stones with

individual volume of 25 dm³ or more.

iii. Supply rock spalls or cobbles to fill open joints.

2. GEOTEXTILE FILTER

1. Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

PART 3 - EXECUTION

1. PLACING

1. Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

2. Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

3. Place geotextile on prepared surface in accordance with Section 31 32 19.01 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

4. Place rip-rap to thickness and details as indicated.

5. Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

6. Hand placing:
    a. Use larger stones for lower courses and as headers for subsequent courses.
    b. Stagger vertical joints and fill voids with rock spalls or cobbles.
    c. Finish surface evenly, free of large openings and neat in appearance.

PART 1 - GENERAL

1. SUMMARY
   1. Section Includes:
      a. Materials and installation for fertilizing and preserving root systems of plants affected by changing grades or excavation.
   2. Related Requirements
      a. Section 02 41 13 Selective Site Demolition
      b. Section 31 00 99 Earthworks for Minor Works
      c. Section 32 93 45 Tree Pruning
2. REFERENCES
   1. Canadian Standards Association (CSA International).
      a. CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
   2. Department of Justice Canada (Jus).
      a. Canadian Environmental Protection Act (CEPA), 1999, c. 33.
      b. Fertilizers Act (R.S. 1985, c. F-10).
      c. Fertilizers Regulations (C.R.C., c. 666).
      d. Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
   3. Health Canada - Pest Management Regulatory Agency (PMRA).
      a. National Standard for Pesticide Education, Training and Certification in Canada (1995).
   4. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
      a. Material Safety Data Sheets (MSDS).
3. DEFINITIONS
   1. Mycorrhiza : association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.
4. ACTION AND INFORMATIONAL SUBMITTALS
   1. Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
   2. Submit monthly written reports on maintenance during warranty period, to Departmental Representative identifying:
      a. Maintenance work carried out.
      b. Development and condition of plant material.
      c. Preventative or corrective measures required which are outside Contractor's responsibility.
5. QUALITY ASSURANCE
   1. Health and Safety: .
      a. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

6. DELIVERY, STORAGE AND HANDLING

1. Waste Management and Disposal:
    a. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    b. Remove from site and dispose of packaging materials at appropriate recycling facilities.
    c. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material appropriate on-site bins for recycling in accordance with Waste Management Plan.
    d. Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.
    e. Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
    f. Divert unused wood materials from landfill by alternative disposal, composting or mulching approved by Departmental Representative.
    g. Divert unused stone and aggregate materials from landfill to local facility approved by Departmental Representative.
    h. Divert unused plastic materials from landfill to local recycling facility approved by Departmental Representative.
    i. Place materials defined as hazardous or toxic in designated containers.
    j. Dispose of unused fertilizer material at official hazardous material collections site approved by Departmental Representative.
    k. Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
    l. Do not dispose of unused fertilizer material into sewer system, into streams, lakes, onto ground or in any other location where they will pose health or environmental hazard.
    m. Ensure emptied containers are sealed and stored safely.
    n. Fold up metal banding, flatten and place in designated area for recycling.

7. SCHEDULING

1. Obtain approval from Departmental Representative of schedule indicating beginning of Work.

8. MAINTENANCE DURING WARRANTY PERIOD

1. From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
    a. Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
    b. Apply pesticides in accordance with National Standard for Pesticide Education, Training and Certification in Canada, Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Departmental Representative prior to application.
    c. Apply fertilizer in early spring at manufacturer's suggested rate.
    d. Remove dead, broken or hazardous branches from plant material. Dispose of debris through alternative disposal, composting or mulching.

PART 2 - PRODUCTS

1. MATERIALS

1. Fill:
    a. Type (A): clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter.
    b. Type (B): excavated pervious soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc). Excavated material shall be approved by Departmental Representative before use as fill.
2. Coarse washed stones: 35-75 mm diameter clean round hard stone.
3. Fertilizer:
    a. To Canada Fertilizer Act and Fertilizers Regulations.
    b. Complete, commercial, slow release with 35 % of nitrogen content in water-insoluble form.
4. Anti-desiccant: commercial, wax-like emulsion.
5. Filter Cloth:
    a. Type 1: 100 % non-woven needle punched polyester, 2.75 mm thick, 240 g/m² mass.
    b. Type 2: biodegradable burlap.
6. Wood posts: 38 x 89 x 2400 mm length, untreated wood.

PART 3 - EXECUTION

1. IDENTIFICATION AND PROTECTION

1. Identify plants and limits of root systems to be preserved as approved by Departmental Representative.
2. Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Departmental Representative.
3. Ensure no pruning is done inside drip line. If pruning inside drip line is required consult an Arborist as approved by Departmental Representative.

2. TRENCHING AND TUNNELING FOR UNDERGROUND SERVICES

1. Centre line location and limits of trench/tunnel excavation to be approved by Departmental Representative prior to excavation. Tunnel excavation to extend 2000 mm from edge of trunk on either side.
2. Excavate manually within zone of root system. Do not sever roots greater than 40 mm diameter except at greater than 500 mm below existing grade. Protect roots, and cut roots cleanly with sharp disinfected tools.
3. Excavate tunnel under centre of tree trunk using methods and equipment approved by Departmental Representative.

4. Minimum acceptable depth to top of tunnel: 1000 mm.

5. Backfill for tunnel and trench to 85% Standard Proctor Density. Avoid damage to trunk and roots of tree.

6. Complete tunnelling and backfilling at tree within 2 weeks of beginning Work.

3. LOWERING GRADE AROUND EXISTING TREE

1. Begin Work in accordance with schedule approved by Departmental Representative.

2. Cut slope not less than 500 mm from tree trunk to new grade level.

3. Excavate to depths as indicated. Protect from damage root zone which is to remain.

4. When severing roots at excavation level, cut roots with sharp tools.

5. Cultivate excavated surface manually to 15 mm depth.

6. Prepare homogeneous soil mixture consisting by volume of:
   a. 60 % excavated soil cleaned of roots, plant matter, stones, debris.
   b. 25 % coarse, clean sterile sand.
   c. 15 % organic matter.
   d. Grade 2:12:8 fertilizer at rate of 1.5 kg/m³.

