Seaview Cemetery Landscape Infill - Phase 1 Construction

24-063 - Seaview Cemetery Expansion - Canada - NMS and CMS

April 10, 2025

1706 Lower Rd, Roberts Creek, BC V0N 2W5 Sunshine Coast Regional District - Seaview Cemetery Landscape Infill

Section 00 01 10
Table of Contents

Contents

Section 01 11 00
Summary of Work

Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises general construction including earthworks, topsoiling, seeding, concrete work and carpentry at Seaview Cemetery in the Sunshine Coast Regional District.

1.2 CONTRACT METHOD

.1 Construct Work under stipulated price contract.

.2 Within 15 days of written notice off award, the Contractor will submit to the Owner:

.1 Performance and Labour and Material bond, each in the amount of 50% of the contract price, covering the performance of the work including the successful Proponent's obligations during the maintenance period, issued by a surety licensed to carry on the business of suretyship in the province of British Columbia and in a form acceptable to the Regional District; or

.2 A bank draft, in the amount of 20% of the total contract price. The bank draft less 5% of the total contract price will be returned 60 days after the completion of the contract which will be held until the end of the maintenance period; or

.3 A letter of credit, in the amount of 20% of the total contract price, without a termination date. The letter of credit will be returned 60 days after the completion of the contract and after the issuance of a letter of credit for the warranty period, without a termination date in the amount of 5% of the total contract price which will be held until the end of the maintenance period.

1.3 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Consultant.

.2 Co-ordinate work with other contractors. If any part of work under this Contract depends for its proper execution or result upon work of another contractor, report promptly to the Consultant, in writing, any defects which may interfere with proper execution of Work.

.3 Verify work of Project executed before start of Work of this Contract, and which is specifically excluded from this Contract:

.1 Tree removals.

.4 Verify work of Project which will be executed after completion of Work covered under this Contract, and which is specifically excluded from this Contract:

.1 Installation of Columbarium unit.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Maintain fire access/control.

.3 Protect workers and public safety.

1.5 CONTRACTOR USE OF PREMISES

.1 Unrestricted use of site until Substantial Performance.

.2 Limit use of premises for Work, to allow:

.1 Partial Owner occupancy.

.2 Work by other contractors for cemetery operations and maintenance.

.3 Public use in areas of the cemetery outside of the work zone.

.3 Co-ordinate use of premises under direction of the Consultant.

.4 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the Consultant.

.5 Ensure that operations conditions of exiting work at completion are still the same, equal to or better than that which existed before new work started.

1.6 OWNER OCCUPANCY

.1 The Owner will occupy premises during entire construction period for execution of normal operations.

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

1.7 DOCUMENTS REQUIRED

.1 Maintain at the job site, one copy of each document as follows:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed Shop Drawings.

.5 List of Outstanding Shop Drawings.

.6 Change Orders.

.7 Other Modifications to Contract.

.8 Field Test Reports.

.9 Copy of Approved Work Schedule.

.10 Health and Safety Plan and Other Safety Related Documents.

.11 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Section 03 10 00
Concrete Forming and Accessories

Part 1 General

1.1 SUMMARY

.1 Products installed but not supplied under this Section:

- .1 fabricated components
- .2 anchor bolts
- .3 bearing plates
- .4 sleeves
- .5 other inserts to be cast in or embedded into concrete

1.2 RELATED REQUIREMENTS

.1 Section 03 20 00 - Concrete Reinforcing

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

.3 Section 05 50 00 - Metal Fabrications

1.3 ABBREVIATIONS AND ACRONYMS

.1 HDO: High density overlay plywood

.2 MDO: Medium density overlay plywood

1.4 REFERENCE STANDARDS

.1 CSA Group (CSA):

- .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
- .2 CSA O86:19, Engineering design in wood
- .3 CSA O121-17, Douglas fir plywood
- .4 CSA O151-17, Canadian softwood plywood
- .5 CSA O153-13, Poplar plywood
- .6 CSA S269.1-16, Falsework and formwork

.2 ULC Standards (ULC):

- .1 CAN/ULC-S701.1:20, Standard for Thermal Insulation, Polystyrene Boards

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordinate with:

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 05 50 00 - Metal Fabrications, for items embedded or cast into concrete.

.2 Pre-Installation Meetings: Conduct a site meeting in accordance with Section 01 31 19 - Project Meetings, attended by Consultant, manufacturer's services representative, specialty Subcontractors for forming and finishing, and related Subcontractors to:

.1 Verify project requirements.

.2 Review delivery, storage, and handling requirements.

.3 Review installation and substrate conditions.

.4 Coordinate with other Subcontractors.

.5 Review manufacturer's instructions and warranty requirements.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, product literature, and data sheets for proprietary materials used in formwork liners, water stops and coatings, including product characteristics, performance criteria, physical sizes, finishes, and limitations.

.2 Submit WHMIS Safety Data Sheet (SDS).

.3 Submit shop drawings for formwork and falsework.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of British Columbia, Canada.

.2 Prepare shop drawings in accordance with CSA S269.1 for formwork and falsework.

.3 Indicate formwork design data, permissible rate of concrete placement, and temperature of concrete in formwork.

.4 Indicate sequence of erection and removal of formwork and falsework.

.5 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.

.6 Include the following information on falsework shop drawings:

.1 Longitudinal, lateral, vertical, dead, live and impact loads used in design.

.2 Allowable bearing capacity of soil underneath mud sills.

.3 Maximum column, post and support loads.

.4 Deflection diagrams for beams with deflection of 10 mm or more.

.5 Deflection diagrams indicating initial and final elevation of deck surfaces, roofs and soffits.

.6 Grade of structural steel.

.7 Indicate steel posts, girders, beams, connections, bracing and welding, providing sufficient detail for safe performance of falsework.

.8 Fully detailed steel frame shoring.

.9 Species, grades and sizes of wood.

.10 Type and weight of equipment (moving or stationary) supported by falsework.

.11 Sequence, methods and rate of concrete placement.

.12 Proprietary equipment, adequately identified for checking purposes.

.13 Full details and locations of splices.

1.7 QUALITY ASSURANCE

.1 Perform in accordance with Section 01 43 00 - Quality Assurance.

.2 Retain a professional engineer registered or licensed in the Province of British Columbia, Canada with experience in formwork and falsework design of comparable complexity and scope to this project to perform the following services as part of work of this Section:

.1 Design of formwork and falsework.

.2 Review, stamp, and sign fabrication and erection shop drawings, design calculations and amendments.

.3 Conduct on-site inspections. Prepare and submit inspection reports verifying this part of work is in accordance with Contract Documents and reviewed Shop Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Perform in accordance with Section 01 61 00 - Common Product Requirements.

.1 Storage and Handling Requirements: Maintain formwork liners for architectural concrete without defects or damages that could affect concrete appearance or cause staining.

Part 2 Products

2.1 MATERIALS

.1 Formwork Materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121 .

.2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.

.2 Form Ties:

.1 For concrete not designated 'Architectural': Removable or snap-off metal ties, fixed or adjustable length, and free of devices leaving holes larger than 25 mm in diameter in concrete surface.

.2 For architectural concrete: Snap ties complete with plastic cones and light grey precast concrete plugs.

.3 Form Liner:

.1 Plywood: MDO, #1 grade, square edge, 13 mm thick.

.4 Form Release Agent: Proprietary, non-volatile material that will not stain concrete or hinder the application of subsequent coatings, treatments, or flooring materials to the concrete surface. Derived from agricultural sources , non-petroleum containing , non-toxic , biodegradable, low VOC.

.5 Falsework Materials: To CSA S269.1.

Part 3 Execution

3.1 PREPARATION

.1 Before placing concrete, clean formwork in accordance with CSA A23.1/A23.2.

3.2 FABRICATION AND ERECTION

.1 Verify lines, levels, and centres before proceeding with formwork/falsework. Confirm that dimensions match the Drawings.

.2 Obtain Consultant's acceptance for use of earth forms framing openings not indicated on Drawings.

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

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

.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 CSA S269.1 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.

.1 Minimize the number of form joints used.

.9 Locate horizontal form joints for exposed columns 2 400 mm above finished floor elevation.

.10 Use 25-mm chamfer strips on external corners and 25-mm fillets at interior corners and joints, unless otherwise indicated on Drawings.

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

.12 Build in anchors, sleeves, and other inserts required to accommodate work specified in other Sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.13 Line forms for the following surfaces:

.14 Lining forms installation process:

.1 Secure lining taut to formwork to prevent folds.

.2 Pull down lining over edges of formwork panels.

.3 Ensure lining is new and not reused material.

.4 Ensure lining is dry and free of oil when concrete is poured.

.5 Application of form release agents on formwork surface is prohibited where drainage lining is used.

.6 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.

.7 Cost of textile lining is included in price of concrete for corresponding portion of work.

.15 When slip forming, flying forms are used, submit details as indicated in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section.

3.3 REMOVAL AND RESHORING

.1 Leave formwork in place after placing concrete for a minimum:

.1 2 days for walls, sides of beams, columns, footings and abutments.

.2 14 days for beam soffits, slabs, decks and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.

.2 Remove formwork when concrete has reached 70% of its 28-day 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 3 000 mm apart.

.5 Reuse formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.4 SITE QUALITY CONTROL

.1 Site Inspections:

.1 Professional engineer responsible for signing and stamping shop drawings to conduct on-site inspections and prepare and submit inspection reports verifying this part of the work is in accordance with Contract Documents and reviewed shop drawings.

.2 Perform inspections a minimum of one per month or at project milestones as indicated on the Drawings.

3.5 CLEANING

.1 Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Section 03 20 00
Concrete Reinforcing

Part 1 General

1.1 RELATED REQUIREMENTS

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

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

1.2 DEFINITIONS

.1 Environmental Product Declaration (EPD): Third-party verified documentation with the supporting Product Category Rule (PCR) and Life cycle assessment information. Prepared in accordance with ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle-to-gate scope.

.1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

.2 Product-specific Type III EPD - Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

1.3 REFERENCE STANDARDS

.1 American Concrete Institute (ACI):

.1 MNL-6620, ACI Detailing Manual

.2 ASTM International (ASTM):

.1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

.3 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.4 ASTM A767/A767M-19, Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

.5 ASTM A775/A775M-19, Standard Specification for Epoxy-Coated Steel Reinforcing Bars

.6 ASTM A884/A884M-19e1, Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement

.7 ASTM A1064/A1064M-18a, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

.3 CSA Group (CSA):

.1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CSA A283:19, Qualification Code for Concrete Testing Laboratories

.3 CSA A23.3:19, Design of Concrete Structures

.4 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement

.5 CSA G40.20-13/G40.21-, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.6 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction

.4 International Organization for Standardization (ISO):

.1 ISO 14025:2006, Environmental labels and declarations - Type III environmental declarations - Principles and procedures

.2 ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework

.3 ISO 14044:2006, Environmental management - Life cycle assessment - Requirements and guidelines

.4 ISO 21930:2017, Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services

.5 Reinforcing Steel Institute of Canada (RSIC):

.1 RSIC-2020, Manual of Standard Practice

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with Section 03 30 00 - Cast-in-Place Concrete

.2 Pre-Installation Meetings: In accordance with Section 01 31 19 - Project Meetings, hold pre-concrete pouring meeting one week before pouring concrete.

.1 Ensure key personnel, site supervisor, Consultant, specialty contractor - finishing, forming concrete producer testing laboratory representative attend.

.1 Verify project requirements.

.2 Review reinforcing testing report.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions if available, product literature and data sheets for proprietary materials used in concrete reinforcement. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.

.2 When a chromate solution is used as a replacement for galvanizing non-prestressed reinforcement, submit a product description for review by Consultant before its use.

.3 Submit WHMIS Safety Data Sheet (SDS).

.3 Shop Drawings:

.1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI MNL-66.

.2 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Quantities of reinforcement.

.3 Sizes, spacing, locations of reinforcement and mechanical splices if approved by Consultant with identifying code marks to permit correct placement without reference to structural drawings.

.4 Indicate sizes, spacing and locations of chairs, spacers and hangers.

.3 Detail lap lengths and bar development lengths to CSA A23.3, unless otherwise indicated on Drawings.

.1 Provide Type A tension lap splices unless otherwise indicated on Drawings.

.4 Indicate position and size of openings in slabs and walls. Coordinate with the different trades requiring openings.

.5 Indicate the concrete cover dimension to the reinforcement.

.4 Certificates:

.1 When requested, submit epoxy coating applicator certificate.

.5 Test and Evaluation Reports:

.1 When requested, submit certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks before beginning reinforcing work.

