Public Works and Government Services Canada

Requisition No. EZ899-211983

DRAWINGS & SPECIFICATIONS
for

CSC Perimeter Fence Upgrades
Various locations, BC

Project No.: R.071529.001

November 2020

APPROVED BY:

Digitally signed by: Burger, Mark
DN: CN = Burger, Mark C = CA O = GC OU = PWGSC-TPSGC
Date: 2021.02.24 13:48:59 -08'00'

Regional Manager, AES — Date

Chris Patterson
Digitally signed by Chris Patterson
Date: 2020.07.24 11:23:25 -07'00'

Construction Safety Coordinator — Date

TENDER: tang, tony
Digitally signed by: tang, tony
DN: CN = tang, tony C = CA O = GC OU = PWGSC-TPSGC
Date: 2020.11.09 07:59:52 -08'00'

Project Manager — Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
Room 219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9

INDEX

INDEX

LIST OF DRAWINGS - Bound Separately

Structural

000	Title Sheet and Drawing List
001	Gate Schedule & General Notes
002	Key Plans - Kent, Mission & Mountain Institutions
003	Key Plans - Matsqui & Pacific Institutions
201	Structural General Notes
202	Structural Typical Details
601	Typical Single and Double Gate Details
602	Typical Gate Details
603	Typical Gate Elevations
604	Typical Vehicle//Emergency Swing Gate Photos (Reference only)
605	Typical Temporary Security Fencing Plans
606	Typical Temporary Inner & Outer Security Fence General Notes and Elevations
607	Typical Perimeter Fence & Temporary Security Inner & Outer Fencing Sections
KT-101	Kent Institution Gate 1 & 2 - Overall Demolition & New Plans & Photos
KT-102	Kent Institution Gate 4 - Demolition & New Plans & Photos
KT-S201	Kent Institution Gate 1 Plan & Details
KT-S202	Kent Institution Gate 2 Plan & Details
KT-S203	Kent Institution Gate 4 Plan & Details
MO-101	Mountain Institution Gate 7 - Demolition & New Plans & Photos
MO-102	Mountain Institution Gate 8 - Demolition & New Plans & Photos
MO-103	Mountain Institution Gate 9 & 10 - Photos & Key Plan
MO-104	Mountain Institution Gate 9 & 10 - Demolition & New Plans & Photo
MO-S201	Mountain Institution Gate 7 Plan & Details
MO-S202	Mountain Institution Gate 8 Plan & Details
MO-S203	Mountain Institution Gate 9 Plan & Details
MO-S204	Mountain Institution Gate 10 Plan & Details

Electrical

Civil

END OF INDEX

ARCHITECT AND ENGINEERS – SEAL & SIGNATURE

Seal / Signature / Date	Seal / Signature / Date
Structural Engineer PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA L. K. S. LAM 2020-11-06	Electrical Engineer PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA G. P. ROBERTSHAW 2020-11-06
..... __/__/____	..... __/__/____
Civil Engineer PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA S. J. VERKAIK #40608 2020-11-06	
..... __/__/____	..... __/__/____
..... __/__/____	..... __/__/____

END

1 SUMMARY OF WORK

.1 Work covered by Contract Documents:

.1 Work under this Contract comprises phased construction of new custom fabricated security gates and framework including new concrete foundations, installation of supplied components; demolition and removal work; reconfiguration of fencing, security systems; civil work and remedial work as directed, for various CSC Correctional Institutions located at:

.1 Kent and Mountain Institutions, 4732 Cemetery Road in Agassiz, BC.

.2 Mission Medium Institution, 8751 Stave Lake Street in Mission, BC.

.3 Matsqui and Pacific Institutions, 33344 King Road in Abbotsford, BC.

.2 Work includes:

.1 Deconstruction of existing gates, adjoining fencing and inner perimeter anti- tunneling wall to accommodate the new gates and foundations.

.2 Installation of supplied Cremone lock hardware for new gates and modifying Cremone locking rods to accommodate the various gate heights. See Section 05 50 00.

.3 Installation of supplied crash barriers on new concrete foundations,

.4 Modifications to existing security fences as indicated.

.5 Remove/extend/modify perimeter security systems (FDS)(PIDS-PA), from existing inner perimeter fence line to inner temporary security fencing:

.1 Re-establish security systems to new inner perimeter gates and adjoining altered fencing.

.2 Maintain integrity of fence security systems during construction period.

.6 Provide temporary security fencing with locking gates where new security gates are under construction as indicated:

.1 Temporary security fencing to form a secure work area at new gates complete with anti-tunneling barrier.

.2 At inner perimeter fence line extend FDS security systems to maintain integrity of Security systems during construction. See above paragraph 1.1.2.5.

.7 Provide temporary construction fencing and gates, before removal of existing gates. Remove temporary gates and fencing after new fencing and security systems are in place and tested.

.8 Civil work including new paving and landscaping, to commence after new security gates/fencing, security systems are completed and approved, as indicated.

.2 Work not covered by Contract Documents includes:

.1 Supply of Cremone Bolt Sets for new security gates.

.1 Ten (10) double gate Cremone Lock sets and five (5) single gate Cremone Lock sets supplied by the Departmental Representative.

.2 Supply of gate hinges:

.1 Only ten (10) gate hinges will be supplied by Departmental Representative. Provide the required remaining hinges under this Contract as specified in Section 05 50 00.

.3 Supply of four (4) Crash Barriers. (New concrete foundations for supplied crash barriers are included in Contract, including installation of crash barriers.)

.4 Supply of miscellaneous fence components

.1 762 mm ö coiled security fence topping (Razor Ribbon). New additional Security Topping specified in Section 32 31 13 - Chain Link Security Fencing and Gates.

.3 Contractor's Use of Premises:

.1 Contractor has use of immediate work areas, within temporary construction fencing for performance of Work and limited storage space for materials.

.2 Obtain and pay for use of additional storage or work areas needed for operations under this Contract. Make arrangements with Departmental Representative for additional storage area at each institution.

.3 Motion Detection Systems (MDS) sectors at construction areas to be "masked off" by Institution security during Work hours and reinstated at the end of each work shift. Coordinate work times with Departmental Representative.

.4 Products Supplied by Departmental Representative (noted in clause1.2):

.1 Departmental Representative responsibilities:

.1 Supply of manufacturer's instructions and certificates to Contractor.

.2 Delivery of supplied materials to each Institution.

.3 Inspect components jointly with Contractor.

.4 Arrange for replacement of damaged, defective or missing items.

.5 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:

.1 Receive components from designated storage at each Institution and move to each work site.

.2 Inspect components jointly with Departmental Representative; record missing, and damaged or defective items.

.3 Handle products at site, including uncrating.

.4 Protect products from damage and from exposure to elements.

.5 Assemble, install, connect, adjust, and finish products.

.6 Arrange for installation inspections by Departmental Representative.

.7 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

.5 Documents Required:

.1 Maintain at job site, one copy 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.

2 WORK RESTRICTIONS

.1 Notify, Departmental Representative of intended Work in each area and provide schedule for review. Notify Departmental Representative 48 hours in advance of changes to schedule throughout course of work.