7. Place soil mixture over area of excavation to finished grade level. Compact to 85% Standard Proctor Density.

8. Water entire root zone to optimum soil moisture level.

9. Install surface cover of sodding in accordance with Section 32 92 23 - Sodding.

4. PRUNING

1. Prune in accordance with Section 32 93 45 - Tree Pruning.

5. ANTI-DESICCANT

1. Apply anti-desiccant to foliage where as directed by Departmental Representative.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 05 16 – Aggregate Materials.
2. REFERENCES
   1. American Society for Testing and Materials (ASTM)
      a. ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
      b. ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
      c. ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      d. ASTM D 422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
      e. ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
      f. ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
      g. ASTM D 1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
      h. ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
      b. CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
3. WASTE MANAGEMENT AND DISPOSAL
   1. Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
   2. Divert unused granular material from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

1. MATERIALS
   1. Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
      a. Crushed, pit run or screened stone, gravel or sand.
      b. Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

c. Other Properties as follows:
   i. Liquid Limit: to ASTM D 4318, Maximum 25.

PART 3 - EXECUTION

1. PLACING

1. Place granular sub-base after subgrade is reviewed and approved by Geotechnical Consultant.
2. Construct granular sub-base to depth and grade in areas indicated.
3. Ensure no frozen material is placed.
4. Place material only on clean unfrozen surface, free from snow or ice.
5. Place granular sub-base materials using methods which do not lead to segregation or degradation.
6. For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
7. Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
8. Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
9. Remove and replace portion of layer in which material has become segregated during spreading.

2. COMPACTION

1. Compaction equipment to be capable of obtaining required material densities.
2. Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.
3. Equipped with device that records hours of actual work, not motor running hours.
4. Compact to density of not less than 98% corrected maximum dry density in accordance with ASTM D 698 ASTM D 1557.
5. Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

6. Apply water as necessary during compaction to obtain specified density.

7. In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

8. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3. PROOF ROLLING

1. For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.

2. Obtain approval from Departmental Representative to use non standard proof rolling equipment.

3. Proof roll at level in sub-base as indicated. If non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.

4. Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

5. Where proof rolling reveals areas of defective subgrade:
   a. Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
   b. Backfill excavated subgrade with common material and compact in accordance with sub-base material and compact in accordance with this section.
   c. Replace sub-base material and compact.

6. Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

4. SITE TOLERANCES

1. Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

5. PROTECTION

1. Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 03 30 00 - Cast-In-Place Concrete
   2. Section 32 12 16 - Asphalt Paving.
   3. Section 32 14 13 - Precast Concrete Unit Paving.
   4. Section 31 05 16 - Aggregate Materials

2. REFERENCES
   1. American Society for Testing and Materials (ASTM)
      a. ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
      b. ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
      c. ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      d. ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
      e. ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
      f. ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
      b. CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

3. DELIVERY, STORAGE, AND HANDLING
   1. Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.
   2. Store cement in weathertight bins or silos that provide protection from dampness and easy access for review and identification of each shipment.

4. WASTE MANAGEMENT AND DISPOSAL
   1. Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
   2. Divert unused granular material from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

1. MATERIALS
   1. Granular base: material in accordance with Section 31 05 16 -

Aggregate Materials and following requirements:

a. Crushed stone or gravel.
b. Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

PART 3 - EXECUTION

1. SEQUENCE OF OPERATION

1. Place granular base after subgrade surface is reviewed and approved by Geotechnical Consultant.

2. Placing
   a. Construct granular base to depth and grade in areas indicated.
   b. Ensure no frozen material is placed.
   c. Place material only on clean unfrozen surface, free from snow and ice.
   d. Begin spreading base material on crown line or on high side of one-way slope.
   e. Place material using methods which do not lead to segregation or degradation of aggregate.
   f. For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
   g. Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
   h. Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
   i. Remove and replace that portion of layer in which material becomes segregated during spreading.

3. Compaction Equipment
   a. Compaction equipment to be capable of obtaining required material densities.

4. Compacting
   a. Compact to density not less than 100% corrected maximum dry density in accordance with ASTM D 698 ASTM D 1557.
   b. Shape and roll alternately to obtain smooth, even and uniformly compacted base.
   c. Apply water as necessary during compacting to obtain specified density.
   d. In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
   e. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

5. Proof rolling

a. For proof rolling use standard roller of [45400] kg gross mass with four pneumatic tires each carrying [11350] kg and inflated to [620] kPa. Four tires arranged abreast with centre to centre spacing of [730] mm.
b. Obtain approval from Departmental Representative to use non standard proof rolling equipment.
c. Proof roll at level in granular base as indicated. If use of non standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.
d. Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
e. Where proof rolling reveals areas of defective subgrade:
    i. Remove base, sub-base and subgrade material to depth and extent as directed by Departmental Representative.
    ii. Backfill excavated subgrade with [common material and compact in accordance with Section 31 22 14 - Airfield Grading [sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-Base.
    iii. Replace sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-base.
    iv. Replace base material and compact in accordance with this Section.
f. Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Departmental Representative and replace with new materials in accordance with Section 32 11 16.01 - Granular Sub-base and this section at no extra cost.