.6 Source Quality Control Submittals:

.1 When requested,submit, in writing, proposed source of reinforcement material.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Testing Laboratory: Certified to CSA A283.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Perform in accordance with Section 01 61 00 - Common Product Requirements.

.2 Package bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.1 Package and deliver epoxy-coated bars in accordance with ASTM A775A/A775M.

.3 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Protect epoxy- and paint-coated portions of reinforcement bars with covering during transportation and handling.

.4 Handle, transport, store, and install epoxy-coated reinforcing steel bars in a way that prevents damage to coating. Prevent bar-to-bar abrasion and excessive sagging. Do not drop or drag bars. Store on suitable non-metallic supports. For lifting use nylon lifting

slings, padded slings, separators, or other means recommended by epoxy-coated reinforcing steel fabricator.

Part 2 Products

2.1 MATERIALS

.1 Substitute different sized bars only if permitted in writing by Consultant.

.2 Reinforcing Steel: Billet steel, grade 350, deformed bars to CSA G30.18, unless otherwise indicated.

.3 Reinforcing steel: Weldable low alloy steel deformed bars to CSA G30.18.

.4 Cold-drawn annealed steel wire ties: To ASTM A1064/A1064M.

.5 Deformed steel wire for concrete reinforcement: To ASTM A1064/A1064M.

.6 Welded steel wire fabric:

.1 Plain in accordance with ASTM A1064/A1064M, fabricated from steel wire into flat sheets; sizes as indicated on Drawings.

.2 Finish:

.1 Galvanized: Hot dip galvanized after welding having Class A coating in accordance with ASTM A641/A641M.

.3 Provide in flat sheets only.

.7 Epoxy Coating of non-prestressed reinforcement: To ASTM A775/A775M.

.8 Galvanizing of non-prestressed reinforcement: To ASTM A123/A123M coating Grade 85, minimum zinc coating 610 g/m^{2}or ASTM A767/A767M, Class I.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.1 Maintain temperature of solution at a minimum of 32°C and immerse galvanized steels for a minimum of 20 seconds.

.3 If galvanizing steel at ambient temperature, add a 0.5% to 1% concentration of sulphuric acid as a bonding agent.

.1 There are no temperature requirements for the aqueous solution.

.4 Chromate solution of equal effectiveness manufactured for this purpose may replace aqueous solution.

.1 Submit product description as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section.

.9 Chairs, bolsters, bar supports, spacers: To CSA A23.1/A23.2.

.10 Tie wire: 1.5 mm diameter annealed wire, except epoxy coated for epoxy-coated rebar.

.11 Mechanical splices: Subject to approval from Consultant.

.12 Plain round bars: To CSA G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 ACI MNL-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Consultant's written approval for locations of reinforcement splices other than those shown on Contract Drawings and shop drawings.

.3 Upon approval from Consultant, weld reinforcement in accordance with CSA W186.

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment: 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 SITE BENDING

.1 Do not bend or weld reinforcement on site except where indicated or when authorized by Consultant.

.1 If site bending is authorized, bend reinforcement without heat, applying slow and steady pressure.

.2 Replace reinforcement bars that develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Cutting or puncturing vapour retarder is not permitted. Repair damage and reseal vapour retarder before placing concrete.

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

.3 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 After paint has dried, apply thick even film of mineral lubricating grease.

.4 Before placing concrete, obtain Consultant's approval of reinforcing material and placement.

.5 Maintain minimum concrete cover to reinforcement during concrete placement.

3.4 SITE TOUCH-UP

.1 Touch-up reinforcing steel where damaged and at cut ends of epoxy-coated reinforcing with compatible epoxy paint and galvanized reinforcing to ASTM A780.

3.5 SITE QUALITY CONTROL

.1 Site tests: Conduct tests on the following in accordance with Section 01 45 00 - Quality Control and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section:

.1 Epoxy coating.

.2 Reinforcing steel and welded wire fabric.

.2 Inspection and testing of reinforcing and reinforcing materials carried out by testing laboratory designated by Consultant for review to CSA A23.1/A23.2.

.3 Distribute test results for discussion at pre-pouring concrete meeting between testing laboratory and Consultant.

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

.5 Inspection or testing by Owner does not augment or replace Contractor's quality control nor relieve Contractor of any contractual responsibility.

3.6 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Section 03 30 00
Cast-in-Place Concrete

Part 1 General

1.1 SECTION INCLUDES

.1 Site work: Columbarium Base, Concrete Slab.

.2 Control, expansion and contraction joint devices associated with concrete work including embedments and joint sealants.

1.2 RELATED REQUIREMENTS

.1 Section 03 11 00 - Concrete Forming: Formwork and accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 35 00 - Concrete Finishing.

.4 Section 05 50 00 - Metal Fabrications.

1.3 REFERENCE STANDARDS

.1 ACI-PRC 305-20 Guide to hot weather concreting

.2 ACI-PRC 306R-16 Guide to cold weather concreting

.3 ASTM C260/C260M-10a(2016) Standard specification for air-entraining admixtures for concrete

.4 ASTM C494/C494M-24 Standard specification for chemical admixtures for concrete

.5 CSA A23.1:24/A23.2:24 Concrete materials and methods of concrete construction/test methods and standard practices for concrete

1.4 ACTION SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on joint devices, attachment accessories, admixtures.

1.5 INFORMATIONAL SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Test Data: Minimum four (4) weeks prior to starting concrete work, submit manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.

.3 Supplementary cementing materials.

.4 Admixtures.

.5 Aggregates.

.6 Water.

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

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

.5 Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Record Documentation: Accurately record actual locations of embedded utilities and components.

1.7 QUALITY ASSURANCE

.1 Perform Work in accordance with CSA-A23.1/A23.2.

.2 Maintain one (1) copy of document on site.

.3 Acquire cement and aggregate from same source for all work.

.4 Conform to CSA-A23.1/A23.2 when concreting during hot weather.

.5 Conform to CSA-A23.1/A23.2 when concreting during cold weather.

Part 2 Products

2.1 CONCRETE MATERIALS

.1 Hydraulic Cement: CSA-A3000, Type GU; Grey colour.

.2 Blended Hydraulic Cement: CSA-A3000, Type GUb; Grey colour.

.3 Supplementary Cementing Materials: CSA-A3000, Fly Ash, Type CI.

.4 Fine Aggregates: Normal density aggregates, graded to CSA-A23.1/A23.2; maximum aggregate size 10 mm.

.5 Coarse Aggregates: Normal density aggregates, graded to CSA-A23.1/A23.2, Group II; maximum aggregate size 19 mm.

.6 Lightweight Aggregate: ASTM C330/C330M, for structural concrete.

.7 Water: CSA-A23.1/A23.2, clean and not detrimental to concrete.

2.2 ADMIXTURES

.1 Air Entrainment: ASTM C260/C260M.

2.3 JOINT DEVICES AND FILLER MATERIALS

.1 Joint Filler Type A: ASTM D1751, asphalt impregnated fibreboard or felt, 6 mm thick; tongue and groove profile.

.2 Sealant: Cold applied two part liquid neoprene.

2.4 CONCRETE MIX

.1 Mix and deliver normal density concrete in accordance with CSA-A23.1/A23.2, Alternative 1, to the following criteria:

.1 Cement Type: Hydraulic.

.2 Class of exposure: C-2.

.3 Compressive Strength (7 day): 23 MPa.

.4 Compressive Strength (28 day): 32 MPa.

.5 Nominal size of coarse aggregate: 19 mm.

.6 Slump at time and point of discharge: 75 mm plus or minus 20 mm.

.7 Air Entrainment: 5-8%.

.2 Use accelerating admixtures in cold weather only when approved by Consultant. Use of admixtures will not relax cold weather placement requirements.

.3 Use calcium chloride only when approved by Consultant.

.4 Use set retarding admixtures during hot weather only when approved by Consultant.

.5 Add air entraining agent to normal weight concrete mix for work exposed to exterior.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 71 00: Verify existing conditions before starting work.

.2 Verify all dimensions and locations required on drawings.

.3 Verify requirements for concrete cover over reinforcement.

.4 Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not impede concrete placement.

3.2 PREPARATION

.1 Prepare previously placed concrete and apply bonding agent to manufacturer's written instructions.

.1 Prepare by:

.1 Mechanical roughening.

.2 Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.3 PLACING CONCRETE

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

.2 Notify Consultant minimum twenty-four (24) hours prior to commencement of operations.

.3 Ensure reinforcement, inserts are not disturbed during concrete placement.

.4 Place concrete continuously between predetermined expansion, control, and construction joints.

.5 Do not interrupt successive placement; do not permit cold joints to occur.

.6 Saw cut joints within twenty-four (24) hours after placing. Use 5 mm thick blade, cut minimum 1/4 depth of slab thickness.

.7 Screed slabs on grade level, maintaining surface flatness to either:

.1 CSA-A23.1/A23.2.

.2 Maximum 6 mm in 3 m.

3.4 CURING AND PROTECTION

.1 Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical damage.

.2 Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.5 FIELD QUALITY CONTROL

.1 Inspection and Testing:

.1 Section 01 45 00: Field testing.

.2 Provide free access to Work and cooperate with appointed firm.

.3 Submit proposed mix design of each class of concrete to inspection firm for review prior to commencement of Work.

.4 Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

.5 One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

.6 One slump or flow test and one air test will be taken for each set of test cylinders.

3.6 PATCHING

.1 Allow Consultant to inspect concrete surfaces immediately upon removal of forms.

.2 Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Consultant upon discovery.

.3 Patch imperfections in accordance with CSA-23.1.

3.7 DEFECTIVE CONCRETE

.1 Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Consultant.

.3 Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Consultant for each individual area.

END OF SECTION

Section 03 35 00
Concrete Finishing

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 32 13 13 - Concrete Paving

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

.2 CSA Group (CSA):

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with Section 03 30 00 - Cast-in-Place Concrete for wet curing.

.2 Coordinate concrete curing accelerators with integral concrete colour material to avoid detrimental chemical interactions.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's product literature and data sheets for concrete finishing products. Include product characteristics, performance criteria, and resulting finishes, and limitations.

.2 Submit WHMIS Safety Data Sheet (SDS).

1.5 QUALITY ASSURANCE

.1 Quality Assurance: Perform in accordance with Section 01 43 00 - Quality Assurance.

.2 Submit proposed quality control procedures a minimum of four weeks before starting concrete finishing work for review by Consultant on the following items:

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Perform in accordance with Section 01 61 00 - Common Product Requirements.

1.7 SITE CONDITIONS

.1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface for each 40 m^2 of floor being treated.

.2 Make work area watertight and protected against rain and detrimental weather conditions.

.3 Temperature: Maintain a minimum 10°C ambient temperature for seven days before installation and a minimum 48 hours after completion of work. Maintain relative humidity at a maximum 40% during both periods.

.4 Moisture: Ensure concrete substrate is within moisture limits prescribed by manufacturer.

Part 2 Products

2.1 CURING COMPOUNDS

.1 To ASTM C309, waterborne, wax-free, penetrating, non-film forming, dries clear, and does not prevent adhesion with subsequently applied coatings, treatments, or other floor finishes.

.2 Waterborne, membrane-forming curing membrane: To ASTM C309, Type 1 Clear, Class B.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that concrete slabs are ready to receive work and elevations as indicated on Drawings as recommended by manufacturer's written instructions.

3.2 PROTECTION

.1 Protect finished surfaces in accordance with manufacturer's recommendations.

END OF SECTION

Section 05 50 00
Metal Fabrications

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 miscellaneous metal fabrications

1.2 RELATED REQUIREMENTS

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

.2 Section 06 10 53 - Miscellaneous Rough Carpentry

1.3 DEFINITIONS

.1 Application Specialist: Individual who performs surface preparation and application of protective coatings and linings to steel surfaces of complex industrial structures.

1.4 REFERENCE STANDARDS

.1 Association for Materials Protection and Performance (AMPP):

.1 ANSI/NACE No. 13/SSPC-ACS-1-2016, Industrial Coating and Lining Application Specialist Qualification and Certification

.2 ASTM International (ASTM):

.1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

.3 ASTM A480/A480M-23, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

.3 CSA Group (CSA):

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with Section 03 30 00 - Cast-in-Place Concrete for casting anchors into concrete.

.1 Provide concrete Subcontractors with copies of reviewed shop drawings and setting templates.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit the following action submittals before starting work of this Section:

.1 Product Data: Product literature and data sheets for installed products, including product characteristics, performance criteria, physical sizes, finishes, and limitations.

.1 WHMIS SDS for site-applied primers, coatings, paints, and other finishes.

.2 Shop Drawings:

.1 Sealed and signed by a qualified professional in accordance with Section 01 43 00 - Quality Assurance.