.2 Complete construction of temporary security fence enclosures with padlocked gates in accordance with para 1.1.2.6, prior to start of Work at each work site. Padlocks supplied by Departmental Representative.

.3 Security Requirements: refer to Section 01 14 10 - Security requirements.

.4 Hours of work:

.1 Perform work during normal working hours at each site (0730 to 1600), Monday through Friday except holidays.

.2 Work may be performed after normal working hours of Institution, Monday through Friday, on weekends and holidays, with a minimum forty-eight (48) hours advance notice and approval of the Departmental Representative.

.3 Provide Work schedule for prior approval of Departmental Representative.

.4 Allow for delays due to security protocol when work interferes with Institution security operations.

.5 Access into Institution:

.1 Vehicular access through the Principal Entrance will be restricted during the inmate “count” at breakfast, lunch and dinner hours. Confirm times with Departmental Representative. Delays may occur when entering and exiting the Institution with vehicles due to security situations and heavy traffic.

.2 A construction escort will be provided by the Departmental Representative at no cost to the Contract when Workers require access to Work areas inside Institution. Notify Departmental Representative minimum 24 hours in advance of when Construction Escort is required.

.3 Prior to construction of perimeter gates at each institution, a security protocol will be set up in liaison with the Departmental Representative and CSC security staff, to permit the contractor direct access to work areas through the temporary security construction fence via locked access gates.

.4 All workers must follow current “sign-in” protocol at Principal Entrance prior to moving to fenced work areas.

3 CONSTRUCTION WORK SCHEDULE

.1 Commence work immediately upon official notification of acceptance of offer and complete the work within ninety-six (96) weeks from the date of such notification.

.2 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are the essence of this Contract.

.3 Submittals:

.1 Submit to Departmental Representative within ten (10) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of construction progress. Phase 1 to 5 may be revised by Departmental Representative due to extensive contract work by other contractors at some institutions.

.2 Provide a detailed work plan including a project schedule showing phasing of work for each site location. Each institution site represents one phase. Proposed phasing schedule:

.1 Phase 1 - Kent Institution. (Complete Mockup of Gate #2 prior to starting all remaining Work)

.2 Phase 2 -Mountain Institution.

.3 Phase 3 - Mission Institution.

.4 Phase 4 - Matsqui Institution.

.5 Phase 5 - Pacific Institution.

.6 Complete Civil Work immediately following each phase. Civil Work will not impede start of next phase.

.3 Departmental Representative will review schedule and return one copy.

.4 Re-submit two (2) copies of finalized schedule to Departmental Representative within five (5) working days after return of reviewed preliminary copy.

.4 Project Scheduling:

.1 Update Project Schedule on two week basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.3 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.4 Security protocol related delays with their remedial measures will be discussed and negotiated.

.5 Before submitting first progress claim submit breakdown of Contract price in detail corresponding with specified phases, as directed by Departmental Representative and aggregating contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments.

4 SUBMITTAL PROCEDURES

.1 Administrative:

.1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work.

.2 Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.3 Do not proceed with work affected by submittal, until review is complete.

.4 Present shop drawings in SI Metric units.

.5 Where items or information is not produced in SI Metric units converted values are acceptable.

.6 Review submittals prior to submission to Departmental Representative . This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

.7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.8 Verify field measurements and affected adjacent Work are coordinated.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.

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

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

.2 Shop Drawings:

.1 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.2 Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

.3 Submit drawings, for structurally designed components, stamped and signed by professional engineer registered or licensed in British Columbia.

.3 Product Data:

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

.2 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.

.4 Samples:

.1 Submit samples in sizes and quantities specified.

.2 Where colour is criterion, submit full range of colours.

.3 Submit all samples as soon as possible after the contract is awarded, to facilitate production of complete colour scheme by the Departmental Representative.

.5 Mock-up:

.1 Erect mock-up of Phase 1 double Gate #2 in accordance with Clause 8- Quality Control.

.6 Submission Requirements:

.1 Schedule submissions at least ten days before dates reviewed submissions will be needed.

.2 Accompany submissions with transmittal letter in duplicate.

.3 Submit either five bond copies or one (1) electronic pdf file of each shop drawing and product data as directed by Departmental Representative.

.7 Coordination of Submissions:

.1 Review shop drawings, product data and samples prior to submission.

.2 Coordinate with field construction criteria.

.3 Verify catalogue numbers and similar data.

.4 Coordinate each submittal with requirements of the work of all trades and contract documents.

.5 Responsibility for errors and omissions in submittals is not relieved by Departmental Representative's review of submittals.

.6 Responsibility for deviations in submittals from requirements of Contract documents is not relieved by Departmental Representative's review of submittals unless Departmental Representative gives written acceptance of specified deviations.

.7 Notify Departmental Representative, in writing at time of submission, of deviations in

.8 submittals from requirements of Contract documents.

.9 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and re-submit as directed by Departmental Representative.

.10 After Departmental Representative's review, distribute copies.

.11 Shop Drawings Review:

.1 Review of shop drawings by Public Services and Procurement Canada (PSPC) is for the sole purpose of ascertaining conformance with the general concept.

.2 The Departmental Representative’s review does not mean that PSPC approves the detail design inherent in the shop drawings, responsibility remains with the contractor submitting same, and such review will not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents.

.3 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co-ordination of the work of all subtrades.

5 HEALTH AND SAFETY

.1 Specified in Section 01 35 33 - Health and Safety Requirements.

6 ENVIRONMENTAL PROCEDURES

.1 Fires and burning of rubbish on site not permitted.

.2 Do not bury rubbish and waste materials on site.

.3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary systems.

.4 Under no circumstances dispose of rubbish or waste materials on property or CSC waste bins.

7 REGULATORY REQUIREMENTS

.1 References and Codes:

.1 Perform Work in accordance with National Building Code of Canada (NBCC2015) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

8 QUALITY CONTROL

.1 Inspection:

.1 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.2 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.3 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative will pay cost of examination and replacement.

.2 Independent Inspection Agencies:

.1 Provide independent Inspection/Testing Agencies for purpose of inspecting and/or testing portions of Work as specified in relevant sections. Cost of such services will form a part of the Contract.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no extra cost to Contract. Pay costs for retesting and reinspection.

.3 Procedures:

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labor and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

.4 Rejected Work:

.1 Remove defective Work, whether as a result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other contractor's work damaged by such removals or replacements, promptly.

.5 Reports:

.1 Submit (4) four copies or one electronic pdf copy of inspection and test reports to Departmental Representative.

.6 Tests and Mix Designs:

.1 Furnish test results and mix designs as may be requested.

.7 Mill Tests:

.1 Submit mill test certificates as requested and as required of specification Sections.

.8 Mock-up:

.1 Erect one new double gate in Phase 1 as a mockup. Double gate must be completed, inspected and signed-off by Departmental Representative (excluding landscaping and paving) prior to start of any other gates.

.2 Prepare mock-up for Work specifically requested in specifications and on drawings. Include for Work of all Sections required to provide mock-up.

.3 Prepare mock-up for Departmental Representative' review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-up in ample time is not considered sufficient reason for an extension of Contract Time.