2. SITE TOLERANCES

1. Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3. PROTECTION

1. Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 32 19.01 - Geotextiles
2. REFERENCES
   1. ASTM International
      a. ASTM C 136-[06], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      b. ASTM C 117-[04], Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
      c. ASTM D 4318-[05], Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
      d. ASTM D 698-[07e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³).
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
      b. CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
3. ADMINISTRATIVE REQUIREMENTS
   1. Access: allow access to golf course at all times.
   2. Scheduling: co-ordinate paving schedule to minimize interference with normal use of premises.
4. ACTION AND INFORMATIONAL SUBMITTALS
   1. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
5. DELIVERY, STORAGE AND HANDLING
   1. Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
   2. Store crushed stone as and where directed by Departmental Representative.
   3. Packaging Waste Management: remove for reuse [and return] [by manufacturer] [pallets,] [crates,] [padding,] [and] [packaging materials] as specified in in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

1. MATERIALS
   1. Granular sub-base: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
      a. Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other

deleterious materials.

b. Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117]. Sieve sizes to CAN/CGSB-8.1

c. Sourced from Walker Aggregates 2800 Thorold Townline Rd, Niagara Falls, ON, L2E 6S4

2. Table:

Sieve Designation	% Passing
75 mm	[100]
4.75 mm	[25-85]
0.425 mm	[5-30]
0.075 mm	[0-10]

3. Granular base: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
   a. Crushed stone or gravel: hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
   b. Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.

   c. Table:

Sieve Designation	% Passing
19 mm	[100]
12.5 mm	[70-100]
4.75 mm	[40-70]
2.00 mm	[23-50]
0.425 mm	[7-25]
0.075 mm	[3-8]

4. Liquid limit: ASTM D 4318 maximum 25.
   a. Plasticity index: ASTM D 4318 maximum 6.

   b. Granular topping:
      i. Screenings: hard, durable, crushed stone particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
      ii. Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117.

Sieve Designation Désignation des t	% Passing
9.5 mm	[100]
4.75 mm	[50-100]
2.00 mm	[30-65]
0.425 mm	[10-30]
0.075 mm	[5-10]

PART 3 - EXECUTION

1. SUBGRADE
   1. Ensure subgrade preparation conforms to levels and compaction required, to allow for installation of granular base.
2. GEOTEXTILE FILTER
   1. Install geotextile filter per drawings and in accordance with Section 31 32 19.01 - Geotextiles.
3. GRANULAR SUB-BASE
   1. Granular sub-base material minimum thickness as indicated.
   2. Place material in uniform layers not to exceed 150 mm compacted thickness.
      a. Compact layer to 98 % Standard Density in accordance with ASTM D 698.
4. GRANULAR BASE
   1. Granular base material thickness as indicated.
   2. Spread and compact granular base material in uniform layers not exceeding [100] mm compacted thickness.
   3. Compact to a density of not less than 98 % Standard Density in accordance with ASTM D 698.
5. EDGING
   1. Install edging true to grade, in location, layout as indicated.
6. GRANULAR TOPPING
   1. Place granular topping to compacted thickness as indicated.
   2. Place material in uniform layers not to exceed 50 mm compacted thickness.
      a. Compact layer to 98 % Standard Density in accordance with ASTM D 698.
7. FIELD QUALITY CONTROL
   1. Inspection and testing of crushed stone paving: carried out by designated testing laboratory.
   2. Costs of tests: paid under Cash Allowance.
8. CLEANING
   1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning
      a. Leave Work area clean at end of each day.
   2. Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
   3. Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
      a. Remove recycling containers and bins from site and dispose of materials at appropriate facility.
9. PROTECTION
   1. Prevent damage to [buildings,] [landscaping,] [curbs,] [sidewalks,] [trees,] [fences,] [roads] and adjacent property.
      a. Repair damages incurred.

PART 1 - GENERAL

1. ACTION AND INFORMATIONAL SUBMITTALS	1. Submit product data in accordance with Section 01 33 00 - Submittal Procedures. 2. Submit shop drawings in accordance with Section 1 33 00 - Submittal Procedures. 3. Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified. 4. Provide maintenance data for care and cleaning of site furnishings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
2. WASTE MANAGEMENT AND DISPOSAL	1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal. 2. Remove from site and dispose of packaging materials at appropriate recycling facilities. 3. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan. 4. Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan. 5. Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

1. ~~TRAFFIC SIGNAGE~~	1. ~~Golf Warning Sign, Trail Users Stay Off Golf Course, Trail Accessibility.~~ a. ~~Manufacturer: Contractor to obtain approval from Departmental Representative~~ b. ~~Installation: As indicated~~
2. FURNISHING	2. Bench a. Manufacturer: WH Reynolds Model 624105 b. Installation: As indicated
3. BOLLARDS	3. REMOVEABLE BOLLARD a. Manufacturer: Maglin MTB 650

b. Installation: As indicated

4. CEDAR BOLLARD
   a. Manufacturer: Contractor to obtain approval from Departmental Representative
   b. Installation: As indicated

4. GOLF SAFETY NETTING

5. POSTS AND NETTING
   a. Manufacturer: Contractor to obtain approval from Departmental Representative
   b. Installation: As indicated

PART 3 - EXECUTION

1. INSTALLATION

1. Assemble furnishings in accordance with manufacturer's instructions.
2. Install furnishing true, plumb, anchored firmly supported, as indicated.
3. Touch-up damaged finishes to approval of Departmental Representative.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 32 93 23 – Trees, Shrubs, and Ground Cover Planting
2. REFERENCES
   1. Agriculture and Agri-Food Canada
      a. The Canadian System of Soil Classification, Third Edition, 1998.
   2. Canadian Council of Ministers of the Environment
      a. PN1340-2005, Guidelines for Compost Quality.
   3. U.S. Environmental Protection Agency (EPA)/Office of Water
      a. EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
3. DEFINITIONS
   1. Compost:
      a. Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
      b. Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
      c. Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminates.
      d. Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).
4. ACTION AND INFORMATIONAL SUBMITTALS
   1. Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
   2. Quality control submittals :
      a. Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
      b. Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
5. WASTE MANAGEMENT AND DISPOSAL
   1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
   2. Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

3. Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

1. TOPSOIL

1. Topsoil for seeded areas planting beds: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
    a. Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
    b. Contain no toxic elements or growth inhibiting materials.
    c. Finished surface free from:
        i. Debris and stones over 50 mm diameter.
        ii. Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
    d. Consistence: friable when moist.

2. SOIL AMENDMENTS

1. Fertilizer:
    a. All recommendations for fertilizer will be based on topsoil sample testing results
    b. Fertility: major soil nutrients present in following amounts:
    c. Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
    d. Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
    e. Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
    f. Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
    g. Ph value: 6.5 to 8.0.