.2 Indicate materials, base metal thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.3 Submit the following informational submittals as work progresses:

.1 Certificates: Signed by the manufacturer certifying materials comply with specified performance characteristics and physical properties.

Part 2 Products

2.1 MATERIALS

.1 Steel Sections and Plates: To CSA G40.20/G40.21, Grade 300W.

.2 Corrugated Galvanized Steel Roofing: To ASTM A525/ CSA S136.

.3 Bolts and Anchor Bolts: Stainless Steel To ASTM F593, A320.

2.2 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 flat-headed screws on items requiring assembly by screws or as indicated.

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

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

2.3 MISCELLANEOUS FABRICATIONS

.1 Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated that are not part of structural steel framework, as required to complete the Work.

.2 Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitred joints for site connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

2.4 FINISHES

.1 Primer Materials:

.1 Shop coat primer: To MPI ASM[EXT] [5.1][_____]-G…….

.2 Zinc-rich primer: To MPI ASM[EXT] [5.1][_____]-G…….

.2 Shop Finishing Methods:

.1 Galvanizing: To [CSA G164], [ASTM A 123/A 123M], hot-dip galvanizing with 600 g/m^2 zinc coating.

.2 Shop painting: In accordance with MPI ASM.

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

.2 Use unadulterated primer as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, and grease when temperature is a minimum 7°C.

.3 Clean surfaces to be site welded; do not paint.

.4 Leave surfaces to be welded and surfaces receiving sprayed fireproofing unpainted and unprimed.

.5 Leave surfaces to be embedded in concrete unpainted.

.6 Apply two coats of primer to parts inaccessible after final assembly.

2.5 ISOLATION COATING

.1 Isolate aluminum from the following components by using bituminous paint:

.1 dissimilar metals, except small areas of stainless steel, zinc, or white bronze

.2 concrete, mortar and masonry

.3 wood

2.6 ACCESSORIES

.1 Protective Film: Treated paper or clear plastic, self-adhering release type as recommended by architectural metal fabricator to protect finished metals. Film to be easily removable without damaging finished surfaces.

Part 3 Execution

3.1 PREPARATION

.1 Thoroughly clean and suitably pre-treat steel prior to finishing.

.2 Remove loose mill scale, rust, oil, grease, dirt, and other foreign matter using one or more of the following methods:

.1 solvent cleaning

.2 wire brushing

.3 power wire brushing

.4 abrasive blasting

.3 Grind sharp projections until smooth.

.4 Prepare metal surfaces to receive paint finishes in accordance with MPI ASM.

3.2 INSTALLATION - GENERAL

.1 Install metal fabrications as indicated on Drawings.

.2 Install in accordance with reviewed shop drawings, square, plumb, straight, true, accurately fitted, and with tight joints and intersections.

.3 Perform welding in accordance with CSA W59unless specified otherwise.

.4 Provide suitable anchorage such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles acceptable to the Consultant.

.5 Provide exposed fastening devices to match finish and be compatible with material through which they pass.

.6 Make site connections with fasteners to CSA S16.

.7 Touch up rivets, site welds, bolts, and burnt or scratched surfaces with primer after installation.

.1 Primer: In accordance with FINISHES in this Section.

.8 Touch up galvanized surfaces burned by site welding with zinc-rich primer after installation.

.1 Zinc-rich primer: In accordance with FINISHES in this Section.

END OF SECTION

Section 06 05 73
Wood Treatment

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 53 - Miscellaneous Rough Carpentry

1.2 DEFINITIONS

.1 Abbreviations: The following abbreviations are used in this Section and are consistent with definitions in CAN/CSA-O80 Series.

.1 chromated copper arsenate (CCA)

.2 alkaline copper quaternary (ACQ)

.3 copper azole (CA)

.4 micronized copper azole (MCA)

.5 ammoniacal copper zinc arsenate (ACZA)

.6 creosote (CR)

.7 pentachlorophenol (PCP or PENTA)

.8 *borates, didecyl dimethyl ammonium carbonate (DDAC)

.9 *borates disodium octaborate tetrahydrate (DOT or SBX)

1.3 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM A123/A123M- 13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M- 09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A480/A480M- 20 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.4 ASTM A653/A653M- 13 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM F593- 17, Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs

.6 ASTM F1667- 13, Standard Specification for Driven Fasteners: Nails, Spikes and Staples

.2 CSA Group (CSA)

.1 CSA G40.20-13/G40.21-18, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.2 CAN/CSA-O80 Series- 15, Wood Preservation

.3 Health Canada (HC):

.1 Pest Management Regulatory Agency (PMRA), Pesticide Information Database; Wood Preservatives

.4 National Lumber Grades Authority (NLGA):

.1 NLGA Standard Grading Rules for Canadian Lumber 2017

.5 Underwriters Laboratory of Canada (ULC)

.1 CAN/ULC-S102- 10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.6 American Wood-Preservers' Association (AWPA)

.1 AWPA M2- 19, Standard for the Inspection of Preservative Treated Products for Industrial Use

.2 AWPA M4- 11, Standard for the Care of Preservative-Treated Wood Products

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Before starting any work of this Section, coordinate with wood products listed in Article 1.4, Related Requirements of the Wood Treatment Reference Guide for allowable wood species, grade and usage.

.1 Obtain products only from certified pressure treating facilities listed in the current version of Canadian Wood Preservation Certification Authority (CWCPA) Environmental Plant Certification Program.

.2 Use only products listed in WPC-04 and that are registered with PMRA Pesticide Information Database.

1.5 SUBMITTALS

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

.2 Action Submittals (to be submitted before starting any work of this Section):

.1 Product Data:

.1 submit manufacturer's product data describing requirements for storage, instructions for use and site dressings for cut ends, and health and safety requirements for handling and disposal of specified products

.3 Informational Submittals (to be provided during the course of Work):

.1 Fastenings and Hardware:

.1 submit list of fastenings and hardware proposed for use

.2 confirm size and configuration, appropriate corrosion resistance based on Use Categories (UC) described in Paragraph 2.2.2 below and types of wood preservative and fire retardant treatment materials used for the Project

.2 Wood Treatment Certificates - submit information for wood preservative treatment materials indicating the following:

.1 storage and handling requirements;

.2 protection requirements, including worker health and safety, and environmental protection;

.3 composition of chemical treatment;

.4 moisture content of materials treated with water borne chemical treatments;

.5 net amount of specified treatments retained; and

.6 acceptable types of paint, stain, and clear finishes that may be used over treated materials that require finishing after treatment.

1.6 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant.

.1 Wood Treatment Facility - obtain treated wood products from a single wood treatment facility

.1 experienced in performance of work described in this Section,

.2 licensed by the chemical treatment manufacturer, and

.3 certified in accordance with the Canadian Wood Preservation Certification Authority.

.2 Kiln Drying After Treatment: Kiln dry lumber and plywood products in accordance with CAN/CSA-O80, when treated with water based preservatives to a maximum of 19% moisture content, or to a lesser percentage when required by NLGA Grading Rules for applicable species and size of wood components.

.3 Certifications (to be provided during the course of Work):

.1 Compliance Certification: Provide certificates from wood treatment facility indicating compliance with specified standards, processes employed during treatment, and retention of treatment values.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Carried out in accordance with Section, AWPA M4, and with manufacturer's written instructions.

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

1.8 WARRANTY

.1 Special Warranty: Submit pressure treatment facility's standard warranty covering defects in material and retention of pressure treatment materials, fully transferrable to Project Owner for the following durations:

.1 Pressure Preservative Treated Wood: Lifetime (50+ Years Minimum).

.2 Start of Warranty: Substantial Performance for the Project.

Part 2 Products

2.1 DESCRIPTION

.1 Regulatory Requirements:

.1 Preservative Registration: Use only wood treatment products that are registered with Health Canada's PMRA.

.2 Pressure Treatment Standards: Use only wood treatments meeting requirements of CAN/CSA-O80 Series and ensure that treated wood products clearly indicate on the face or edge the following labelling requirements in accordance with Wood Preservation Canada and CSA O322:

.1 name of registered treatment;

.2 basic safety instructions;

.3 consumer safety contact information.

2.2 PERFORMANCE CRITERIA

.1 Corrosion Resistance of Fasteners and Hardware: Carbon steel, galvanized steel, aluminum, copper or red brass in contact with treated wood must exhibit corrosion rates less than 2.5µm per year.

.2 Preservative Treated Service Conditions: Indicate the following Use Categories (UC) on Drawings; coordinate and confirm material location and type before ordering pressure treated products:

.1 UC3 Exterior Construction, No Ground Contact - exterior construction that allows water to quickly drain from surfaces, that are within 450 mm of ground and not in contact with ground:

.1 UC3.1: Vertical construction exposed to full effects of weather that allows water to drain quickly from surface such as coated exterior millwork, painted siding and trim.

.2 UC3.2: Construction exposed in horizontal and vertical configurations that do not require coating but may be finished to achieve desired aesthetic effect.

.2 UC4 Exterior Construction, Ground Contact - exterior construction in contact with concrete slabs and with ground, and exposed to wet conditions favourable to deterioration of wood components:

.1 UC4.1: Vertical construction exposed to fresh water and located in regions of low natural potential for wood decay and insect attack such as fence posts, deck posts, guardrail posts, structural lumber, timbers and utility poles.

.3 Preservative Solvents: Use waterborne or oil borne preservative treatments required by Use Categories described above and generally as follows:

.1 Water Based Solvents:

.1 wood in contact with masonry or concrete;

.2 wood within 450 mm of grade;

.2 Oil Based Solvents:

.1 wood in contact with ground;

.2 landscaping timbers;

2.3 MATERIALS

.1 Wood Products: Coordinate with the following for species, grade and quality requirements:

.1 Dimensional Lumber: List wood species and grade, refer to Section

.2 Driven Fasteners for Treated Wood: Nails, brads, spikes and staples; use stainless steel, hot-dip galvanized or corrosion protective coated in accordance with ASTM F1667,applicable to Use Categories described in Paragraph 2.2.2 above and wood preservative treatment materials used for the project.

.3 Threaded Fasteners for Treated Wood: Screws, bolts, washers and nuts of material type applicable to Use Categories described in Paragraph 2.2.2 above and wood preservative treatment materials used for the project as follows:

.1 Stainless Steel Fastenings: Fastenings manufactured using stainless steel, Type 316 meeting requirements of ASTM F593.

.4 Hardware, Connectors and Hangers for Treated Wood: Hardware fabricated from sheet steel of material type required by Use Categories described in Paragraph 2.2.2 above and wood preservative treatment materials used for the project as follows:

.1 Stainless Steel Hardware: Fabricated from stainless steel sheet, plates or strips, Type 316 meeting requirements of ASTM A480/A480M.

2.4 ACCESSORIES

.1 Surface Applied Treatments: Wood treatments specific to Use Categories described Paragraph 2.2.2 above; for application to machined and cut ends, or drilled surfaces meeting the requirements of CAN/CSA-O80, and in accordance with AWPA M4.

Part 3 Execution

3.1 INSTALLATION

.1 Dimensional Lumber and , Timber: Incorporate treated wood products into construction as described in Section.

.2 Fastenings, Connectors and Hardware: Use corrosion-resistant fastenings, connectors and hardware described in this Section for specified treated wood products. Use stainless steel hardware where material is susceptible to salt or other types of surface ice melt.

.3 Site-Applied Preservative Treatments: Re treat surfaces exposed by cutting, trimming or drilling in accordance with of CAN/CSA-O80, and in accordance with AWPA M4, and in accordance with treatment manufacturer's written instructions.

.4 Preparation for Site-Applied Finishes: Use fine sandpaper to remove chemical deposits on treated wood to receive applied finish.

3.2 CLOSEOUT ACTIVITIES

.1 Waste Management: Dispose of construction waste at a landfill facility licensed to accept pressure preservative treated wood products:

.1 Do not burn or dispose of waste on-site by burying;

.2 Do not recycle scrap materials;

.3 Do not compost scrap materials; and

.4 Separate waste materials from non preservative treated wood products to prevent contamination of waste stream and storm drainage system.

END OF SECTION

Section 06 10 53
Miscellaneous Rough Carpentry

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 05 73- Wood Treatment

1.2 DEFINITIONS

.1 Environmental Product Declaration (EPD): Third-party verified documentation with supporting Product Category Rule (PCR) and life-cycle assessment (LCA) information, including at least a cradle-to-gate scope. Prepared in accordance with ISO 14025, 14040, 14044, and EN 15804 or ISO 21930.

.1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification where the manufacturer is explicitly recognized as the participant by the program operator.