.5 It is intended the mock-up gate will remain as part of the Work provided the completed Work meets all requirements specified and shown on drawings or amendments, as approved by the Departmental Representative. (Schedule Civil Work for completion at end of each phase. Work will not delay start of next phase).

9 TEMPORARY UTILITIES

.1 Temporary Power and Light:

.1 Provide temporary electrical power at existing site for construction purposes.

.2 Temporary Communication Facilities:

.1 Conform to Section 01 14 10 Security Requirements for use of cell phones inside institution.

.3 Fire Protection:

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

10 CONSTRUCTION FACILITIES

.1 Site Storage/Loading:

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

.2 Construction Parking:

.1 Parking space outside double fence and temporary parking for delivery vehicles at the construction site is available as directed by the Departmental Representative. Remove vehicles as directed.

.3 Equipment, Tools and Material Storage:

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials, not required to be stored in weatherproof sheds, on site in a manner to cause least interference with work activities and Institution security operations.

.4 Sanitary Facilities:

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances. Maintain washroom facilities in clean condition.

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

.5 Hoisting:

.1 Provide, operate and maintain cranes required for moving of materials and equipment.

.2 Cranes to be operated by qualified operator.

.6 Construction Signs:

.1 Format, location and quantity of site signs and notices to be approved by Departmental Representative.

.2 Signs and notices for safety or instruction to be in English language, or commonly understood graphic symbols.

.3 Maintain signboards, signs and notices for duration of project. Remove and dispose of signs off site when directed by Departmental Representative.

.4 Remove signs from site at completion of project or as directed by Departmental Representative.

11 TEMPORARY BARRIERS AND ENCLOSURES

.1 Installation and Removal:

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Confirm with Departmental Representative locations and installation schedule three days prior to installation.

.3 Be responsible for damage incurred due to lack of or improper protection.

.2 Fire Routes:

.1 Maintain access to property, through emergency vehicle gates during construction, including overhead clearances, for use by emergency response vehicles.

.3 Temporary Protection:

.1 Open excavations:

.1 Cover open excavations with steel plates at the end of each Work shifts to permit passage of emergency vehicular traffic during construction, until foundations have cured and backfilled. Design steel plate covers to support intended loads of fire truck.

.2 Be responsible for damage to Work due to failure in providing adequate protection during construction.

.4 Inner and Outer Temporary Security Fencing and Gates:

.1 Provide temporary 3.6 m nominal height security fencing with locking gates at all new emergency gates under construction as indicated. Gate opening minimum 3.6 m clear width. Construct fencing and gates specified in Section 32 31 13 - Chain Link Security Fencing.

.2 Provide Inner temporary security fencing and gates with Fence Detection System (FDS) as indicated. Remove Security systems from Temporary security fencing upon completion of new security gates and fencing as indicated.

12 COMMON PRODUCT REQUIREMENTS

.1 Reference Standards:

.1 If there is a question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.2 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in the event of non-conformance.

.3 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.2 Quality:

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

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

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

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

.3 Storage, Handling and Protection:

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

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

.4 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative .

.5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

.4 Transportation:

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

.5 Manufacturer’s Instructions:

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in price to Contract.

.6 Quality of Work:

.1 Ensure Quality of Work is of specified standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

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

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

.7 Co-ordination:

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

.8 Concealment:

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

.9 Remedial Work:

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

.10 Fastenings:

.1 Provide metal trim and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

.11 Protection of Work in Progress:

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

13 EXECUTION REQUIREMENTS

.1 Preparation:

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.2 Execution:

.1 Execute cutting, fitting, and patching, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.6 Employ experienced installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.7 Restore work with new products in accordance with requirements of Contract Documents.

.8 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

14 REMEDIAL WORK

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

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

15 CLEANING

.1 Project Cleanliness:

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

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

.3 Provide on-site containers for collection of waste materials and debris.

.4 Provide and use clearly marked separate bins for recycling. Refer to-Construction/Demolition Waste Management and Disposal.

.5 Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finishing operations.

.6 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.7 Provide adequate ventilation during use of volatile or noxious substances.

.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate adjoining components.

.2 Final Cleaning:

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products from site.

.5 Rake clean work areas.

.6 Cleaning required in exterior areas as a result of Work of this Contract.

.1 Broom clean exterior surfaces; rake clean other surfaces of grounds.

.2 Remove debris and other disfiguration from exterior surfaces as a result of Work.

.3 Sweep clean paved areas used during work of this contract.

.4 Remove discarded metal items, fasteners etc. from site work areas using magnetic pick-up tool or metal detectors.

16 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

.1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste. Separate non-salvageable materials from salvaged items. Handle removed materials not being reused, salvaged, or recycled in accordance with appropriate regulations and codes. Transport and deliver non-salvageable items to licensed disposal facility.

.1 Collect and salvage steel from construction waste and demolition for reuse and recycling.

.2 Collect and salvage wood waste for recycling and/or disposal.

.3 Collect excavated granular and organic material from construction waste and deliver to designated area at each site.

.4 Collect asphalt and concrete material from construction/demolition waste and deliver to recycling facility.

.2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.

.3 Collect, handle, store on-site and transport off-site, salvaged materials in separate containers. Transport to approved and authorized recycling facilities and/or users of material for recycling.

.4 Locate waste and salvage bins on site as directed by Departmental Representative.

17 CLOSEOUT PROCEDURES

.1 Inspection and Declaration:

.1 Contractor's Inspection: Conduct an inspection of Work with all subcontractors, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.2 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.3 Request Departmental Representative's Inspection.

.2 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct deficient Work accordingly.

.3 Substantial Completion (issued at completion of each phase): submit written certificate that the following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and components have been tested, adjusted and are fully operational. Operation of equipment have been demonstrated to Department's personnel.

.4 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

18 CLOSEOUT SUBMITTALS

.1 Record Drawings:

.1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur. At completion supply:

.1 Four (4) sets of printed as-built drawings following review.

.2 Submit one copy of marked up as-built drawings to Departmental Representative.

.3 Retain original logo and title block on the as-built drawings. Contractor may place on the upper right-hand title block area a small company logo, the text "AS- BUILT" and the date.

.2 Maintenance manual:

.1 On completion of project submit to Departmental Representative four paper (in loose leaf type binder) of Operations and Maintenance Manual, made up as follows:

.1 Provide maintenance manual, with as-built drawings, in O&M manual, page size images and page size drawings. Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

.2 Organize files into CSI Masterformat numbering system or other approved descriptive titles.

.3 Label binder "Operation and Maintenance Data", project name, date, names of Contractor, subcontractors, consultants and subconsultants.

.4 Include guarantees, diagrams and drawings.

.5 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labeled tabs.

.6 Drawings and manufacturer's literature must be legible.

19 ARCHAEOLOGICAL REMAINS

.1 If archaeological biological resources not previously known to be onsite are unearthed during construction, notify Departmental Representative of findings and proceed as directed.

END OF SECTION

1 PURPOSE

.1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

2 DEFINITIONS

.1 "Contraband" means:

.1 an intoxicant, including alcoholic beverages, drugs and narcotics.

.2 a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,

.3 an explosive or a bomb or a component thereof,

.4 currency over any applicable prescribed limit, $25.00, and

.5 any item not described in paragraphs (.1 to .4) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.