2. Sand: washed coarse silica sand, medium to course textured.

3. Organic matter: compost Category A in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

4. Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

5. Limestone:
    a. Ground agricultural limestone.
    b. Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

6. Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

3. SOURCE QUALITY CONTROL

1. Advise Departmental Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.

2. Contractor is responsible for amendments to supply topsoil as specified.

3. Soil testing by recognized testing facility for PH, P and K, and organic matter.

4. Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
    a. Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

1. TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2. STRIPPING OF TOPSOIL

1. Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.

2. Strip topsoil to depths as directed by Departmental Representative.
    a. .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

3. Stockpile in locations as directed by Departmental Representative.
    a. Stockpile height not to exceed 2 m.

4. Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.

5. Protect stockpiles from contamination and compaction.

3. PREPARATION OF EXISTING GRADE

1. Verify that grades are correct.
    a. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
2. Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
3. Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
    a. Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
    b. Remove debris which protrudes more than 75 mm above surface.
    c. Dispose of removed material off site.
4. Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
    a. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

4. PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

1. Place topsoil after Departmental Representative has accepted subgrade.
2. Spread topsoil in uniform layers not exceeding 150 mm.
3. For sodded areas keep topsoil 15 mm below finished grade.
4. Spread topsoil as indicated following minimum depths after settlement.
    a. Per drawings and details
5. Manually spread topsoil/planting soil around trees, shrubs and obstacles.

5. FINISH GRADING

1. Grade to eliminate rough spots and low areas and ensure positive drainage.
    a. Prepare loose friable bed by means of cultivation and subsequent raking.
2. Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
    a. Leave surfaces smooth, uniform and firm against deep footprinting.

6. ACCEPTANCE

1. Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

7. SURPLUS MATERIAL

1. Dispose of materials except topsoil not required off site.

8. CLEANING

1. Proceed in accordance with Section 01 74 11 - Cleaning.

2. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 32 91 19_13 Topsoil Placement and Grading
2. ACTION AND INFORMATIONAL SUBMITTALS
   1. Product Data.
      a. Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
      b. Provide product data for:
         i. Seed.
         ii. Mulch.
         iii. Tackifier.
         iv. Fertilizer.
      c. Submit in writing to Departmental Representative 7 days prior to commencing work:
         i. Volume capacity of hydraulic seeder in litres.
         ii. Amount of material to be used per tank based on volume.
         iii. Number of tank loads required per hectare to apply specified slurry mixture per hectare.
3. QUALITY ASSURANCE
   1. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
   3. Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.
4. SCHEDULING
   1. Schedule hydraulic seeding to coincide with preparation of soil surface.
   2. Schedule hydraulic seeding using grass mixtures between dates recommended by the Provincial Agricultural Department.
5. WASTE MANAGEMENT AND DISPOSAL
   1. Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
   2. Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.
   3. Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

1. MATERIALS

1. Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
    a. Grass mixture: "Certified" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
        i. Mixture composition (OSC MTC mix):
            1. .1 55% Creeping Red Fescue
            2. .2 27% Kentucky Blue Grass
            3. .3 3% White Clover
            4. .4 15% Perennial Rye Grass
        ii. Annual Rye Grass in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
2. Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
    a. Type I mulch:
        i. Made from wood cellulose fibre.
        ii. Organic matter content: 95% plus or minus 0.5%.
        iii. Value of pH: 6.0.
        iv. Potential water absorption: 900%.
3. Tackifier: water dilutable, liquid dispersion
4. Water: free of impurities that would inhibit germination and growth.
5. Fertilizer:
    a. To Canada "Fertilizers Act" and "Fertilizers Regulations".
    b. Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
6. Inoculants: inoculant containers to be tagged with expiry date.

PART 3 - EXECUTION

1. WORKMANSHIP

1. Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
2. Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.
3. Do not perform work under adverse field conditions such as wind speeds over 15 km/h, frozen ground or ground covered with

snow, ice or standing water.

4. Protect seeded areas from trespass until plants are established.

2. PREPARATION OF SURFACES

1. Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
2. Cultivated areas identified as requiring cultivation to depth of 25mm.
3. Ensure areas to be seeded are moist to depth of 150 mm before seeding.
4. Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

3. FERTILIZING PROGRAM

1. Fertilize prior to fine grading incorporating fertilizer equally distributed in accordance with the following program:
2. Fertilize once during establishment and once during warranty period.

4. PREPARATION OF SLURRY

1. Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.
2. Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
3. After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

5. SLURRY APPLICATION

1. Hydraulic seeding equipment:
    a. Slurry tank.
    b. Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
    c. Capable of seeding by 100 m hand operated hoses and appropriate nozzles.
    d. Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
2. Slurry mixture applied per manufacturers' specifications
3. Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
    a. Using correct nozzle for application.
    b. Using hoses for surfaces difficult to reach and to control application.

4. Blend application 300 mm into adjacent grass areas or sodded areas, previous applications to form uniform surfaces.

5. Re-apply where application is not uniform.

6. Remove slurry from items and areas not designated to be sprayed.

7. Protect seeded areas from trespass satisfactory to Departmental Representative

8. Remove protection devices as directed by Departmental Representative

6. MAINTENANCE DURING ESTABLISHMENT PERIOD

1. Perform following operations from time of seed application until acceptance by Departmental Representative

2. Grass Mixture:
    a. Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
    b. Mow grass to 75 mm whenever it reaches height of 100 mm. Remove clippings which will smother grass [as directed by Departmental Representative
    c. Fertilize seeded areas after 10 weeks after germination provided plants have mature true leafs in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles ;water in well] .
    d. Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
    e. Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3. Legume Mixture:
    a. Repair minor dead and bare spots as determined by Departmental Representative to allow establishment of seed prior to acceptance.
    b. Negotiate repair of major dead and bare spots as determined by Departmental Representative in accordance with site climatic averages and recommendations of local horticultural governmental representative.

    c. Mow annual rye grass mixtures to 100mm whenever height reaches 200 mm and as follows:
        i. Do not mow within period commencing 3 weeks before and ending 3 weeks after first severe, average fall frost date and 3 weeks after actual severe fall frost.
        ii. When mowing after first severe fall frost, mow at a height of not less than 300 mm.

d. Remove clippings which will smother plants [as directed by Departmental Representative
e. Water seeded areas to maintain optimum soil moisture level for germination and continued growth. Control watering to prevent washouts.