.2 Product-specific Type III EPD Products with third-party certification (Type III), including external verification where the manufacturer is explicitly recognized as the participant by the program operator.

1.3 REFERENCE STANDARDS

.1 The American Society of Mechanical Engineers (ASME):

.1 ASME B18.6.1- 1981, Wood Screws (Inch Series)

.2 ASTM International (ASTM):

.1 ASTM A307- 21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.2 ASTM D7612- 10, Standard Practice for Categorizing Wood and Wood-Based Products According to their Fiber Sources

.3 ASTM F1667- 13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples

.3 CSA Group (CSA):

.1 CSA O86- 14 Engineered Design in Wood

.2 CSA O121- 08, Douglas Fir Plywood

.3 CSA O141- 05, Softwood Lumber

.4 CSA O151- 09, Canadian Softwood Plywood

.5 CAN/CSA-Z809- 16, Sustainable Forest Management

.4 Canadian Wood Council:

.1 Wood Design Manual 2010 edition

.2 Engineering Guide for Wood Frame Construction 2014

.5 National Lumber Grades Authority (NLGA):

.1 Standard Grading Rules for Canadian Lumber 2017

.2 NLGA SPS-1-2013, Fingerjoined Structural Lumber

.3 NLGA SPS-2-2013, Machine Graded Lumber

.4 NLGA SPS-4-2020, Fingerjoined Machine Graded Lumber

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Refer to Structural Engineer’s drawings for wood species and wood grade requirements.

.3 Action Submittals (to be submitted before starting any work of this Section):

.1 Product Data:

.1 Submit manufacturer's instructions, product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Include manufacturer's pre-engineered installation details.

.3 Submit certified test reports for prefabricated structural members from an approved independent laboratory indicating compliance with specifications for specified performance characteristics and physical properties.

.4 Submit Canadian Construction Materials Centre (CCMC) Product Evaluation Certificate number for engineered wood products.

.5 Submit manufacturer's installation instructions.

.2 Shop Drawings:

.1 For structural applications or conditions beyond the scope of the manufacturer's pre-engineered design information, submit drawings stamped and signed by professional engineer registered or licensed in British Columbia, Canada.

.2 Include on drawings:

.1 Design data in accordance with CSA O86 and CWC Engineering Guide for Wood Frame Construction.

.2 Indicate configuration and spacing of pre-engineered timber members, hanger and connector types, fasteners, locations and design values; bearing details.

.3 Indicate allowable load and stress increase.

.3 Provide a comprehensive set of engineering calculations or computer analysis and design outputs demonstrating the adequacy of the proposed system when requested by the Consultant.

.4 Informational Submittals (to be submitted during the course of Work):

.1 Material Certificates: Submit certificates for machine-graded and fingerjoined dimensional lumber indicating species and grade selected for each use and design values approved by the NLGA.

.5 Sustainable Standards Certification:

.1 Certified Wood: Submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Delivery and Acceptance Requirements: Protect materials from weather conditions while in transit and while on the jobsite

.2 Storage and Handling Requirements:

.1 Store materials using pallets or blocking a minimum of 150 mm from the ground and covered with protective waterproof sheets allowing for air circulation and ventilation under the covering.

.2 Protect edges and corners of sheet materials from damage during handling and storage.

.3 Protect kiln-dried and seasoned wood materials from conditions that will cause an increase to moisture content.

.4 Store engineered lumber on its edge.

.5 Stack, lift, brace, cut and notch engineered lumber products in accordance with manufacturer's instructions and recommendations.

.6 Store separated reusable wood waste convenient to cutting station and work areas.

Part 2 Products

2.1 DESCRIPTION

.1 Regulatory Requirements:

.1 Lumber Grades: Provide lumber products that are all sides finished (S4S) in nominal dimensions required for the project; grade-marked by accredited agencies of the Canadian Lumber Standards Accreditation Board and that conform to National Grading Rules published by the NLGA.

.1 Grading: Machine Grading, Visual Grading, or Both

.2 Moisture Content: Kiln Dry, 19% or less

.3 Structural Design Properties: Strength and related properties in accordance with CSA O86

.4 Sizes: Nominal dressed dimensions described in CSA O141 for surfaced dry conditions and wood species.

2.2 PERFORMANCE CRITERIA

.1 Plywood Grades: Provide plywood products in nominal dimensions required for the project; grade-marked by accredited agencies of the APA and that conform to the Canadian Plywood Grading Guide, and tolerances described for specific plywood Products below, and identified as follows:

.1 Name of Standard CSA O121 or CSA O151;

.2 Manufacturer's Mill Identification;

.3 Bond Quality (Exterior);

.4 Commercial Species Grouping (DFP, CSP, ASP or HEM-FIR);

.5 Product Grade (SHG, SEL, SEL TF, G1S or G2S);

.6 Nominal Thickness; and

.7 Additional Grade or Product Designations (if applicable).

.2 Lumber Grades: Provide lumber products that are all sides finished (S4S) in nominal dimensions required for the project; grade marked by accredited agencies of the Canadian Lumber Standards Accreditation Board and conform to National Grading Rules published by the National Lumber Grades Authority, and as follows:

.1 Grading: Machine Grading, Visual Grading, or Both.

.2 Moisture Content: Kiln Dry, 19% or less.

.3 Structural Design Properties: Strength and related properties in accordance with CSA O86 and NLGA SPS 2.

.4 Sizes: Nominal dressed dimensions described in CSA O141 for surfaced dry conditions and wood species.

.5 Acceptable Alternative Products: Lumber products meeting requirements of the American Lumber Standards Committee designated ALS Program Lumber and that are accepted by the Canadian Lumber Standards Accreditation Board, may be acceptable for the Project when proof of compliance with strength and related properties meeting CSA O86 are submitted before purchasing any lumber products.

2.3 MATERIALS

.1 Lumber Materials:

.1 Timber Post: No.1 Grade, meeting CSA O86, with the following minimum properties:

.1 Sizes: 89-mm width by 89-mm depth.

.2 Species: Cedar

.3 Fingerjoined Materials: Not Allowed.

.2 Light Framing: Provide Construction Grade with the following minimum properties:

.1 Sizes: 38-mm width by 89-mm depth (rafters), 38-mm width by 140mm.

.2 Fingerjoined Materials: Not Allowed.

.3 Species Group: Cedar or approved equivalent.

2.4 ACCESSORIES

.1 Driven Fasteners: Steel nails, spikes, brads and staples meeting requirements of ASTM F1667. Ensure length is sufficient to penetrate connecting solid wood materials.

.1 Exterior Work: Stainless Steel.

.2 Rough Hardware (Bolts, Nuts and Washers): Provide manufacturer recommended fastening devices and anchors meeting requirements of ASTM A307 and as follows:

.1 Ground Contact Materials: Stainless steel.

.2 Exterior Work: Hot-dipped galvanized.

.3 Wood Screws: Stainless Steel screws meeting requirements of ASME B18.6.1 and as follows:

.1 Exterior Work: stainless steel.

.4 General Purpose Adhesive: CSA O112.9.

.5 Nailing Discs: Flat caps, minimum 25 -mm diameter, minimum 0.4 mm thick, sheet metal, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

.6 Wood Preservative: As specified in Section 06 05 73- Wood Treatment.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrates previously installed are acceptable for product installation in accordance with manufacturer's instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 INSTALLATION

.1 Requirements:

.1 Accurately frame and properly assemble rough carpentry work

.2 Securely attach rough carpentry work to substrate by anchoring and fastening

.3 Include required nails, fastenings and other connectors

.4 Set rough carpentry to required levels and lines with members plumb, true to line, cut, and fitted

.5 Fit rough carpentry to other construction

.6 Scribe and cope as needed for accurate fit

.7 Locate furring, nailers, blocking, grounds, and similar supports as required when attaching to other construction.

.8 Do not use materials with defects that impair the quality of the rough carpentry or use pieces that are too small to use with a minimum number of joints or optimum joint arrangement.

3.3 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

Section 31 00 99
Earthwork for Minor Works

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 22 13 - Rough Grading

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

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

.2 CSA Group (CSA):

.1 CSA A23.1/A23.2- 14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 MATERIALS

.1 Unshrinkable fill: Concrete to CSA A23.1/A23.2.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Before commencing work verify locations of buried services on and adjacent to site.

.2 Evaluation and Assessment:

.1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.2 Not later than 1 week before backfilling or filling, provide to designated testing agency, 23 kg sample of backfill material s proposed for use.

.3 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.

.4 Before commencing work, conduct, with Consultant, 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.

3.2 PREPARATION

.1 Protection of in-place conditions:

.1 Protect excavations from freezing.

.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 Consultant's 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 to remain undisturbed.

.2 Removal:

.1 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.

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

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

.4 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

.5 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.

3.3 EXCAVATION

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

.2 Topsoil stripping:

.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.

.2 Strip topsoil to depths as indicated. Avoid mixing topsoil with subsoil.

.3 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.

.4 Stockpile in locations as approved by Consultant.

.5 Dispose of topsoil off site.

.3 Excavate as required to carry out work, in all materials met.

.1 Do not disturb soil or rock below bearing surfaces. Notify Consultant when excavations are complete.

.2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

.3 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.

.1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.4 SITE QUALITY CONTROL

.1 Fill material and spaces to be filled to be inspected and approved by Consultant.

3.5 BACKFILLING

.1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Consultant.

.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:

.1 Place backfill, fill and basecourse material in 150 mm lifts. Add water as required to achieve specified density.

.2 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 D698:

.1 To underside of basecourses: 95%.

.2 Basecourses: 100%.

.3 Elsewhere: 90%.

.7 Under slabs and paving:

.1 Use structural fill up to bottom of granular base courses.

.2 Use crushed aggregate for base courses.

.8 In trenches:

.1 Up to 300 mm above pipe or conduit: sand placed by hand.

.2 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.

.12 Underground tanks: Use sand to bottom of granular base courses or to bottom of topsoil, as applicable.

3.6 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.

3.7 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.1 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 00 - Cleaning.

END OF SECTION

Section 31 11 00
Clearing and Grubbing

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 01 90.33 - Tree and Shrub Preservation

.2 Section 31 14 13 - Soil Stripping and Stockpiling

.3 Section 31 22 13 - Rough Grading

.4 Section 31 00 99 - Earthwork for Minor Works

1.2 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.

.1 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.

.2 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.

.3 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.

.2 Grubbing: Consists of excavation and disposal of stumps and roots , boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

.3 Emerald ash borer (EAB): A non-native, invasive beetle that is highly destructive to ash trees where it occurs.

.1 Woodchips in the context of EAB consist of untreated, raw bark and wood fragments broken or shredded from logs or branches. Woodchips are to be less than 2.5 cm in at least any two dimensions.

.2 Firewood in the context of EAB consists of non-manufactured, solid wood material, with or without bark, cut into sizes less than 1.2 metres long and less than 25 cm in diameter which may be handled manually.

.3 Logs in the context of EAB consist of untreated, raw wood greater than 1.2 metres in length and greater than 25 cm diameter.

.4 Enclosed vehicle in the context of EAB consist of any vehicle transporting regulated wood material that is equipped to prelude the loss of materials or the escape of EAB while in transit.

1.3 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Health and Safety Regulations.

.2 Canadian Environmental Protection Act, 1999 (CEPA 1999).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Arrange for a site meeting, before Work starts, with Consultant in accordance with 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Examine existing site conditions and adjacent areas to construction's work, before Work starts.

.3 Identify potential environmental impact on existing site conditions.

.2 Contractor is responsible for obtaining or coordinating any permits required for clearing and grubbing works.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan (HSP), within seven days after date of Notice to Proceed and before mobilization to site, in accordance with Section 01 35 29.06 - Health and Safety Requirements. Submit HSP for review by Consultant.

.3 Submit certificates by manufacturer certifying that materials are in compliance with specified performance characteristics and physical properties.

.4 Submit list of equipment that are going to be on-site.

1.6 HEALTH AND SAFETY

.1 Perform clearing and grubbing work in accordance with the site-specific HSP recommendations.

.2 Safety Requirements: Worker protection.

.1 Ensure workers are wearing gloves, protective clothing, safety vests while performing clearing and grubbing activities.

1.7 QUALITY CONTROL

.1 Regulatory Requirements:

.1 Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial and municipal regulations.

.2 Comply with hauling and disposal regulations of authority having jurisdiction.

.2 Qualifications:

.1 Submit proof of qualifications when requested by Consultant.

.2 Qualification Statement: Contractor have documented proof that they have completed work of similar scope.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Prevent damage to trees, landscaping, fencing, existing pavement, utility lines, site appurtenances, root systems of trees which are to remain.