.2 “Unauthorized smoking and related Items” means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director, Warden or Superintendent of the Institution as applicable.

.6 "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

.7 "Departmental Representative" means the Public Works and Government Services Canada representative defined in General Conditions.

.8 "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.

.9 "Construction limits" means the area, as indicated in the contract documents, that the contractor will be allowed to work". This area may or may not be isolated from the security area of the institution. Limits to be confirmed at construction start-up meeting.

3 PRELIMINARY PROCEEDINGS

.1 At construction start-up meeting:

.1 Discuss the nature and extent of all activities involved in the Project.

.2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.

.2 The contractors' responsibilities:

.1 Ensure that all construction employees are aware of the security requirements.

.2 Ensure that a copy of the security requirements is always prominently on display at the job site.

.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

4 CONSTRUCTION EMPLOYEES

.1 Submit to the Departmental Representative a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow 10 working days for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at this institution except as approved otherwise.

.3 The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the institution or in an electronic database for identification purposes. The Director may require that these Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked up upon arrival at the Institution and be displayed prominently on the construction employees clothing at all times while employees are in the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:

.1 appear to be under the influence of alcohol, drugs or narcotics.

.2 behave in an unusual or disorderly manner.

.3 are in possession of contraband.

5 VEHICLES

.1 All unattended vehicles on CSC property must have windows closed; fuel caps locked, doors and trunks locked and keys removed. The keys must be securely in the possession of the owner or an employee of the company that owns the vehicle.

.2 The director may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project will require security clearances and must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or PWGSC Construction Escorts while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, the trailer doors must be locked at all times. All windows must be securely locked bars when left unoccupied. Cover all windows with expanded metal mesh. When not in use lock all storage trailers located inside and outside the perimeter.

6 PARKING

.1 The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

7 SHIPMENTS

.1 To avoid confusion with the institution's own shipments, address all shipments of project material, equipment and tools in the Contractor’s name and have a representative on site to receive any deliveries or shipments. CSC or PWGSC staff will **NOT** accept receipt of deliveries or shipments of any material equipment or tools.

8 TELEPHONES

.1 The installation of telephones, facsimile machines and computers with Internet connections is not permitted within the Institution perimeter unless prior approved by the Director.

.2 The Director will ensure that approved telephones, facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, Blackberries, telephone used as 2-way radios are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4 The Director may approve but limit the use of 2-way radios.

9 WORK HOURS

.1 Conform to Division 1.

.2 Work is not permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waved by the Director.

10 OVERTIME WORK

.1 Conform to Division 1.

.2 Provide 48 hours advance notice to Director for all work to be performed after normal working hours of the Institution. Notify Director immediately if emergency work is required, such as to

.3 complete a concrete pour or make the construction site safe and secure.

11 TOOLS AND EQUIPMENT

.1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required by the Institution.

.2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.

.3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.4 Store all tools and equipment in approved secure locations.

.5 Lock all toolboxes when not in use. Keys to remain in the possession of the employees of the contractor. Secure and lock scaffolding when not erected and when erected Secure in a manner agreed upon with the Institution designate.

.6 Report all missing or lost tools or equipment immediately to the Departmental Representative/Director.

.7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:

- .1 At the beginning and conclusion of every workday or shift upon entering and exiting the Institution.
- .2 At any time when contractor is on Institution property.

.8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day. Maintain up to date inventory of all used blades/cartridges.

.9 If propane or natural gas is used for heating the construction, the institution will require that the contractor supervise the construction site during non-working hours.

12 KEYS

.1 Security Hardware Keys.

.1 Arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).

.2 The SMO will provide a receipt to the Contractor for security hardware keys.

.3 Provide a copy of the receipt to the Departmental Representative.

.2 Other Keys

.1 Use standard construction cylinders for locks for his use during the construction period.

.2 Issue instructions to employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.

.3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:

.1 Prepare an operational keying schedule.

.2 Accept the operational keys and cylinders directly from the lock manufacturer.

.3 Arrange for removal and return of the construction cores and install the operational core in all locks.

.4 Upon putting operational security keys into use, the PWGSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the PWGSC construction escort.

13 SECURITY HARDWARE

.1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

14 PRESCRIPTION DRUGS

.1 Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

15 SMOKING RESTRICTIONS

.1 Smoking is not permitted inside correctional facilities or outdoors within the perimeter of a correctional facility and persons must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Persons in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist will be directed to leave the Institution.

.3 Smoking is permitted outside the perimeter of a correctional facility in an area designated by the Director.

16 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.

.2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.

.3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

17 SEARCHES

.1 All vehicles and persons entering institutional property may be subject to search.

.2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband, he may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

18 ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Director.

19 MOVEMENT OF VEHICLES

.1 Escorted commercial vehicles may not be allowed to enter or leave the institution through the vehicle access gate during the regular “inmate count” occurring at breakfast, lunch and dinner hour as established by the Institution. Confirm “count” times with Director or Departmental Representative to reduce down times for deliveries to Institution and movement of contractors vehicles through Institution vehicle access gate.

.2 Construction vehicles will not be allowed to leave the Institution until an inmate count is completed.

.3 The contractor shall advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.4 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or PWGSC construction escorts working under the authority of the Director.

.5 Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.

.6 Vehicles shall be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the institution. Arrange with Director for parking of contractor’s vehicles at minimum security Institutions.

.7 Private vehicles of construction employees will not be allowed within the security wall or fence of medium or maximum security institutions without the permission of the Director.

.8 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.

.9 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.

.2 However, notwithstanding paragraph above, the Director may:

.1 Prohibit or restrict access to any part of the institution.

.2 Require that in certain areas of the institution, either during the entire construction project or at certain intervals, construction employees only be allowed access when accompanied by a member of the CSC security staff.

.3 During the lunch and coffee/health breaks, all employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

21 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

22 STOPPAGE OF WORK

.1 The director may request at any time that the contractor, his employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.

.2 The contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

23 CONTACT WITH INMATES

.1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his security clearance revoked.

.2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

END OF SECTION

1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work minimum one meeting per month and at the call of Departmental Representative, but no more than 2 meetings per month.

.2 Prepare agenda for meetings.

.3 Distribute email notice of each meeting four days in advance of meeting date to Departmental Representative and all participants.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative, meeting participants and affected parties not in attendance.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

.9 Setup a virtual meeting system to use during pandemic restrictions and when travel distances or time management are an issue.

2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 2 days before meeting.

.4 Agenda to include:

- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work: Construction Progress Schedules - Bar (GANTT) Chart.
- .3 Schedule of submission of shop drawings, samples.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.
- .5 Site security: personnel clearances
- .6 Proposed changes, change orders, procedures, approvals required, time extensions, overtime, administrative requirements.
- .7 Owner provided products.
- .8 Record drawings.

.9 Maintenance manuals.

.10 Take-over procedures, acceptance, staged substantial completion.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

3 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule progress meetings monthly and when requested by Departmental Representative.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative, Consultant and] CSC representative are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Review proposed changes for affect on construction schedule and on completion date.

.11 Other business.