7. ACCEPTANCE

1. Seeded areas will be accepted by Departmental Representative that:
   a. Seeded areas are free of rutted, eroded, bare or dead spots.
   b. Areas have been mown at least twice.
   c. Areas have been fertilized.

2. Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

8. MAINTENANCE DURING WARRANTY PERIOD

1. Perform following operations from time of acceptance until end of warranty period:
   a. Repair and reseed dead or bare spots to satisfaction of Departmental Representative
   b. Mow areas seeded, [remove clippings,] as directed by Departmental Representative
   c. Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles [and water in well].

9. CLEANING

1. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1. SUMMARY
   1. Section Includes:
      a. Materials and installation for plant material, accessories, mulch, planting, tree support, mulching and maintenance.
   2. Related Requirements
      a. Section 31 00 99 – Earthworks for Minor Works
      b. Section 32 91 19.13 – Topsoil Placement and Grading
2. REFERENCES
   1. Agriculture and Agri-Food Canada (AAFC).
      a. Plant Hardiness Zones in Canada-2000.
   2. Canadian Nursery Landscape Association (CNLA).
      a. Canadian Standards for Nursery Stock-2001.
   3. Department of Justice Canada (Jus).
      a. Canadian Environmental Protection Act (CEPA), 1999, c. 33.
      b. Transportation of Dangerous Goods Act (TDGA), 1992, c.34.
   4. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
      a. Material Safety Data Sheets (MSDS).
3. DEFINITIONS
   1. Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.
4. ACTION AND INFORMATIONAL SUBMITTALS
   1. Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
   2. Submit product data for:
      a. Fertilizer.
      b. Anti-desiccant.
      c. Guying assembly including clamps, collar, guying wire, anchors and wire tightener.
      d. Mulch.
5. QUALITY ASSURANCE
   1. Health and Safety:
      a. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
6. STORAGE AND PROTECTION
   1. Protect plant material from frost, excessive heat, wind and sun during delivery.
   2. Immediately store and protect plant material which will not be installed within 1 hours after arrival at site in storage location

approved by Departmental Representative.

3. Protect plant material from damage during transportation:
    a. When delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
    b. When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
    c. Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

4. Protect stored plant material from frost, wind and sun and as follows:
    a. For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
    b. For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
    c. For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

5. Waste Management and Disposal:

    a. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
    b. Remove from site and dispose of packaging materials at appropriate recycling facilities.
    c. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
    d. Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with WMP.
    e. Place materials defined as hazardous or toxic in designated containers.
    f. Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
    g. Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
    h. Fold up metal and plastic banding, flatten and place in designated area for recycling.
    i. Divert discarded plastic plant containers materials from landfill to plastic recycling facility approved by Departmental Representative.
    j. Dispose of unused fertilizer at official hazardous material collection site approved by Departmental Representative.

k. Dispose of unused anti-desiccant at official hazardous material collections site approved by Departmental Representative.
l. Divert unused wood and mulch materials from landfill to recycling, composting facility approved by Departmental Representative.

7. SCHEDULING

1. Obtain approval from Departmental Representative of schedule 7 days in advance of shipment of plant material.

2. Schedule to include:
   a. Quantity and type of plant material.
   b. Shipping dates.
   c. Arrival dates on site.
   d. Planting Dates.

8. WARRANTY

1. The Contractor hereby warrants that plant material as itemized on plant list will remain free of defects in accordance with Departmental Representative's General Conditions.

2. End-of-warranty inspection will be conducted by Departmental Representative.

3. Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

PART 2 - PRODUCTS

1. PLANT MATERIAL

1. Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
   a. Source of plant material: grown in Zone 6a in accordance with Plant Hardiness Zones in Canada.
   b. Plant material must be planted in zone indicated as appropriate for its species.
   c. Plant material in location appropriate for its species.

2. Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

3. Trees: with straight trunks, well and characteristically branched for species except where specified otherwise.

4. Trees larger than 200 mm in caliper: half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on site.

5. Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

6. Collected stock: maximum 40 mm in caliper, with well-developed crowns and characteristically branched; no more than 40% of

overall height may be free of branches.

2. WATER
   1. Free of impurities that would inhibit plant growth.
3. STAKES
   1. Softwood, 40 x 40 x 5 x 2440 mm.
4. GUYING WIRE
   1. Deeproot Arbortie Staking and Guying Material
5. CLAMPS
   1. U-bolt: galvanized, 13 mm diameter, c/w curved retaining bar and hex nuts.
   2. Crimp type.
6. ANCHORS
   1. Wood:
      a. Type 1: 38 x 38 x 460 mm.
      b. Type 2: 38 x 67 x 600 mm.
   2. Drive-in type.
      a. Type 1: 13 mm diameter x 75 mm long aluminum.
      b. Type 2: 18 mm diameter x 120 mm long, aluminum.
   3. Screw-in type:
      a. Type 1: 100 mm diameter steel disc.
7. MULCH
   1. Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.
   2. Wood chip: varying in size from 50 mm to 75 mm and 5 to 20 mm thick, free of bark, small branches and leaves.
   3. Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.
8. FERTILIZER
   1. Synthetic commercial type as recommended by manufacturer.
9. FLAGGING TAPE
   1. Fluorescent, pink colour.
10. SOURCE QUALITY CONTROL
    1. Obtain approval from Departmental Representative of plant material prior to planting.
    2. Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.
    3. All plant stock to be verified as local stock, sourced and grown within 100km of the project site.