.1 Repair damaged items to approval of Consultant.

.2 Replace any damaged trees designated to remain, as directed by Consultant.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Perform clearing and grubbing work in accordance with the site-specific EPP recommendations as directed by Consultant.

.2 Ensure safe disposal of wood preservatives complies with all Federal, Provincial and municipal regulations, particularly the Canadian Environmental Assessment Act (CEAA), the Canadian Environmental Protection Act, and the Pest Control Products Act.

Part 2 Products

2.1 MATERIALS

.1 Ensure that pesticides delivered to the site are registered by Health Canada as part of the Pest Control Products Act.

.2 Soil Material for Fill:

.1 Excavated soil material: Free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.

Part 3 Execution

3.1 PREPARATION

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

.2 Locate and protect utility lines: Preserve in operating condition active utilities traversing site.

.1 Notify Consultant immediately of damage to or when unknown existing utility line(s) are encountered.

.2 When utility lines which are to be removed are encountered within area of operations, notify 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.

3.2 CLEARING

.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 indicated by 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 unsound branches on trees designated to remain as directed by Consultant.

3.3 ISOLATED TREES

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

.2 Grub out isolated tree stumps.

.3 Prune individual trees as indicated.

.4 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.

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

3.4 UNDERBRUSH CLEARING

.1 Clear underbrush from areas as indicated at ground level.

3.5 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

.3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m^3 in accordance with Section 31 23 16.26 - Rock Removal.

.4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.6 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site.

.2 Remove diseased trees identified by Consultant and dispose of this material to approval of Consultant.

.3 Any ash wood materials in the form of wood chips or logs are to be scattered widely, to maximum 75 mm depth as directed by Consultant.

.4 Contractor is responsible for monitoring all cut ash wood and firewood until it is properly disposed of as determined by Consultant.

3.7 FINISHED SURFACE

.1 Leave ground surface in condition suitable for stripping of topsoil to approval of Consultant.

3.8 CLEANING

.1 Perform cleaning in accordance with Section 01 74 00 - Cleaning.

.2 Clean and remove debris and sediment from work area drainage devices and dispose of to an approved landfill site.

.3 Do not clean equipment in the waterbody or where the wash-water can enter the waterbody.

.4 Maintain tidy Work area, free from accumulation of waste products and debris.

END OF SECTION

Section 31 14 13
Soil Stripping and Stockpiling

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19.13 - Topsoil Placement and Grading

.2 Section 31 11 00 - Clearing and Grubbing

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM D5268-22 , Standard Specification for Topsoil Used for Landscaping and Construction Purposes

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: Sequence the work of this Section after temporary erosion and sedimentation control measures are installed, as indicated in Section 01 57 00 - Temporary Controls.

.2 Remove topsoil before other construction procedures commence to avoid compaction of topsoil.

Part 2 Products - Not Used

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 Verify the procedures are conducted in accordance with applicable provincial and municipal requirements.

.2 Handle topsoil only when it is dry and warm.

.3 Strip topsoil by scraper to depths 10 to 15 cm as approved by Consultant.

.1 Avoid mixing topsoil with subsoil. Refer to Section 00 31 00 - Available Project Information for geotechnical report on subsurface soil information.

.4 Pile topsoil by mechanical hoe in berms in locations as approved by Consultant.

.1 Stockpile height less than 2.5 m.

.2 Avoid driving excavation equipment over topsoil piles.

.5 Protect stockpiles from contamination and compaction.

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

3.2 PREPARATION OF GRADE

.1 Verify the grades are correct. Notify Consultant if discrepancies occur. Proceed with work when instructed by Consultant.

.1 Grade area only when soil is dry to lessen soil compaction.

.2 Grade soil with scrapers, establishing natural contours and eliminating uneven areas and low spots and ensuring positive drainage.

3.3 PLACING OF TOPSOIL

.1 Place topsoil only after Consultant has accepted subgrade.

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

.3 If required, conduct a physical evaluation of topsoil in accordance with ASTM D5268 to determine the presence and the amount of organic matter, moisture content, inorganic matter (sand, silt, and clay), pH, salt content, cation exchange capacity percentages, and deleterious materials.

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

.5 After spreading procedures are complete, cultivate soil.

3.4 SUBSOILING

.1 Apply subsoiling to designated areas to improve drainage and agricultural potential of soil.

.2 Work subsoiled area following natural grade contour lines, with vibrating subsoiler to depth of 40 cm.

.3 Cross subsoiled area following the first pass.

.4 Cultivate the soil with a chain harrow to break up soil clod.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.1 On completion of the work, remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION

Section 31 22 13
Rough Grading

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 00 99 - Earthwork for Minor Works

.2 Section 31 11 00 - Clearing and Grubbing

.3 Section 31 14 13 - Soil Stripping and Stockpiling

.4 Section 32 91 19.13 - Topsoil Placement and Grading

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

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

.2 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modi?ed Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Verify rough grading work is coordinated with erosion and sedimentation control measures in Section 01 57 00 - Temporary Controls.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Site Quality Control Submittals: Submit testing procedure, frequency of tests, testing laboratory certified by ULC or certified testing personnel to Consultant for review.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Testing Agencies: Testing laboratory certified by ULC will conduct the soil compaction test.

1.6 EXISTING CONDITIONS

.1 Examine subsurface investigation report which is available for inspection as indicated in Section 00 31 00 - Available Project Information.

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

Part 2 Products

2.1 MATERIALS

.1 Excavated material existing on site suitable to use as fill for grading work if accepted by Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading in accordance with Section 01 71 00 - Examination and Preparation.

.1 Examine soil for unsuitable conditions such as clods, rocks, snow, frost, frozen, muddy, large roots, litter, toxic substances, and unstable material.

.2 Proof roll the subgrade areas indicated on Drawings.

.1 Verify the subsoil is free of surface water and not frozen.

.3 Verify locations of all underground utilities.

.2 Inform Consultant of unacceptable conditions immediately upon discovery. Consult a professional geotechnical engineer to provide solutions when unacceptable conditions are discovered.

.3 Proceed with the Work after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Remove litter, unsatisfactory and unstable materials.

.2 Stake and flag locations of utilities.

.3 Protect existing underground and above head utilities.

.4 Notify utility companies to remove and relocate utilities as indicated on Drawings.

3.3 GRADING

.1 Rough grade to levels, profiles, and contours preparing for post grading processes as indicated on Drawings.

.2 Rough grade to the following depths below finish grades:

.1 Grassed areas: as indicated on Drawings.

.2 Gravel paving: as indicated on Drawings.

.3 Remove soil to a minimum depth of 150 mm from the surface before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding, unless otherwise specified by a professional geotechnical engineer.

.4 Compact filled and disturbed areas to corrected maximum dry density to ASTM D698 , ASTM D1557, as follows:

.1 85% under landscaped areas.

.2 95% under paved and walk areas.

.5 Avoid disturbing soil within the areas of existing trees and shrubs indicated to remain, to maintain their stability and health.

3.4 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Perform tests on compacted soils to determine conformance with specified requirements.

.1 One test per 200 m^2 of compacted areas.

.2 Submit test results to Consultant for review.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

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

3.6 PROTECTION

.1 Protect existing trees, fencing, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines as directed by Consultant. If damaged, restore to original or better condition, unless directed otherwise.

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

END OF SECTION

Section 32 01 90.33
Tree and Shrub Preservation

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 11 00 - Clearing and Grubbing.

.2 Section 32 92 19.16- Hydraulic Seeding

1.2 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

1.3 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.2 CSA Group (CSA)

.1 CSA G30.18- 09, Carbon Steel Bars for Concrete Reinforcement.

.3 Canadian Society of Landscape Architects (CSLA)/ Canadian Nursery Landscape Association (CNLA)

.1 Canadian Landscape Standard 2024, Second Edition

.2 Canadian Nursery Stock Standard 2017, Ninth Edition

.4 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.2 Fertilizers Act (R.S. 1985, c. F-10).

.3 Fertilizers Regulations (C.R.C., c. 666).

.4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.5 Health Canada - Pest Management Regulatory Agency (PMRA)

.1 National Standard for Pesticide Education, Training and Certification in Canada (1995).

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Obtain approval from Consultant of schedule indicating beginning of Work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's instructions, printed product literature and data sheets for tree and shrub preservation materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide monthly written reports on maintenance during warranty period, to Consultant identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

.3 Submit WHMIS Safety Data Sheet (SDS) in accordance with Section 01 47 15- Sustainable Requirements: Construction and Section 02 81 00- Hazardous Materials.

1.6 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant.

.2 Landscape Contractor: to be a Member in Good Standing of BC Landscape Nursery Association (BCLNA) and Canadian Nursery Landscape Association.

.3 Landscape Planting Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Softscape Installation designation or equivalent.

.4 Landscape Maintenance Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Ornamental Maintenance designation or equivalent.

1.7 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:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect tree and shrub preservation materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.8 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Consultant to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

.2 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 Consultant before application.

.3 Apply fertilizer in early spring at manufacturer's suggested rate.

.4 Remove dead, broken or hazardous branches from plant material. Dispose of debris through composting.

Part 2 Products

2.1 MATERIALS

.1 Fill:

.1 Type (A): clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter.

.2 Type (B): excavated soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc). Excavated material shall be approved by Consultant before use as fill.

.2 Coarse washed stones: 35-75 mm diameter clean round hard stone.

.3 Fertilizer:

.1 To Canada Fertilizer Act and Fertilizers Regulations.

.2 Complete, commercial, slow release with 35% of nitrogen content in water-insoluble form.

.4 Anti-desiccant: commercial, wax-like emulsion.

.5 Filter Cloth:

.1 Type 1: 100% non-woven needle punched polyester, 2.75 mm thick, 240 g/m ^{2} mass.

.2 Type 2: biodegradable burlap.

.6 Wood posts: 38 x 89 x 2400 mm length, untreated wood.

.7 Tree Barriers: steel T-rail posts 40 x 40 x 5 x 2440 mm, at 1800 mm o.c., with wood slat snow fencing attached to posts with 9 gauge wire, 13 per post.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for tree and shrub preservation installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 IDENTIFICATION AND PROTECTION

.1 Identify plants and limits of root systems to be preserved as approved by Consultant.

.2 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Consultant.

.3 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult a Certified Arborist (CA) or Registered Consulting Arborist (RCA) or Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Ornamental Maintenance designation, or equivalent, as approved by Consultant.

3.3 TRENCHING AND TUNNELING FOR UNDERGROUND SERVICES

.1 Centre line location and limits of trench/tunnel excavation to be approved by Consultant before excavation. Tunnel excavation to extend 2000 mm from edge of trunk on either side. Require a protective layer of bark mulch 150 mm in depth applied around the bases of the trees to avoid compaction of surface roots where heavy traffic with construction equipment is anticipated.

.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.

.1 If air space trenching is used carefully thread piping and conduit through exposed root system minimizing damage to the root systems.

.3 Excavate tunnel under centre of tree trunk using methods and equipment approved by Consultant.

.4 Keep roots moist by spraying or covering with moist burlap while the roots are exposed during the excavation and before backfilling.

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

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

.7 Complete tunnelling and backfilling at tree within two (2) weeks of beginning Work.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.

.1 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 00- Cleaning.

END OF SECTION

Section 32 11 17
Reshaping Granular Roadbed

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 - Aggregate Materials

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C117-03, Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-03, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-01, Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m^3).

.5 ASTM D4318-00, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Excess materials are to be diverted from landfill to site approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Granular base material: to Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material and other deleterious materials.

.2 Graduations within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1

.3 Gradation to:

.1

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

.4 Gradation to: insert name of agency and material type.

.5 Other properties as follows:

.1 Liquid limit: ASTM D4318, maximum 25

.2 Plasticity index: ASTM D4318, maximum 6

.3 Crushed particles: at least 50 % of particles by mass within 19.0 mm to 4.75 mm sieve designation range to have at least 1 freshly fractured face. Material divided into ranges using methods of ASTM C136

Part 3 Execution

3.1 SEQUENCE OF OPERATION

.1 Scarifying and reshaping:

.1 Scarify roadbed to width as indicated unless directed otherwise by Consultant and to minimum depth of 150mm.

.2 Compaction equipment:

.1 Compaction equipment capable of obtaining required material densities.

.2 Provide Consultant with proof of equipment efficiency for unspecified equipment.

.1 Efficiency of proposed equipment equal to specified equipment.

.2 Obtain approval Consultant before use.

.3 Equip with device that records hours of actual work, not motor running hours.