END OF SECTION

1 REFERENCES

.1 Government of Canada:

.1 Canada Labour Code - (R.S.C., 1985, c. L-2) Amended on 2020-03-25.

.1 Part II, Occupational Health and Safety.

.2 National Building Code of Canada (NBCC 2015):

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 National Fire Code of Canada (2015):

.1 Part 5, Hazardous Processes and Operations and Division B as applicable.

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

.1 Material Safety Data Sheets (MSDS).

.2 Province of British Columbia:

.1 Workers Compensation Act.

.1 Part 3, Occupational Health & Safety Regulations.

.2 Province of British Columbia Building Code (2018).

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 American National Standards Institute (ANSI):

.1 ANSI/ASSP A10.3 - 2013, Safety Requirements for Powder-Actuated Fastening Systems.

.4 Canadian Standards Association (CSA):

.1 CSA S269.1-16 Falsework and Formwork

.2 CSA 462 - 18 Workplace Electrical Safety Standard.

.3 CSA Z797- 2018 Code of Practice for Access Scaffold.

.4 CSA Z1006 -10 Management of Work in Confined Spaces.

2 RELATED SECTIONS

.1 Section 01 01 50 - General Instructions for; Submittals procedures, Section Temporary utilities, Construction facilities and Temporary barriers and enclosures.

.2 Section 02 81 01 - Hazardous Materials use and Abatement.

.3 Section 02 41 17 - Deconstruction and Removal.

3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

4 COMPLIANCE WITH REGULATIONS

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations

.2 Ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

5 SUBMITTALS

.1 Make submittals in accordance with Section 01 01 50 General Instructions - Submittal clause.

.2 Submit the following:

- .1 Organization’s Health and Safety Plan.
- .2 Site specific Safety Plan (SSSP) or Health and Safety Plan (HASP)
- .3 Copies of reports or directions issued by federal and provincial health and safetyinspectors.
- .4 Copies of incident and accident reports.
- .5 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .6 Emergency Response Procedures.

.3 The Departmental Representative will review the Contractor's Site Specific Safety Plan or Health and Safety Plan (SSSP/HASP) and emergency response procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative for review.

.4 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.5 Submission of the Site Specific safety Plan or Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

- .1 Be construed to imply approval by the Departmental Representative.
- .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
- .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for work under this contract.

.2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

7 HEALTH AND SAFETY COORDINATOR

.1 Assign a competent and qualified Health and Safety Coordinator to do the following:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Safety Plan (SSSP) or Health and Safety Plan (HASP) .

.3 Be on site during execution of work.

.4 Have minimum (2) years site related working experience.

.5 Have working knowledge of the applicable occupational safety and health regulations.

8 GENERAL CONDITIONS

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are restricted from designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site after working hours and ensure all gates are locked in accordance with Section 01 14 10 - Security Requirements.

.3 Conform to the Canadian Construction Association latest COVID 19 protocols.

9 PROJECT/SITE CONDITIONS

.1 Work at site may involve contact with:

.1 Multi-employer work site.

.2 Federal employees.

.3 Energized electrical services.

.4 Working from heights.

.5 Persons incarcerated in the federal institutional system.

.6 Hazards - PSPC Preliminary Hazard Assessment as an Appendix to Specifications.

.7 Contract will involve working in areas where inmates may be present, who are under supervision by CSC staff. Conform to Section 01 14 10 Security Requirements, clause 23 for Contact with Inmates and other security requirements pertaining to a CSC institution.

10 UTILITY CLEARANCES

.1 Be solely responsible for all underground utility detection and clearances prior to starting the work.

.2 Do not rely solely upon the Reference Drawings or other information provided for utility locations.

11 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

12 WORK PERMITS

.1 Obtain specialty permit(s) related to project before start of work.

13 FILING OF NOTICE

.1 File a Notice of Project, with Provincial authorities prior to commencement of work.

.2 Submit copies to the Departmental Representative.

14 SITE SPECIFIC HEALTH AND SAFETY PLAN

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a Site Specific Safety Plan (SSSP) based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.11 COVID 19 protocols and procedures.

.2 Summary of health risks and safety hazards, resulting from analysis of hazard assessment with respect to site tasks and operations, will be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work. Safety Data Sheets required for all products.

.4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Site Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) as required and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Site Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) by Public Works and Government Services Canada (PWGSC) will not relieve the Contractor of responsibility for errors or omissions in final Site Specific Safety Plan (SSSP) and/or Health and Safety Plan (HASP) of responsibility for meeting all requirements of construction and Contract documents and registered requirements.

15 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e., names/telephone numbers) of:

.1 Designated personnel from own company.

.2 Regulatory agencies applicable to work and as per legislated regulations.

.3 Local emergency resources.

.4 Departmental Representative.

.5 A route map with written directions to the nearest hospital or medical clinic.

.2 Include the following provisions in the emergency procedures:

.1 Fire: in all cases of a fire (active or extinguished), initiate the following emergency communication protocol:

.1 Notify the CSC MCCP by radio (via the Construction Escort Officer (CEO)) of the type and particulars of fire emergency and if fire department is required.

.2 CSC MCCP will advise the Contractor (via CEO) if further action is required and/or taken.

.2 Emergency Medical: in all cases where emergency services are requested, initiate the following emergency communication protocol:

.1 Notify the CSC MCCP by radio (via the Construction Escort Officer (CEO)) of the type and particulars of the type and particulars of the incident and if an ambulance has been requested.

.2 CSC MCCP will advise the Contractor (via the CEO) if further action is required and/or taken.

.3 Should an institutional security or emergency situation arise, the CSC MCCP will instruct the contractor and their workers on the direction to take.

.3 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

.1 Work at high angles.

.2 Work in confined spaces or where there is a risk of entrapment.

.3 Work with hazardous substances.

.4 Underground work.

.5 Workplaces where there are persons who require physical assistance to be moved.

16 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS 2015 documents in accordance with Section 01015 General Instructions - Submittals clause.

.3 Use of Asbestos containing materials is prohibitive.

17 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate arc flash protection, required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

18 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a logbook for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

19 OVERLOADING

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

20 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1.

21 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797 - Code of Practice for Access Scaffold and BC Occupational Health and Safety Regulations.

22 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with provincial regulations.

23 POWDER-ACTUATED DEVICES

.1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

24 FIRE SAFETY AND HOT WORK

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

25 FIRE SAFETY REQUIREMENT

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

26 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work immediately stop work and advise the Departmental Representative verbally and in writing.

27 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:

- .1 Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP).
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshaling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plans or site plans. Post in non-inmate access areas.
- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative**.**

28 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

29 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

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

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The Contractor will be responsible for any costs arising from such a "stop work order".

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Methods for removal of existing concrete and asphalt pavement.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Divert unused concrete and asphalt materials from landfill to local facility approved by DCC Representative.

2 Products N/A

3 Execution

3.1 PREPARATION

.1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of concrete and asphalt pavement to be removed.

3.2 PROTECTION

.1 Protect existing concrete and pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.3 REMOVAL

.1 Remove existing concrete and asphalt pavement to lines and grades as indicated.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Prevent contamination of removed concrete and asphalt pavement by topsoil, underlying gravel or other materials.