PART 3 - EXECUTION

1. PRE-PLANTING PREPARATION
   1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

2. Ensure plant material acceptable to Departmental Representative.

3. Remove damaged roots and branches from plant material.

2. EXCAVATION AND PREPARATION OF PLANTING BEDS

1. Establishment of sub-grade for planting beds is specified in Section 31 22 13 - Rough Grading.

2. Preparation of planting beds is specified in Section 32 91 19.13 - Topsoil Placement and Grading.

3. For individual planting holes:
   a. Stake out location and obtain approval from Departmental Representative prior to excavating.
   b. Excavate to depth and width as indicated.
   c. Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
   d. Scarify sides of planting hole.
   e. Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

3. PLANTING

1. For bare root stock, place 50 mm backfill soil in bottom of hole. Plant trees and shrubs with roots placed straight out in hole.

2. For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball. Do not pull burlap or rope from under root ball.

3. For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

4. Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.

5. For trees and shrubs:
   a. Backfill soil in 150 mm lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.
   b. Form watering saucer as indicated.

6. For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

7. Water plant material thoroughly.

8. After soil settlement has occurred, fill with soil to finish grade.

9. Dispose of burlap, wire and container material off site.

4. TRUNK PROTECTION

1. Install trunk protection on deciduous trees as indicated.

2. Install trunk protection prior to installation of tree supports when used.

5. TREE SUPPORTS

1. Install tree supports as indicated.

2. Use single stake tree support for deciduous trees less than 3 m and evergreens less than 2 m.
    a. Place stake on prevailing wind side and 150 mm from trunk.
    b. Drive stake minimum 150 mm into undisturbed soil beneath roots. Ensure stake is secure, vertical and unsplit.
    c. Install 150 mm long guying collar 1500 mm above grade.
    d. Thread Type 1 guying wire through guying collar tube. Twist wire to form collar and secure firmly to stake. Cut off excess wire.

3. Use 3 guy wires and anchors for deciduous trees greater than 3 m and evergreens greater than 2 m.
    a. Use Type 2 guying wire for trees less than 75 mm in diameter and Type 3 guying wire with clamps for trees greater than 75 mm in diameter.
    b. Use Type 1 anchors for trees less than 75 mm in diameter and Type 2 anchors for trees greater than 75 mm in diameter.
    c. Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.
    d. Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.
    e. Install anchors at equal intervals about tree and away from trunk so that guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.
    f. Attach guy wire to anchors. Tension wire and secure by multi-wraps.
    g. Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.
    h. Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Departmental Representative.
    i. Install flagging tape to guys as indicated.

4. After tree supports have been installed, remove broken branches with clean, sharp tools.

6. MULCHING

1. Ensure soil settlement has been corrected prior to mulching.

2. Spread mulch as indicated.

7. MAINTENANCE DURING ESTABLISHMENT PERIOD

1. Perform following maintenance operations from time of planting to acceptance by Departmental Representative.
    a. Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
        i. For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.
        ii. Remove weeds monthly.
        iii. Replace or respread damaged, missing or disturbed mulch.
        iv. For non-mulched areas, cultivate as required to keep top layer of soil friable.
        v. If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
        vi. Remove dead or broken branches from plant material.
        vii. Keep trunk protection and guy wires in proper repair and adjustment.
        viii. Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

8. MAINTENANCE DURING WARRANTY PERIOD

1. From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
    a. Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
    b. Reform damaged watering saucers.
    c. Remove weeds monthly.
    d. Replace or respread damaged, missing or disturbed mulch.
    e. For non-mulched areas, cultivate monthly to keep top layer of soil friable.
    f. If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
    g. Apply fertilizer in early spring as indicated by soil test.
    h. Remove dead, broken or hazardous branches from plant material.
    i. Keep trunk protection and tree supports in proper repair and adjustment.
    j. Remove trunk protection, tree supports and level watering saucers at end of warranty period.
    k. Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same

manner as specified for original plantings.

l. Submit monthly written reports to Departmental Representative identifying:
    i. Maintenance work carried out.
    ii. Development and condition of plant material.
    iii. Preventative or corrective measures required which are outside Contractor's responsibility.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 01 74 11 - Cleaning
2. REFERENCES
   1. American National Standard Institute (ANSI)
      a. ANSI A300 (Part 1)-2001, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).
      b. ANSI A300 (Part 2)-1998, Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.
      c. ANSI A300 (Part 3)-2000, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).
   2. Canadian Nursery Landscape Association (CNLA)
   3. International Society of Arboriculture (ISA)
   4. Ontario Ministry of Agriculture, Food and Rural Affairs
      a. Publication 483-2004,Pruning Ornamentals.
3. DEFINITIONS
   1. Crown Cleaning: consists of selective removal of one or more of following items: dead, dying or diseased branches, weak branches and water sprouts.
   2. Crown Thinning: consists of selective removal of branches to increase light penetration, air movement and reduce weight.
   3. Crown Raising: consists of removal of lower tree branches to provide clearance.
   4. Crown Reduction or Crown Shaping: decreases tree height and/or spread.
   5. Vista Pruning: is selective thinning of framework limbs or specific crown areas to improve views.
   6. Crown Restoration: improves structure, form and appearance of trees that have been severely headed or vandalized.
4. QUALITY ASSURANCE
   1. Certification: provide International Society of Arboriculture certification.
   2. Field Samples: do sample pruning in manner to enable Departmental Representative to identify:
      a. Knowledge of target areas including branch bark ridge and branch collars.

b. Technique for selection process and pruning used to establish desired form and shape for each species.

3. Acceptance of Work will be determined by Departmental Representative from field sample.

5. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2. Place materials defined as hazardous or toxic in designated containers.

3. Dispose of unused disinfectant at official hazardous material collections site approved by Departmental Representative.

4. Ensure emptied containers are sealed and stored safely.

5. Divert wood materials from landfill to facility for recycling or composting as directed by Departmental Representative.