.3 Compacting:

.1 Compact to density minimum 100 corrected maximum dry density ASTM D698.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

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

.4 Use mechanical tampers, approved by Consultant to compact areas not accessible to rolling equipment to specified density.

.4 Repair of soft areas:

.1 Correct soft areas by removing defective material to depth and extent approved by Consultant. Replace with material acceptable to Consultant and compact to specified density.

.2 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until acceptance by Consultant.

3.2 SITE TOLERANCES

.1 Reshaped compacted surface within plus or minus 10 mm of elevation as indicated.

END OF SECTION

Section 32 11 23
Aggregate Base Courses

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 - Aggregate Materials

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM C117- 17, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing

.2 ASTM C131/C131M- 20, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

.3 ASTM C136/C136M- 19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

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

.5 ASTM D1557- 12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft ^{3}) (2,700kN-m/m ^{3})

.6 ASTM D4318- 17el, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 31 05 16 - Aggregate Materials.

.2 Storage and Handling Requirements:

.1 Stockpile minimum 50 % of total aggregate required prior to beginning operation.

.2 Store materials in clean dry location and in accordance with manufacturer's recommendations.

.3 Store cement in weathertight bins or silos that provide protection from dampness and easy access for inspection and identification of each shipment.

Part 2 Products

2.1 MATERIALS

.1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and the following requirements:

.1 Crushed stone or gravel.

.2 Gradations to be within limits specified when tested to ASTM C136/C136M. Sieve sizes to CAN/CGSB-8.1.

.1 Gradation Method #1 to:

.1

Sieve Designation	% Passing		
	(1)	(2)	(3)
100 mm	-	-	-
75 mm	-	-	-
50 mm	[100]	-	-
37.5 mm	[70-100]	-	-
25 mm	-	[100]	-
19 mm	[50-75]	-	[100]
12.5 mm	-	[65-100]	[70-100]
9.5 mm	[40-65]	-	-
4.75 mm	[30-50]	[35-60]	[40-70]
2.00 mm	-	[22-45]	[23-50]
0.425 mm	[10-30]	[10-25]	[7-25]
0.180 mm	-	-	-
0.075 mm	[3-8]	[3-8]	[3-8]

.2 Gradation Method #2 to: …….

.3 Material to level surface depressions to meet gradation (2) limits in accordance with Method #1.

.4 Liquid limit: To ASTM D4318, maximum 25

.5 Plasticity index: To ASTM D4318, maximum 6.

.6 Crushed particles: at least 60 % of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C136/C136M.

.1

Passing		Retained on
[50] mm	to	[25] mm
[25] mm	to	[19.0] mm
[19.0] mm	to	[4.75] mm

.7 Soaked CBR: to ASTM D1883, minimum 80, when compacted to 100% of ASTM D1557.

Part 3 Execution

3.1 PLACEMENT AND INSTALLATION

.1 Place granular base after sub-base surface is inspected and approved in writing by Consultant.

.2 Placing:

.1 Construct granular base to depth and grade in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Begin spreading base material on crown line or on high side of one-way slope.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.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.

.1 Consultant 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 that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is 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 Consultant before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compacting:

.1 Compact to density not less than 100 % corrected maximum dry density.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtain specified density.

.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Consultant.

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

.5 Proof rolling:

.1 For proof rolling use standard roller of 45 400 kg gross mass with four pneumatic tires each carrying 11 350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Consultant to use non standard proof rolling equipment.

.3 Proof roll at level in granular base as indicated.

.1 If use of non standard proof rolling equipment is approved, Consultant 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:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by Consultant.

.2 Backfill excavated subgrade with sub-base material and compact in accordance with Section.

.3 Replace sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-base.

.4 Replace base material and compact in accordance with this Section.

.6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as approved by Consultant and replace with new materials in accordance with Section 32 11 16.01 - Granular Sub-base and this Section at no extra cost.

3.2 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.

3.3 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.4 PROTECTION

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

END OF SECTION

Section 32 13 13
Concrete Paving

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 - Concrete Forming and Accessories

.2 Section 03 20 00 - Concrete Reinforcing

.3 Section 31 05 16 - Aggregate Materials

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.3 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.4 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.

.5 ASTM C666/C666M-03(2008), Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

.6 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.7 ASTM D2628-91(2011), Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

.8 ASTM D5329-09, Standard Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.

.9 ASTM D6690 -12, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

.2 CSA Group

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

.2 CSA-A3000-13, Cementitious Materials Compendium.

.3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.3 MEASUREMENT PROCEDURES

.1 Measure Portland cement concrete paving in metric metres.

.2 Measure supply of Portland cement in tonnes.

.3 Measure sealing of joints including saw cutting and preparation, in linear metres.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete paving material and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding and joint material.

.2 Evaluation of cleaning and sealing compound.

.3 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's:

.1 For cleaning and sealing compounds.

.2 Sealing and caulking compounds.

.3 Samples:

.1 Inform Consultant of proposed source of aggregates and provide access for sampling at least 5 weeks prior to commencing work.

.2 Submit to Consultant samples of following materials proposed for use, at least 5 weeks prior to commencing work:

.1 10 kg of Portland cement.

.2 3 kg of each type of Supplementary Cementing Material.

.3 10 kg of each type of Blended Hydraulic Cement.

.4 5 L of each admixture.

.5 5 L of curing compound.

.6 10 kg of joint sealant (hot pour).

.7 Component proportions for 5 L of joint sealant (cold pour).

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: Company or person specializing Portland cement concrete paving approved by manufacturer.

.2 Certifications:

.1 Submit to Consultant manufacturer's test data and certification that following material meets criteria and requirements of this section prior to starting concrete work:

.1 Portland Cement.

.2 Blended Hydraulic Cement.

.3 Supplementary Cementing Material.

.4 Admixtures.

.5 Joint Sealants.

.6 Curing Materials.

.7 Joint Filler.

.2 Submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

1.6 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:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.1 Unload cement and store in weathertight bins or silos that protect cement from dampness and contamination and provide easy access for inspection and identification of each shipment.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Mix design requirements:

.1 Submit concrete mix design to Consultant for review, 4 weeks prior to commencing work.

2.2 MATERIALS

.1 Portland cement: to CSA A3000.

.2 Aggregates: to CSA A23.1/A23.2 and to following requirements:

.1 Coarse aggregate:

.1 Produce coarse aggregate in at least two separate sizes which, when combined, yields gradation specified. Each component size to form approximately equal percentage of total coarse aggregate.

.2 Gradation: to CSA A23.1/A23.2, table 5, nominal size 28-5.

.3 Flat and elongated particles: to CSA A23.1/A23.2 (13A) (length to width and width to thickness ratio greater than 3) not to exceed 0.5% by mass.

.2 Fine aggregate:

.1 Gradation: to CSA A23.1/A23.2, Table 1. Material passing 0.160 mm sieve: maximum 5%.

.2 Aggregates for use in concrete pavement shall not be susceptible to D-cracking. Unless field experience, aggregate history or prior laboratory testing have proven otherwise.

.3 Aggregates for use in concrete pavement shall be tested in accordance with ASTM C666/C666M. Test shall be in accordance with Procedure A for a period of 350 cycles.

.3 Supplementary cementing materials: to CSA A3000.

.4 Air entraining admixture: to ASTM C260/C260M.

.5 Chemical admixtures: to ASTM C494/C494M. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Curing compound: to ASTM C309, Type 1-D or 2.

.7 Sheet material for curing: to ASTM C171, waterproof paper.

.8 Burlap mats for curing: to ASTM C171.

.9 Joint sealant, hot poured. Bond breaker to Consultant's approval.

.10 Joint seal, preformed polychloroprene elastomeric: to ASTM D2628.

.11 Preformed expansion joint filler: to ASTM D1752.

.12 Dowels and tie-bars: to CSA G30.18.

.1 Dowels: clean, straight and free from flattened or burred ends, plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to ASTM A775/A775M.

.2 Tie-Bars: deformed steel bars in compliance with CSA G30.18 and be epoxy-coated to ASTM A775/A775M.

.13 Protective covers and insulation for cold weather concreting: to CSA A23.1/A23.2.

2.3 MIXES

.1 Job mix formula to be reviewed by Consultant in accordance with Alternative 3 of CSA A23.1/A23.2, Table 13 and as specified below.

.2 For concrete proportioned in accordance with Alternative 1:

.1 Use type 10 cement.

.2 Compressive strength when tested in accordance with CSA A23.1/A23.2, (9C): average 28 day compressive strength to be minimum 35 MPa.

.3 Cementing materials content: 290 to 335 kg/m^3 of concrete mix.

.4 Air content when tested in accordance with CSA A23.1/A23.2, (4C), immediately after discharge: in accordance with CSA A23.1/A23.2 , Table 10.

.5 Class of exposure: Class C-2.

.6 Use of chemical admixture will be approved only when specified mix requirements or workability cannot be achieved by proportioning of aggregates, water, cement and air entraining admixture.

.3 For concrete proportioned in accordance with Alternative 2:

.1 Use type 10 cement.

.2 Cementing materials content: 335 kg/m^3 of concrete mix.

.3 Coarse to fine aggregate ratio: coarse aggregate to comprise 60 to 70% by mass of combined aggregate.

.4 Maximum total water /cement ratio: 0.45 (including moisture in aggregates): 140 kg/m^3 of concrete mix.

.5 Slump at point of discharge when tested in accordance with CSA A23.1/A23.2, (5C): 10 to 50 mm.

.6 Air content when tested in accordance with CSA A23.1/A23.2, (4C), immediately after discharge: 4-6%.

.4 Proposed changes in material source to be approved by Consultant. New mix design to be approved by Consultant.

.5 Consultant to carry out 7 day strength tests. If average strength at 7 days is less than 70% of specified minimum 28 day strength, check mix at once and adjust to ensure required strength is obtained.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete paving installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 EQUIPMENT

.1 Concrete plant: in accordance with CSA A23.1/A23.2.

.2 Where fixed form paving is used provide equipment with following features:

.1 Mechanical self-propelled spreader capable of moving concrete forward and laterally.

.2 Vibrator locations and spacings whether surface or internal to be installed as per manufacturer's specifications or as directed by the Consultant.

.3 Mechanical, self-propelled finisher with two independently operated transverse screeds.

.4 Float to be aluminum or magnesium, straight, smooth, sufficiently light to avoid sinking into concrete surface, operated mechanically or manually from edge to edge while advancing longitudinally.

.3 Where slip form paving is used provide equipment with following features:

.1 Self-propelled slip form paver with crawler type tracks, designed to spread, consolidate, screed and float finish fresh concrete to required cross section, lines and grades. Paver to be approved by Consultant.

.2 Pavement line and surface elevation to be automatically controlled from taut string or wire.

.3 Internal type vibrators: to be installed and arranged as per manufacturer's specifications.

.4 Use following equipment on approval of Consultant:

.1 Hand operated transverse screeds spanning side forms.

.2 Mechanically powered vibrating beam spanning side forms.

.3 Hand operated floats and fluting tools used by skilled workers.

.5 Provide following miscellaneous equipment where required:

.1 Edging tool.

.2 Water truck equipped with pump, hose line and fine spray nozzle.

.3 Self-propelled automatic spray machine spanning fresh concrete, equipped with fine spray nozzles suitable for application of membrane curing compound uniformly over surface and exposed edges, and with wind skirt to permit proper application during windy conditions.

.4 Self-propelled concrete saws equipped with rubber-tired wheels, readily adjustable blade depth controls, and sawing line guide pointers both front and rear. Provide adequate number of units to complete sawing at rate required and have ample supply of suitable saw blades and at least one standby sawing unit available on job site before concrete placement is started.

.5 Heating kettle or tank for heating sealing compound:

.1 Double boiler with space between inner and outer shells filled with oil, asphalt or other material for heat transfer.

.2 Equip for positive temperature control of sealing compound.

.3 Equip with readily calibrated device which accurately registers temperature of sealing compound.

3.3 FORMWORK

.1 Install in accordance with Section 03 10 00 - Concrete Forming and Accessories and to following requirements:

.1 For fixed form paving:

.1 Provide steel forms of sufficient strength to support and keep alignment under weight of spreading and finishing machines.

.2 Use of wood forms for fillet areas to be approved by Consultant.

.3 Set forms true to line and grade, join neatly and tightly and stake securely to resist concrete pressure and impact from tampers without springing.

.4 Clean and oil forms before each use.

.5 Obtain Consultant's approval of forms before placing concrete.

.2 For slip form paving:

.1 Provide sufficient length of slip form trailing behind paver to prevent slumping at slab edge. Ensure rigid lateral support.

.2 Set grade and line for control string or wire from bench marks established by Consultant.