.4 Provide for suppression of dust generated by removal process.

END OF SECTION

1 General

1.1 SUMMARY

.1 This section specifies general requirements for the use of hydrovac technology for locating of buried utilities.

1.2 RELATED WORK

.1 Section 01 01 50 - General Instructions.

.2 Section 32 12 16 - Asphalt Paving.

.3 Section 32 23 10 - Excavating, Trenching and Backfilling.

.4 Section 32 91 19 - Topsoil Placement and Grading.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of Hydrovac slurry material on Institutional property at the approved disposal site at each Institution, as directed by the Departmental Representative.

.2 Comply with appropriate environmental protection procedure as noted in Section 01 01 50.

2 Products N/A

3 Execution

3.1 REGULATORY REQUIREMENTS

.1 Before commencing work, conduct, with the Departmental Representative, condition survey of existing structures, known underground services, fencing, service poles, wires and paving, survey benchmarks and monuments which may be affected by work.

3.2 ENVIRONMENTAL REQUIRMENTS

.1 Prior to work commencing provide:

.1 The necessary environmental protection for the surrounding area from excessive water/soil spray.

.2 Protection for the storm sewer system adjacent to or downstream of the excavation in the event of an accidental escape or over production of water slurry used in the excavation.

3.3 SAFETY

.1 If the utility excavation is exposed and unmanned, protect the excavation using warning signs to identify the hazard, and:

.1 Cover with steel plate.

.2 Fenced, or

.3 Barricades placed such to create closed perimeter.

3.4 CLEAN UP

.1 Once the utility has been survey located, backfill the excavation with proper material and the surface restored to the original condition or better as per the Section 32 13 16 and Section 32 23 10 respectively.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 Remove selected existing fencing, gate post foundations, concrete / asphalt paving and crash barriers to facilitate the new gates, post frames and crash barriers.

.2 Refer to Section 02 41 13 for Asphalt Paving and Concrete Removal.

1.2 RELATED WORK

.1 Section 01 01 50 - General Instructions: Schedule, summary of work, Hours of work, waste management and safety barriers.

.2 Section 01 14 10 - Security Requirements.

.3 Section 01 35 33 - Health and Safety Requirements.

.4 Section 02 41 13 - Asphalt Paving and Concrete Removal.

.5 02 81 01 Hazardous Materials Use and Abatement.

.6 Section 28 16 00 - Electronic Security Systems.

.7 Section 31 23 10 - Excavating, Trenching and Backfilling

1.3 REGULATORY REQUIREMENTS

.1 Comply with WCB Industrial Health and Safety Regulations and Canada Labour Code, Canada Occupational Safety and Health Regulations.

.2 CSA S350-M1980(R2003), Code of Practice of Safety in Demolition of Structures.

.3 Federal Legislation.

.1 Canadian Environmental Assessment Act (CEAA), 2012, c. 37, amended on2012-07-06.

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

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34, Amendment No. 6 (2008).

.4 WorkSafe BC

.1 British Columbia’s Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work).

.2 “Lead-Containing Paints and Coatings; Preventing Exposure in the Construction Industry” (2017).

.3 “Safe Work Practices for Handling Lead” (2017).

.4 “Developing a Silica Exposure Control Plan” (2014).

1.4 SUBMITTALS

.1 Prior to beginning of Work on site submit detailed Waste Reduction Work Plan in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal and indicate:

.1 Name and address of haulers, waste receiving organizations.

.2 Provide proof of paid dumping fees to local authority having jurisdiction.

1.5 EXISTING CONDITIONS

.1 Take over areas where demolition/removal work is indicated based on the condition at time of examination prior to tendering.

.2 If Hazardous Containing Materials (HCM) are encountered in course of removal work or cutting and boring activities, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative.

.3 The Institution will be operational during work of this Contract. Maintain access around work areas specifically the perimeter road and through existing gates.

1.6 PROTECTION

.1 Prevent movement, settlement or damage of services, adjacent fencing, landscaping and site furnishings, not being removed or altered.

.2 If safety of fencing, components or electrical security systems appears to be compromised during demolition, cease operations and notify Departmental Representative.

1.7 DEFINITIONS

.1 Alternate Disposal: reuse and recycling of materials by designated facility, user or receiving organization which has valid Certificate of Approval to operate. Alternative to landfill disposal.

.2 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.3 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.4 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials, before demolition stage, for resale, reuse to recycle facility or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.5 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.6 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.

1.8 ENVIRONMENTAL PROTECTION

.1 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.

.2 Do not pump water containing suspended materials into watercourses, storm orsanitary sewers, or onto adjacent properties in accordance with authorities having jurisdiction.

.3 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.

.4 Employ reasonable means necessary to protect salvaged materials from vandalism, theft, adverse weather, or inadvertent damage.

.5 Organize staging site and workers in manner which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

2 Products N/A

3 Execution

3.1 SITE VERIFICATION OF CONDITIONS

.1 Employ necessary means to assess site conditions to determine quantity and locations of hazardous materials.

.2 Investigate site to determine dismantling, processing and storage logistics required prior to beginning of Work.

.3 Develop strategy for deconstruction to facilitate optimum salvage of recyclable materials.

.4 Systematically dismantle and remove Gates and fencing components, concrete post foundations, as noted, and dispose of removed material off property in accordance with local authorities having jurisdiction and in accordance with Section 01 01 50 General Instructions for Waste Management and Disposal clause and approved phased construction.

.5 Take precautions to support fencing not being demolished and provide temporary support to prevent collapse. Ensure perimeter fencing is secure at the end of each work shift.

.6 Do Work in accordance with Section 01 35 33 - Health and Safety Requirements.

.7 Refer to Appendix G - Pre-renovation Hazardous Building Materials report for location of paint coatings containing lead within the work site areas and Section 02 81 01 Hazardous Materials Use and Abatement for safe handling of silica during demolition of concrete and steel fence framework with lead containing paint coatings.

3.2 PREPARATION

.1 Notify Departmental Representative prior to commencing work on site.

.2 Ensure electrical security systems are removed or disconnected. Maintain warning signs on electrical security equipment which must remain active to serve other areas during period of demolition.

.3 Shut off active water lines and disconnect sanitary sewer lines and cap lines at excavation areas.

.4 Disconnect, dismantle and remove gates and indicated fencing to facilitate the new arrangement as indicated and to approved schedule.

.5 Repair damage to existing fencing components caused by removal work, as approved by Departmental Representative.

.6 Demolish and remove concrete foundations, pavement at fence posts and crash barriers to facilitate the construction of new fencing, gates and crash barriers. Dispose of removed materials, to appropriate waste management facility in accordance with authority having jurisdiction. Reference Section 02 41 13 - Asphalt Paving and Concrete Removal.

3.3 DISASSEMBLY, SALVAGE AND DISPOSAL

.1 At end of each day's work, leave work in safe and secure condition, clean up and remove debris and materials not being reused.

.2 Materials removed from site are property of Contractor.

.3 Throughout course of deconstruction pay close attention to connections and material assemblies. Employ workmanship procedures which minimize damage to materials and equipment.

.4 Ensure workers and subcontractors are briefed to carry out work in accordance with appropriate deconstruction techniques.