6. TOOL MAINTENANCE

1. Ensure that tools are clean and sharp throughout pruning operation: do not use tools that crush or tear bark.

2. Disinfect tools before each tree is pruned.

3. On diseased plant material disinfect tools before each cut.

PART 2 - PRODUCTS

1. DISINFECTANT

1. 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

PART 3 - EXECUTION

1. APPLICATION

1. Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

2. GENERAL

1. Prune in accordance with ANSI A300, and as directed by Departmental Representative. Where discrepancies occur between standard and specifications, specifications govern.

2. Notify immediately Departmental Representative conditions detrimental to health of plant material or operations.

3. Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.

4. Retain natural form and shape of plant species.

5. Do not:
   Flush cut branches.
   Crush or tear bark.
   Cut behind branch bark ridge.
   Damage branch collars.
   Damage branches to remain.

3. PRUNING

1. Remove dead, dying, diseased and weak growth from plant material to provide crown cleaning and crown restoration as designated by Departmental Representative in order to promote healthy growth.

2. Remove live branches that:
   a. Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.
   b. Are of weak structure including narrow crotches.
   c. Obstruct development of more important branches.
   d. Are broken.

3. Remove live branches to re-establish natural species form including:
   a. One or more developing leaders.
   b. Multiple growth due to previous topping.
   c. Branches extending outward from natural form.
   d. Undesirable sucker growth.

4. Remove loose branches, twigs and other debris lodged in tree.

5. Remove vines.

6. For branches under 50 mm in diameter:
   a. Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.
   b. Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.
   c. Do not cut lead branches unless directed by Departmental Representative.

7. For branches greater than 50 mm in diameter:
   a. Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.
   b. Make second cut on upper side of branch 500 mm from trunk until branch falls off.
   c. Make final cut adjacent to and outside branch collar.

8. Ensure that trunk bark and branch collar are not damaged or torn

during limb removal.

a. Repair areas which are damaged, or remove damaged area back to next branch collar.

9. Remove additional growth designated by Departmental Representative.

4. ROOT GIRDLING

1. For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.

2. Remove exposed portion of girdling root as directed by Departmental Representative after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

5. CARE OF WOUNDS

1. Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

6. CLEAN-UP

1. Proceed in accordance with Section 01 74 11 - Cleaning.

2. Collect and compost/recycle whenever applicable pruned material and remove from site.

3. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

1. RELATED REQUIREMENTS
   1. Section 31 05 16 - Aggregate Materials
   2. Section 31 00 99 - Earthworks for Minor Works
   3. Section 31 32 19.01 – Geotextiles

2. REFERENCES
   1. American Society for Testing and Materials International, (ASTM)
      a. ASTM D 698-00a, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
   2. Canadian General Standards Board (CGSB)
      a. CAN/CGSB-34.22-94, Asbestos-Cement Drain Pipe.
   3. Canadian Standards Association (CSA International)
      a. CSA-A23.1/A23.2-00(June 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
      b. CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
         i. CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
      c. CSA-G401-[01], Corrugated Steel Pipe Products.
   4. Department of Justice Canada (Jus)
      a. Canadian Environmental Protection Act, 1999 (CEPA)
   5. Transport Canada (TC)
      a. Transportation of Dangerous Goods Act, 1992 (TDGA)

3. WASTE MANAGEMENT AND DISPOSAL
   1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
   2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
   3. Collect and separate for disposal, paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
   4. Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
   5. Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
   6. Divert unused metal materials from landfill to metal recycling

facility for disposal approved by Departmental Representative.

7. Divert unused geotextiles from landfill to plastic recycling facility for disposal approved by Departmental Representative.

8. Place materials defined as hazardous or toxic in designated containers.

9. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

10. Dispose of unused asbestos cement pipe in accordance with regulations governing the disposal of hazardous materials.

4. SITE CONDITIONS

1. Examine sub-surface investigation report (Appendix D)

2. Known underground utility lines and buried objects are as indicated on plans.

PART 2 - PRODUCTS

1. BEDDING AND SURROUND MATERIALS

1. Coarse filter aggregate: in accordance with Section 31 05 16 - Aggregate Materials.

2. Fine filter aggregate: to in accordance with Section 31 05 16 - Aggregate Materials.

3. Flexible plastic tubing and fittings. Perforated nominal inside diameter 100 mm.

4. Rigid plastic pipe and fittings: to CSA-B182.1, size NPS 6, complete with fittings.

5. Geotextile filter: see Section 31 32 19.01 - Geotextiles.

6. Cleanouts

2. BACKFILL MATERIAL

1. Type 2, in accordance with Section 31 00 99 Earthworks for Minor Works.

2. Excavated or graded material existing on site may be suitable to use if approved by Departmental Representative.

PART 3 - EXECUTION

1. EXAMINATION

1. Ensure graded subgrade conforms with required drainage pattern before placing bedding material.

2. Ensure improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions are corrected to approval of Departmental Representative.

2. BEDDING PREPARATION

1. Cut trenches in subgrade and place bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
2. Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
3. Shape transverse depressions, as required, to suit joints.
4. Compact each layer full width of bed to 95% maximum density to ASTM D 698.
5. Fill excavation below design elevation of bottom of specified bedding with compacted bedding material.

3. PIPE OR TUBING INSTALLATION

1. Ensure pipe interior and coupling surfaces are clean before laying.
2. Lay perforated pipe minimum as indicated. For pipe face perforations and coupling slots downward.
3. Lay non-perforated pipe as indicated from perforated pipe to disposal area. Make joints watertight.
4. Grade bedding to establish pipe slope.
5. Install end plugs at ends of collector drains to protect pipe ends from damage and ingress of foreign material.
6. Connect non-perforated pipe to outlet by appropriate adapters manufactured for this purpose as indicated.
7. Provide cleanouts on non-perforated pipe at changes of pipe direction and in runs greater than 15 m.
8. Provide flush cleanouts where directed by Departmental Representative.