3.4 SUBGRADE AND SUBBASE PREPARATION

.1 Soft, yielding materials or other portions of subgrade that will not compact to specification shall be removed and replaced with suitable material. Subgrade to be brought to a firm unyielding condition with a uniform density. It shall be compacted at or above optimum moisture content to 95% Standard Proctor density.

.2 When concrete is placed directly on subgrade, it will be checked for conformity with the cross-section tolerance. Finished surface shall not deviate more that 0 mm above and 20 mm below specified grade and cross-section, and the surface shall not deviate more than 10 mm at any place on a3 mm template.

.3 Subbase to consist of specified material and have a compacted thickness of not less than specified.

.4 For slip-form paving, subbase travelled by tracks in paving machine shall be firm and have a smooth surface.

.5 Subbase shall be compacted to specified density.

.6 Prepared subbase shall be checked for conformity with the cross-section and grad tolerances. Finished surface of subbase shall not deviate more than 0 mm above and 20 mm below specified grade and cross-section, and surface shall not deviate more than 10 mm at any place on a 3 mm template.

.7 Repair damage to subbase resulting from hauling or equipment operations.

.8 Prior to placing concrete, subbase shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

.9 Surface condition of base to be approved by Consultant before placing concrete.

3.5 REINFORCING STEEL AND DOWELS

.1 Place reinforcing steel and dowels as indicated and to Section 03 20 00 - Concrete Reinforcing.

.2 Dowel bars shall be plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to requirements of ASTM A775/A775M, also coated with bond breaker material.

.3 Steel for tie bars or tie bolts to comply to CSA G30.18 and be epoxy-coated to ASTM A775/A775M.

.4 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

.5 Remove oil, grease, dirt and deleterious material from reinforcing bars before placing concrete.

.6 Steel placement to be approved by Consultant before placing concrete.

3.6 PLANT AND MIXING REQUIREMENTS

.1 If crusher screenings are approved as mixture component, proportion separately from sand.

.2 If washing of aggregate required, allow aggregate to drain for 24 hours or longer as required to stabilize moisture content.

.3 For truck mixers, mixing to be in accordance with CSA A23.1/A23.2.

.4 Mix produced to be within following tolerances from mix design:

.1 Air content: as per CSA A23.1/A23.2 , Table 10.

3.7 TRANSPORT AND DELIVERY OF MIX

.1 Time from initial mixing to final placing to be not more than 120 minutes if mix is transported by agitating equipment (e.g. truck mixer) in accordance with CSA A23.1/A23.2 , clause 18.4.2 - Delivery with Agitating Equipment.

.2 Transport mix by non-agitating equipment only if;

.1 Time from addition of cement to time of placing not to exceed45 minutes.

.2 Haul units to be of sufficient capacity to transport at least one regular size batch from mixer.

.3 Haul routes to be well maintained to prevent undue disturbance of concrete mix during transport.

3.8 PLACING

.1 Place concrete to lines, grades and depths as indicated.

.2 Discharge concrete into forms as soon as practical after mixing.

.3 Construct pavement lanes in sequence approved by Consultant.

.4 Use hand placing where machine spreading is not feasible.

.5 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

.6 Operate with continuous forward momentum. Schedule concrete supply to minimize interruptions.

.7 Insert tie bars as indicated.

.8 When completing concrete placement for day, carry placement through to scheduled control joint location.

.9 Where concrete placement is stopped for more than 30 min due to breakdowns, weather or other reasons, construct extra bulkhead and construction joint as directed by Consultant.

.10 Do not place concrete on frozen surface.

.11 No concrete shall be placed during rain.

.12 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CSA A23.1/A23.2. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

.13 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses providing complete coverage of the pavement to minimize the temperature rise of the concrete.

.14 When concrete has been placed in cold weather and the sire temperature is expected to drop below 5 degrees C, insulating curing blankets or other suitable material shall be placed on the concrete pavement and weighted to prevent movement. Curing to continue until the cumulative number of days, or fraction thereof, during which the temperature of the concrete is above 10 degrees C, has totalled a minimum of 7 days. Alternatively, if compressive tests of cylinders cured under field conditions achieve at least 70% of the specified compressive strength, curing may be discontinued.

.15 Concrete pavement placed in cool weather shall experience a minimum of 30 day air-drying period, following final curing, before first application of de-icing salts.

3.9 CONSOLIDATION

.1 When internal vibrators are used:

.1 For slab depths up to 50 mm, mount vibrators parallel to base at mid depth. For slab depths greater than 50 mm, mount vibrators with tips minimum 50 mm above base and tops minimum 50 mm beneath pavement surface.

.2 Operate at manufacturer's recommended number of vibrations and specifications.

.2 When surface vibrators are used:

.1 Synchronize units on each individual screed or pan.

.2 Operate at minimum of 3,500 vibrations per minute and minimum amplitude of 0.4 mm.

.3 Treat each pavement section to at least 2 passes of vibratory equipment unless otherwise directed by Consultant.

.3 Stop vibrators when paver stops.

.4 Use hand operated vibrator on odd shaped slabs inaccessible to frame mounted units. Do not operate vibrator in one location longer than 5 seconds.

.5 Ensure concrete adjacent to edge forms or previously constructed slabs is thoroughly vibrated.

3.10 FINISHING

.1 After consolidation by vibration, finish with equipment approved by Consultant.

.2 When striking off concrete surface, maintain uniform roll of concrete ahead of first screed for its full length when finishing machine is on first pass.

.3 Make 2 passes with transverse finishing machine.

.4 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

.5 Hand finish areas inaccessible to finishing machines to same quality and surface characteristics as machine finished surfaces.

.6 Finish concrete surface with approved float at proper time. Operate from edge to edge with wiping motion while advancing, with each succeeding pass overlapping previous one.

.7 Check surface with approved 3.5 m long straightedge. Correct irregularities exceeding 5 mm before concrete takes initial set.

.8 Finish edges of slabs with edging tool to form smooth squared surface. Do not patch with cement paste.

3.11 SURFACE TEXTURING

.1 Commence texturing immediately after float finishing and after tooling of joints and edges of slabs.

.2 Use stiff bristled broom to produce nonslip concrete surface finish approved by Consultant, with fine granular texture free from disfigurations.

.3 Provide surface texture by transverse wire comb leaving grooves in surface of plastic concrete as per American Concrete Pavement Association publications.

.4 Provide transverse surface texture by self-propelled machine specifically designed for purpose, automatically controlled from stringline reference used by paver, to produce an average surface texture as per American Concrete Pavement Association publication - Constructing Smooth Concrete Pavement.

.5 Texturing to be straight, precise and not damaging to pavement edges.

3.12 CURING

.1 Cure for minimum 7 days by one of following methods:

.1 Curing compound:

.1 Apply in two coats with approved spray equipment to form complete and unbroken film on surface of concrete. Mechanically agitate compound before and during use.

.2 For hand application apply first coat immediately after texturing operations, second coat to be applied immediately after first coat in a perpendicular direction.

.3 For machine application curing compound to be applied in accordance with manufacturers' specifications.

.4 Apply second spray in accordance with manufacturer's instructions.

.5 Apply each spray at application rate recommended by manufacturer.

.6 Spray slab edges immediately after removal of forms.

.7 Protect formed or sawed joints from evaporation during curing period.

.8 Respray areas where membrane is damaged during curing period.

.2 Burlap or cotton mats:

.1 As soon as concrete surface has been finished and can bear weight without marking, carefully cover with burlap or cotton mats.

.2 Place mats to overlap each other by 300 mm or more and to overlap concrete slab by 300 mm or more at each side secured by a continuous bank of sand and gravel.

.3 Cover sides and ends of slab with mats as soon as forms are removed.

.4 Thoroughly wet mats before placing them on concrete and keep saturated during curing period with water spray sufficiently fine to avoid damaging concrete surface, avoiding wet/dry cycles.

.3 Sheet material:

.1 Cover slab with waterproof sheet material as soon as concrete has set sufficiently to bear weight without marking, sheet shall be in full contact with concrete surface during curing process.

.2 On leading slabs place sheet material at least 1 m wider than slab and after removal of side form fold down edges of sheet and bank with soil, sand or gravel to prevent air circulation.

.3 Batten down sheet to prevent free access of air.

.4 Keep sheet in place during curing period and promptly repair tears and pinholes.

3.13 PROTECTION

.1 Do not open concrete pavement to traffic or construction equipment until approved by Consultant.

.2 When placing concrete in lanes adjacent to existing concrete, operate placing equipment on rubber wheels or pads to prevent damage to existing surface.

3.14 TOLERANCES

.1 Finished concrete surface to be within 5 mm of design grade but not uniformly high or low.

.2 Finished concrete surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

.3 Horizontal deviations of slab edge from alignment of pavement not to exceed 10 mm.

3.15 JOINTS

.1 General:

.1 Construct joints plumb, straight and square to details indicated.

.2 Transverse joints to coincide with those in adjacent pavement unless indicated or directed otherwise.

.3 Install preformed joint filler at locations and to details indicated.

.4 Install isolation joints around structures and features that project through, into or against pavement.

.2 For sawn joints.

.1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of Consultant.

.2 Saw joints using approved equipment and methods to produce joint dimensions indicated.

.3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.

.4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.

.5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.

.6 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.

.7 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.

.8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

.9 Immediately on completion of sawing, flush joints with water to remove laitance.

.3 Sealing:

.1 Seal joints before allowing vehicular traffic on new pavement.

.2 Provide Consultant with copy of sealant manufacturer's instructions for application. Have sealant manufacturer's representative on site during initial 3 days of sealing operation.

.3 Just prior to sealing joint, clean with compressed air or flush with high pressure water to remove laitance, curing compound and protrusions of hardened concrete. Clean and dry by compressed air and vacuum to remove loose and foreign material.

.4 Do not apply joint sealant in rainy weather or when ambient temperature is less than 5 degrees C.

.5 Insert approved filler and bond breaking material in joint prior to applying sealant, then fill joint from bottom up with sealant to avoid trapping air.

.6 Prepare sealant for application using equipment and methods approved by Consultant.

.7 Apply sealant strictly in accordance with manufacturer's recommendations with special attention to temperature ranges for safe heating and for application of hot poured sealants and cleanliness of concrete to be bonded.

.8 On completion of first application of sealant, return and top up any underfilled areas.

.9 Replace sealant which fails to bond to concrete or fails to cure properly, as approved by Consultant.

3.16 DEFECTIVE CONCRETE

.1 Concrete is defective when:

.1 It contains: honeycombing, embedded debris, uncontrolled shrinkage cracking, or other surface defects.

.2 It is damaged by freezing.

.3 It is placed at too high temperature.

.4 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.

.5 Any 28 day strength test result is more than 3.5 MPa below the specified minimum 28 day strength.

.6 Standard deviation of 28 day strength test results exceeds CSA A23.1/A23.2 clause 17.6.7.1 requirements.

3.17 REPAIR/RESTORATION

.1 Repair of defective concrete work:

.1 Where defective concrete is identified by Consultant during plastic condition, repair using methods approved by Consultant.

.2 Grind off high surface variations to the approval of Consultant.

.2 Remove and replace defective concrete where directed by Consultant.

.1 Remove minimum 3 m of pavement by sawing through concrete across full lane width.

.2 Replace with new concrete to this specification.

.3 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.

.4 Install new reinforcement dowel bars and tie bars between old and new concrete as indicated.

3.18 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

.1 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 00 - Cleaning.

3.19 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving has properly cured and joints have been sealed.

END OF SECTION

Section 32 15 40
Crushed Stone Surfacing

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM D4318-05, Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

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

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Access: allow access to building at all times.

.2 Scheduling: co-ordinate paving schedule to minimize interference with normal use of premises.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 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 Store crushed stone as and where approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Granular base:

.1 Crushed stone or gravel: hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 , CAN/CGSB-8.2.

.3 Table:

.1

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 D4318 maximum 25

.5 Plasticity index: ASTM D4318 maximum 6

.2 Granular topping:

.1 Screenings: hard, durable, crushed stone particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117.

.1

Sieve Designation	% 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

3.1 SUBGRADE

.1 Ensure subgrade preparation conforms to levels and compaction required, to allow for installation of granular base.

3.2 GEOTEXTILE FILTER

.1 Install geotextile filter as indicated.

3.3 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.

.1 Compact layer to 100 % Standard Density in accordance with ASTM D698

3.4 GRANULAR BASE

.1 Granular base material thickness: 150 mm minimum 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 100 % Standard Density in accordance with ASTM D698

3.5 GRANULAR TOPPING

.1 Place granular topping to compacted thickness as indicated minimum.