.5 Deconstruct in accordance with CSA S350 and Section 01 35 33, Health and Safety Requirements.

.6 Workers must utilize adequate fall protection in accordance with WorkSafe BC requirements.

.7 Carefully remove security fence topping (coiled razor ribbon), and salvage for reuse in new arrangement except as directed otherwise by Departmental Representative.

.8 Remove crash barriers and move to storage area on property as directed by Departmental Representative.

.9 Remove and store materials to be salvaged for delivery to recycle facility, in manner to prevent damage.

.1 Store and protect in accordance with requirements for maximum preservation of material.

.2 Handle salvaged materials as new materials.

.3 Handle and dispose of steel fence framework with lead containing paint coatings and concrete with silica content in accordance with Section 02 81 01 - Hazardous Materials Use and Abatement.

.10 Remove materials that cannot be salvaged for recycling and dispose of in accordance with applicable codes at licensed facilities.

3.4 PROCESSING

.1 Locate area for processing of materials to eliminate double handling and provide adequate space to maintain efficient material flow.

.2 Keep processing area clean and free of excess debris.

.3 Supply separate, marked disposal bins for categories of waste material and remove from site on a daily basis.

3.5 REMOVAL FROM SITE

.1 Transport material designated for recycling to approved facilities or receiving organizations and in accordance with applicable regulations.

.2 Dispose of materials not designated for recycling and dispose in accordance with applicable regulations.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 01 50 – General Instructions

.2 Section 01 35 33 – Health and Safety Requirements

1.2 REFERENCE

.1 Reports:

.1 DST Consulting Engineers Inc. “Pre-Renovation Hazardous Building Materials Assessment Correctional Services Canada – Pacific Region, Perimeter Fence and Gate Upgrades”, dated October 23, 2020 (herein referred to as the Previous Environmental Report).

.1 Copies of the Previous Report is attached in the Appendix of the Project Specifications.

.2 Definitions:

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Building Material: component of a building or structure that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when altered, disturbed, or removed during maintenance, renovation, or demolition.

.3 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.4 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

.3 Reference Standards:

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

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 SOR/2018-196 Prohibition of Asbestos and Products Containing Asbestos Regulations.

.2 Department of Justice Canada

.1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).

.2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001 286).

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

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council Canada Institute for Research in Construction (NRC-IRC)

.1 National Fire Code of Canada (2015).

.5 WorkSafe BC

.1 British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work)

.2 "Lead-Containing Paints and Coatings; Preventing Exposure in the Construction Industry" (2017).

.3 "Safe Work Practices for Handling Lead" (2017).

.4 "Developing a Silica Exposure Control Plan" (2014).

.6 The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations (COHSR).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data for hazardous materials to be used by the Contractor to complete the Work:

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

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

.3 Submit site specific risk assessment and exposure control planto Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

.4 Construction/Demolition Waste Management:

.1 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating percentage of construction/demolition wastes were recycled or salvaged.

.5 Low-Emitting Materials: submit listing of adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.

1.4 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver, store and handle hazardous materials to be used by the Contractor to complete the Work in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver hazardous materials to be used by the Contractor to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials to be used by the Contractor to complete the Work with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and waste in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.4 Keep no more than 45 liters of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45 liters for work purposes requires the written approval of the Departmental Representative.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 liters for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with Departmental Representative.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Only trained personnel handle offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

.12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.13 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

2 PRODUCTS

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

.2 Maintain SDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

3 EXECUTION

3.1 HAZARDOUS MATERIALS ABATEMEN

.1 Scope of Abatement Activities.

.1 Abatement shall be conducted to handle, alter, remove and/or dispose of hazardous building materials as identified in the Assessment Reports in accordance with applicable regulations, guidelines, standards and/or best practices for such work, where such identified hazardous building materials will be impacted (handled, altered, damaged, removed) by the Work.

.2 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of hazardous materials that will be impacted by the Work of this contract, and such that appropriate plans and budgets can be included in their overall bids.

.3 The listing below is a summary of the identified hazardous building material categories that are anticipated to require disturbance and/or will be in the work area of the renovations, along with their associated removal and disposal regulations, guidelines and/or standards.

.1 Lead and Lead-Containing Paints (LCPs)

.1 Refer to the Assessment Report for identities and locations of lead-containing materials (including LCPs) that may require disturbance during the Work.

.2 Actions that will disturb lead-containing materials (including paints and materials coated with LCPs) are to be conducted in accordance with the requirements of the current version of the WorkSafe BC publication “Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry” and “Safe Work Practices for Handling Lead”, keeping airborne exposure to lead dust to less than the 8-hour Occupational Exposure Limit (OEL) for lead of .05 milligram per cubic metre (mg/m^3).

.3 Although LCPs and items coated with LCPs will be removed for disposal during the Work, unless deemed necessary through risk assessment conducted by the Contractor, comprehensive removal of LCPs from items or surfaces is not expected to be required during the demolition work.

.1 If required, refer to the provisions of the 2017 WorkSafe BC publication “Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry” and “Safe Work Practices for Handling Lead”, for removal of LCPs from surfaces before any welding and torch-cutting, should the Contractor plan to use such methods to complete the Work.

.1 Contractor will be responsible for verification testing of surfaces where LCPs have been removed. Confirmation of acceptable results is to be provided to the Departmental Representative for review before proceeding with any welding or torch-cutting on surfaces where LCPs were present.

.4 Waste transportation to be conducted in accordance with BC Reg. 63/88 and the Federal Transportation of Dangerous Goods Regulation.

.5 Waste classification (including Toxicity Characteristic Leachate Procedure (TCLP)) and subsequent disposal to be conducted in accordance with BC Reg. 63/88.

.2 Silica

.1 When silica-containing materials are to be disturbed and/or removed (e.g., coring through concrete slabs, demolition of masonry or concrete units), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by BC Reg. 296/97 (Cristobalite and Quartz – each 0.025 mg/m^3). This would include, but not be limited to, the following:

.1 Developing a Silica Exposure Control Plan.

.2 Providing workers with respiratory protection.

.3 Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions.

.4 Providing workers with facilities to properly wash prior to exiting the work area.

3.2 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for reuse and recycling.

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable federal and provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, for example:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 31 23 10 - Excavating, Trenching and Backfilling

.2 Section 03 20 00 - Concrete Reinforcing

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

1.2 REFERENCES

.1 Canadian Standards Association (C Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.1 CSA-O86S1-15, Supplement No. 1 to CAN/CSA-O86-14, Engineering Design in Wood.

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

.3 CSA O141-05(2014), Softwood Lumber.

.4 CSA S269.1-16, Falsework for Construction Purposes.
CAN/CSA-S269.3-M92(R2013), Concrete Formwork.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 – General Instructions for Shop Drawings, Product Data and Samples.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 33 – Health and Safety Requirements.

.3 Co-ordinate submittal requirements and provide submittals required by Section 01 01 50.

.4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings and Comply with CAN/CSA-S269.3 for formwork drawings.

.5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 01 50 – General Instructions for Temporary Facilities.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50-General Instructions for Waste Management and Disposal.