4. PIPE OR TUBING SURROUND MATERIAL

1. Upon completion of pipe laying and after Departmental Representative has reviewed Work in place, surround and cover pipe and install geotextile filter as indicated.
2. Hand place surround material in uniform layers not exceeding 150 mm compacted thickness, as indicated. Do not drop material within 5 m of pipe.
3. Place layers uniformly and simultaneously on each side of pipe.
4. Compact each layer from pipe invert to mid-height of pipe to at least 98% maximum density to ASTM D 698.
5. Compact each layer from mid-height of pipe to underside of backfill to at least 90% maximum density to ASTM D 698.

5. BACKFILL MATERIAL

1. Place backfill material above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

Appendix A:

Basic Impact Analysis (To be Provided as Supplemental Information)

Appendix B:
Special Provisions

ARTICLE SC1 Limit of the Working Area

On the Owner's land, the Contractor shall limit his operations to within the road allowances, easements and property boundaries, unless otherwise approved by the Consultant.

The Contractor must obtain all necessary permits for the Work.

The Contractor must notify the Owner and consultant prior to the start of construction activity and prior any changes to the restricted working area.

ARTICLE SC2 Existing Utilities and Services

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and for permanently supporting utilities which cross over the services to be constructed under this Contract.

The utility companies require that their own forces are employed to repair any damages to these utilities.

In situations where the Contractor will be connecting to existing live underground services as part at this contract, he/she must expose all stubs, plugs, and connections to manholes to verify location and elevations prior to the start of construction.

The Contractor must provide all necessary safety measures required to connect to a live underground sanitary sewer, as well as ensuring the existing service is not disrupted or otherwise adversely affected during construction. This may include, but is not limited to, providing methane detection devices, oxygen tanks and masks, safety cables, etc.

ARTICLE SC3 Independent Testing

The Contractor will retain independent 3rd party specialized testing companies, paid for directly by Parks Canada, to provide the following services:

a) Compaction Tests

Provide Proctor and field density tests, certifying adequate bearing capacity and compaction of trench backfill, fill sub base and granular base as required in accordance with the applicable specifications.

b) Gradation Tests

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

c) Topsoil Tests

Provide topsoil tests for N, P, K and minor element values, soluble salt content, organic matter, pH value and toxic chemicals, in conformance with the applicable specifications.

d) Concrete Tests

Provide strength tests for concrete in conformity with the applicable specifications.

e) Asphalt Tests

Provide adequate testing as required to verify conformance with the applicable specifications and to determine the asphalt cement content.

ARTICLE SC4 - Landscaping Works Maintenance

Once the landscaping works have been installed to the Consultant's satisfaction, the Owner and Consultant will inspect the works for Substantial Performance. Following certification of Substantial Performance, the Contractor will maintain responsibility for regular and preventive maintenance and warranty related repairs and replacements as deemed by the Consultant to be covered under the Contractor's warranty. Parks Canada will assume maintenance responsibilities following the end-of-warranty inspection and subsequent acceptance by the Contract Administrator.

ARTICLE SC5 - Provisional Items

Where it occurs in this Contract, the notation 'Provisional' shall mean that the tender items so marked shall be executed only at the direction of the Owner through the Consultant in writing as a formal contract amendment.

No claims for extra payment will be accepted by the Owner should Provisional Items be deleted.

ARTICLE SC6 – Licenses, Permits, Locates and Approvals

The successful bidder shall comply with all applicable statutes, laws, by-laws, regulations, ordinances, notices and orders whether Federal, Provincial, Municipal or otherwise, at any time in effect during the execution of this contract, and all rules and requirements of the Police and Fire departments, or other governmental authorities, and procure all C.S.A. approvals, as required. The successful bidder shall obtain and pay for all necessary permits and licenses, and shall not do or suffer to be done anything in violation of any such laws, ordinances, rules or requirements. If the attention of the successful bidder is called to any such violation on the part of the successful bidder, or of any person employed or engaged by the successful bidder, the successful bidder shall immediately desist from and correct such violation.

ARTICLE SC7 – Discrepancies in Grading Drawings

The Contractor will construct site works according to elevations provided in grading drawings. If discrepancies are found between grading drawings and field measurements the Contractor must notify the Consultant immediately. Discrepancies that affect site servicing, AODA compliance, or connections to future construction phasing must be addressed in order to coordinate appropriate changes to the proposed grading drawings. The Contractor will notify the Consultant and await written direction to proceed with alterations to the original design.

In the event that notification is not provided, and discretionary field changes are performed by the Contractor to the proposed grading without the written consent of the Consultant, the Contractor will be held fully responsible, without addition to the contract, for steps required to correct non-compliant work.

ARTICLE SC8 – Clearing of Vegetation

The Contractor will clear all vegetation as instructed in the drawings and specifications. Due to the sensitive cultural heritage elements located onsite, vegetation is to be cut at grade and removed offsite. No grubbing is to take place. All vegetation greater than 12mm is to be treated with a glysophate

herbicide to inhibit regeneration. All invasive species, including but not limited to Siberian Elm, Buckthorn and Dog-strangling Vine, are to be disposed of per best management practices.

ARTICLE SC9 – Construction Access

The Contractor shall access the site from the west access near station 0+000. All construction of site works shall occur from this access except:

- Construction of the two metre wide limestone trail south of the earthworks and removal and remediation of the existing construction access drive to the interior of the earthworks in drawing L-115. This shall be accessed from the existing trail to the south-east of the earthworks.

- Removal of vegetation and installation of topsoil and hydroseed north of the earthworks in drawings L-100 and L-115. This access shall be from the east and will be determined in the field by the departmental representative.

ARTICLE SC10 – Armour Stone

All armour stone walls shall consist of squared natural limestone as supplied by a quarry acceptable to the Departmental Representative. The exposed face will have a natural chipped appearance and be free of drill holes. Stone size shall be approximately 450mm wide x 600mm tall x 1000mm long unless otherwise noted. Armour stone shall be placed with tight joints. Stagger joints on subsequent courses. Fill gaps between armour stone to eliminate potential settlement or washout problems. Landscape Architect to review and approve armour stone pieces prior to construction.