.2 Place material in uniform layers not to exceed 50 mm compacted thickness.

.1 Compact layer to 100 % Standard Density in accordance with ASTM D698

3.6 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 by Contractor.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

.1 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 00 - Cleaning.

3.8 PROTECTION

.1 Prevent damage to buildings, columbaria, landscaping, curbs, sidewalks, trees, fences, roads and adjacent property.

.1 Repair damages incurred.

.2 Provide access to building at all times. Co-ordinate paving schedule to minimize interference with normal use of premises.

END OF SECTION

Section 32 31 13
Chain-Link Fences and Gates

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM A53/A53M-22, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

.2 ASTM A90/A90M-21, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

.3 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating

.2 CAN/CGSB-138.2-19, Steel Framework for Chain Link Fence

.3 CAN/CGSB-138.3-19, Installation of Chain Link Fence

.3 CSA Group (CSA):

.1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CSA A3000-18, Cementitious Materials Compendium

.4 The Master Painters Institute (MPI):

.1 Architectural Painting Specification Manual, current edition

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, product literature and data sheets for concrete mixes, fence fabric, posts, and gates. Include product characteristics, performance criteria, metal thickness, finishes, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Perform in accordance with Section 01 61 00 - Common Product Requirements.

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

Part 2 Products

2.1 MATERIALS

.1 Concrete Materials: In accordance with CSA A23.1/CSA A23.2.

.1 Coarse aggregate nominal size: 20-5.

.2 Compressive strength: Minimum 20 MPa at 28 days.

.2 Posts, Braces, and Rails: To CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated on Drawings.

.3 Top and Bottom Tension Wire: To CAN/CGSB-138.2, single strand, vinyl coated steel wire.

.4 Tie Wire Fasteners: Steel wire, vinyl coated.

.5 Tension Bar: To ASTM A653/A653M, minimum 5-mm x 20-mm vinyl coated steel.

.6 Privacy Fence Slats: Slat size 28mm wide, to be compatible with 50mm chain link mesh, colour: Black. Install as per manufacturer's instructions along entire fence length.

.7 Fittings and Hardware: To CAN/CGSB-138.2, galvanized steel.

.1 Tension bar bands: Minimum 3-mm x 20-mm galvanized steel or minimum 5-mm x 20-mm aluminum.

.2 Post caps to:

.1 provide waterproof fit,

.2 fasten securely over posts, and

.3 carry top rail.

.3 Overhang tops to:

.1 provide waterproof fit,

.2 hold top rails, and

.8 Organic Zinc-Rich Coating: To CAN/CGSB-1.181 .

2.2 FINISHES

.1 Vinyl Coating: To ASTM F1664.

.1 Minimum 0.045-mm dry film thickness.

.2 All fencing components to be painted black.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Perform in accordance with Section 01 71 00 - Examination and Preparation.

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

3.2 PREPARATION

.1 Grading: Remove debris and correct ground undulations along fenceline to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.3 INSTALLATION FENCE

.1 Install fence to CAN/CGSB-138.3, along fencelines indicated on Drawings.

.2 Excavate post holes 600-mm depth x 300-mm diameter.

.1 Excavate end posts 150 mm deeper than line posts.

.3 Space line posts 3 m apart, measured parallel to ground surface.

.4 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 150 m.

.5 Install additional straining posts at sharp changes in grade.

.6 Install corner post where change in alignment exceeds 10 degrees.

.7 Install end posts at end of fence and at buildings.

.8 Place concrete in post holes then embed posts into concrete to depths indicated on Drawings.

.1 Extend concrete 50 mm above ground level. Slope upper concrete surface to drain water away from posts.

.2 Temporarily brace posts in plumb position and true to alignment and elevation until concrete has set.

.9 Allow concrete to cure a minimum of 7 days before beginning installation of fence fabric.

.10 Install overhang tops and caps.

.11 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

3.4 ADJUSTING

.1 Clean and prepare damaged surfaces with wire brush removing loose and cracked coatings, rust, and foreign materials. Prepare damaged surfaces according to paint manufacturer's instructions.

3.5 CLEANING

.1 Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Section 32 91 19.13
Topsoil Placement and Grading

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 22 13 - Rough Grading

1.2 DEFINITIONS

.1 Compost:

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil amendment.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.

.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25), and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category A.

1.3 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada:

.1 The Canadian System of Soil Classification, Third Edition, 1998

.2 Canadian Council of Ministers of the Environment (CCME):

.1 PN1340- 2005, Guidelines for Compost Quality

.3 Canadian Society of Landscape Architects (CSLA)/Canadian Nursery Landscape Association (CNLA):

.1 Canadian Landscape Standard, second edition

.2 Canadian Nursery Stock Standard, 2017

1.4 PAYMENT

.1 Testing of topsoil: Contractor will pay for cost of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Quality control submittals:

.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

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

1.6 QUALITY ASSURANCE

.1 Qualifications: Submit proof of qualifications when requested by Consultant.

.2 Contractor Qualifications:

.1 Landscape Contractor: To be a Member in Good Standing of BC Landscape Nursery Association (BCLNA) and Canadian Nursery Landscape Association.

.2 Landscape Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Softscape Installation designation or equivalent.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused soil amendments from landfill to official hazardous material collections site approved by Consultant.

.2 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

2.1 TOPSOIL

.1 Topsoil for seeded areas: mixture of particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 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.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Coarse vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistency: Friable when moist.

2.2 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertility: Major soil nutrients present in following amounts:

.2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.

.3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.

.4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

.5 Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

.6 pH range of 6.5 to 8.0

.2 Sand: washed coarse silica sand, medium to coarse 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 in accordance with CCME requirements for landfill reclamation and large scale industrial applications.

.5 Limestone:

.1 Ground agricultural limestone.

.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

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

2.3 SOURCE QUALITY CONTROL

.1 Advise Consultant of sources of topsoil to be used with sufficient lead time for testing.

.2 Contractor is responsible for amendments to imported soil(s) as specified.

.3 Conduct soil testing by recognized testing facility for pH, Nitrogen (N), Phosphorous (P), and Potassium (K), and organic matter.

.4 Carry out testing of topsoil by testing laboratory designated by Consultant.

.1 Perform soil sampling, testing and analysis in accordance with applicable Provincial standards.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as approved by Consultant after area has been cleared of stumps, rocks 50 mm and over, invasive and noxious plants and their reproductive parts, brush, weeds and grasses and removed from site.

.2 Strip topsoil to depths as approved by Consultant.

.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as approved by Consultant.

.1 Stockpile height not to exceed 2 m.

.2 Protect stockpile from adverse weather conditions, contamination from invasive plant material, and compaction.

.3 Avoid placing stockpile in low areas where natural drainage or storm water could pond, or erode these materials during inclement weather.

.4 Dispose of unused topsoil in an environmentally responsible manner but do not use as landfill as approved by Consultant.

3.2 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

.1 If discrepancies occur, notify Consultant and do not start work until instructed by Consultant.

.2 Grade soil, eliminate uneven areas and low spots, ensure positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75 mm above surface.

.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Consultant has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Keep topsoil 15 mm below finished grade for sodded areas.

.4 Spread topsoil as indicated to the following minimum depths after settlement.

.1 150 mm for seeded areas.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

.6 Avoid spreading or grading in wet, frozen, or saturated state.

3.4 SOIL AMENDMENTS

.1 For seeded areas: apply and thoroughly mix soil amendments into full specified depth of topsoil at the rates specified by the soil analysis report.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Consultant.

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.6 ACCEPTANCE

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

3.7 SURPLUS MATERIAL

.1 Dispose of surplus materials except not required topsoil where approved by Consultant.

3.8 CLEANING

.1 Proceed with cleaning in accordance with Section 01 74 00 - Cleaning.

.1 Leave Work area organized and tidy at end of each day.

.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

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

.1 Clean and reinstate areas affected by Work.

END OF SECTION

Section 32 92 19.16
Hydraulic Seeding

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19.13 - Topsoil Placement and Grading.

1.2 REFERENCE STANDARDS

.1 Canadian Society of Landscape Architects (CSLA) / Canadian Nursery Landscape Association (CNLA)

.1 Canadian Landscape Standard 2016, First Edition

.2 Canadian Nursery Stock Standard 2017, Ninth Edition

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.

.2 Scheduling:

.1 Schedule hydraulic seeding to coincide with preparation of soil surface.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.

.3 Submit in writing 14 days before work starts:

.1 Volume capacity of hydraulic seeder in litres.

.2 Amount of material to be used per tank based on volume.

.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

.4 Samples:

.1 Submit 0.5 kg container of each type of fertilizer used.

.5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant.

.2 Contractor Qualifications:

.1 Landscape Contractor: to be a Member in Good Standing of BC Landscape Nursery Association (BCLNA) and Canadian Nursery Landscape Association.

.2 Landscape Planting Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Softscape Installation designation or equivalent.

.3 Landscape Maintenance Supervisor: Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Turf Maintenance designation or equivalent.

1.6 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:

.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.

.2 Inoculant containers to be tagged with expiry date.

.3 Storage and Handling Requirements:

.1 Store fertilizer off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

1.7 WARRANTY

.1 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.

.2 End-of-warranty inspection will be conducted by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

.1 Mixture composition:

.1 15% Quatro Sheep's Fescue.

.2 15% Hard Fescue.

.3 10% Chantilly Creeping Red Fescue.

.4 20 % Creeping Red Fescue.

.5 20 % Longefellow 3 Chewing's Fescue

.6 20 % Gator Cinco Perennial Ryegrass

.2 Mulch: Rainier Fiber Plus Tacifier supplied by Premier Pacific Seeds or approved equivalent specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:

.1 Made from wood cellulose fibre.

.2 Organic matter content: 95% plus or minus 0.5%.

.3 Value of pH: 6.0.

.4 Potential water absorption: 900%.

.3 Tackifier: water soluble vegetable carbohydrate powder.

.4 Water: free of impurities that would inhibit germination and growth.

.5 Fertilizer: 16-32-8 50% N-Dure Slow release fertilizer supplied by Premier Pacific Seeds or approved equivalent.

.1 To Canada "Fertilizers Act" and Regulations.

.2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.

.3 Soil testing is to be performed to determine ideal fertilizer use.

.6 Inoculants: inoculant containers to be tagged with expiry date.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PROTECTION OF EXISTING CONDITIONS

.1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.

.2 Immediately remove any material sprayed where not intended as directed by Consultant.

3.3 PREPARATION OF SURFACES

.1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.2 Fine grade areas to be seeded free of humps and hollows.

.1 Ensure areas are free of deleterious and refuse materials.

.3 Cultivated areas identified as requiring cultivation to depth of 25 mm.

.4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.5 Obtain Consultant's approval of grade and topsoil depth before starting to seed.

3.4 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Consultant. 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 materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.5 SLURRY APPLICATION

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 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.

.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.

.4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

.2 Slurry mixture applied per hectare.

.1 Seed: grass mixture, Low Maintenance Mix supplied by Premier Pacific Seeds or approved equivalent, 140 to 270 kg.

.2 Mulch: Rainier Fiber Plus Tacifier supplied by Premier Pacific Seeds or approved equivalent, 2050 kg.

.3 Water: Minimum 30,000 L.

.4 Fertilizer: 30 kg, ratio 16-32-8 50% N-Dure slow release fertilizer.

.3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

.1 Using correct nozzle for application.

.2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 305 mm into adjacent grass areas or sodded areas to form uniform surfaces.

.5 Re-apply where application is not uniform.

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

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.1 Clean and reinstate areas affected by Work.

3.7 PROTECTION

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

.2 Remove protection devices as directed by Consultant.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

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

.2 Grass Mixture:

.1 Repair and reseed dead or bare spots to allow establishment of seed before acceptance.

.2 Mow grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Consultant.

.3 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 it well.

.4 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.

.5 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.9 ACCEPTANCE

.1 Seeded areas will be accepted by Consultant provided that:

.1 Seeded areas are free of rutted, eroded, bare or dead spots.

.2 Areas have been mown at least twice.

.3 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.

3.10 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Repair and reseed dead or bare spots to satisfaction of Consultant.

.2 Mow areas seeded, remove clippings that will smother grassed areas, as directed by Consultant, and in accordance with following schedule:

.1

Seed Mixture	Frequency	Requirements for Cutting	Height of Cut
Low Maintenance Mix by Premier Pacific Seeds	1 - 2 times monthly	----------	1/3 the height of grass per mowing

.3 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 well.

3.11 CLOSEOUT ACTIVITIES

.1 Submit seeded areas maintenance reports for review by Consultant.

END OF SECTION

Specification created using NBS Chorus