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

.3 Divert wood materials from landfill to a recycling, reuse, composting facility as approved by Departmental Representative.

.4 Divert plastic materials from landfill to a recycling, reuse, composting facility as approved by Departmental Representative.

.5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

2 Products

2.1 MATERIALS

.1 Materials and resources in accordance with Section 01 01 50 – General Instructions for requirements.

.2 Formwork materials:

.1 For concrete without special architectural features, use 38 mm members of wood and wood product formwork materials to CSA-O141, to CAN/CSA-O86.

.3 Tubular column forms: round, spirally wound laminated fibre forms, internally treated with release material.

.4 Form ties:

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

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

.6 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

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

3 Execution

3.1 FABRICATION AND ERECTION

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

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth 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 CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.8 Align form joints and make watertight.

.1 Keep form joints to minimum.

.9 Form chases, slots, openings and recesses, as indicated.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

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

3.2 REMOVAL AND SHORING

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

.1 Three days for footings and abutments.

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

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 31 23 10 - Excavating, Trenching and Backfilling.

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

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

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.

.2 ACI 315R-94, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.3 Canadian Standards Association (CSA International)

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

.2 CSA-A23.3-14, Design of Concrete Structures.

.3 CAN/CSA-G30.18-09(R2014), Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.

.4 CSA-G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.

.6 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2018, Manual of Standard Practice.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 – General Instructions for Shop Drawings, Product Data and Samples.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 Submit shop drawings including placing of reinforcement and indicate:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.

.5 Indicate sizes, spacings and locations of chairs, spacers and hangers.

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

.1 Provide type A tension lap splices where indicated unless otherwise indicated.

.5 Quality Assurance: Provide the following to the Departmental Representative.

.1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 01 50 – General Instructions for Temporary Facilities.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions for Waste Management and Disposal.

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

2 Products

2.1 MATERIALS

.1 Materials and resources in accordance with Section 01 01 50 – General Instructions for Product Requirements.

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

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

.4 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.

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

.6 Deformed steel wire for concrete reinforcement: to ASTM A497/A497M.

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

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

2.2 FABRICATION

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

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

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

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

2.3 SOURCE QUALITY CONTROL

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

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

3 Execution

3.1 FIELD BENDING

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

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

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

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

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

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

.4 Protect paint coated portions of bars with covering during transportation and handling.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 31 23 10 - Excavating, Trenching, and Backfilling.

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

.3 Section 03 20 00 - Concrete Reinforcing.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

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

.2 ASTM C827 / C827M - 16 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-2014, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete. CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.2 CSA-A3001-13, Cementitious Materials for Use in Concrete.

.3 CAN/CSA-G30.18-09 (R2014), Billet-Steel Bars for Concrete Reinforcement.

1.3 DESIGN REQUIREMENTS

.1 Alternative 1 - Performance: in accordance with CSA-A23.1/A23.2, and as described in Mixes of part 2 – PRODUCTS.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 – General Instructions for Shop Drawings, Product Data and Samples.

.2 Shop Drawings:

.1 At least 2 weeks prior to beginning Work, inform Departmental Representative source of fly ash and submit samples to Departmental Representative.

.2 Do not change source of Fly Ash without written approval of Departmental Representative.

.3 At least 2 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound.

.4 Submit samples of materials to be used in concrete mix for testing:

.1 Supplementary cementing materials.

.2 Blended hydraulic cement.

.3 Admixture.

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

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

1.5 QUALITY ASSURANCE

.1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by the Departmental Representative.

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions for Waste Management and Disposal.

.2 Ensure emptied containers are sealed and stored safely.

.3 Use excess concrete for:

.1 Divert unused concrete materials from landfill to local facility as reviewed by Departmental Representative.

.2 Provide appropriate area on job site where concrete trucks and be safely washed.

.3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.

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

2 Products

2.1 MATERIALS

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

.2 Blended hydraulic cement: Type GUb to CAN/CSA-A3001.

.3 Supplementary cementing materials: with minimum 10% Type F fly ash replacement, by mass of total cementitious materials to CAN/CSA A3001.Water: to CSA-A23.1/A23.2.

.4 Air entraining admixture: to CAN/CSA-23.1

.5 Chemical admixtures: to CAN/CSA-A23.1 as approved by Departmental Representative.

.6 Non-shrink grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.

.1 Compressive strength: 50 Mpa at 28 days.

.2 Consistency:

.1 Fluid : to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30s.

.2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s. (ASTM C109, applicable portion) 125 to 145%.

.3 Plastic: to ASTM C827. Flow table table, 5 drops in 3 s. (ASTM C109, applicable portion) 100 to 125%.

.4 Dry pack to manufacturer's requirements.

.7 Other concrete materials: to CSA-A23.1/A23.2.

2.2 CONCRETE MIXES

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give the following properties:

.2 Cement: Type GU F-1 Portland cement.

.3 Minimum compressive strength at 28 days, class of exposure and nominal size of coarse aggregate:

Member	min. 28-days strength (MPa)	max. aggregate size (mm)	exposure class	air content category
Exterior footings, Piers	40	25	F-1	1

.4 Slump at time and point of discharge: To CSA-A23.1 Clause 4.3.2.3. When superplasticizers are used, the slump may be increased by shall kept below the point where segregation will occur. Include the superplasticizers in the cost of the concrete. Smaller aggregate size may be used where necessary to increase slump.

.5 Air content: To CSA-A23.1 Table 2 & 4 to suit appropriate exposure class.

.6 Chemical admixtures: following admixtures in accordance with to ASTM C494M. Admixtures shall contain no salts or acids.

.7 Submit concrete mix designs to Departmental representative for review prior to any concrete work.

3 Execution

3.1 PREPARATION

.1 Provide Departmental Representative 48 hours' notice before each concrete pour.

.2 Place concrete to CAN/CSA A23.1, Clause 19; Adhere strictly to CSA A23.1 for proper preparation of Cold Weather Concrete.

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

.4 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.5 Anchor Bolts:

.1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

3.2 CONSTRUCTION

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

3.3 INSERTS

.1 Cast in sleeves, ties, anchors, reinforcement, bolts and other inserts required to be built in.

.1 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.

3.4 FINISHES

.1 Horizontal exposed site concrete: provide broom finish for top of footings at grade level.

3.5 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows and submit report .

.1 Concrete pours at each site.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory approved by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Concrete testing: to CSA-A23.1/A23.2 by testing laboratory designated is included in the Contract. Accelerated test methods will apply.

3.6 VERIFICATION

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in 2 - Products, by Departmental Representative and provide verification of compliance.

.2

3.7 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Cleaning of concrete equipment to be done in accordance with Environmental Procedures clause in Section 01 01 50 General Instructions.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions for Submittal Procedures, Construction/Demolition Management and Disposal clauses.

.2 Section 32 31 13 - Chain Link Security Fencing and Gates.

1.2 WORK SUPPLIED BY DEPARTMENTAL REPRESENTATIVE

.1 Ten (10) double gate Cremone Lock sets and five (5) single gate Cremone Lock sets.

.2 Ten (10) gate hinges.

.3 Four (4) Crash Barriers.

1.3 WORK INCLUDED

.1 Provide new security gates, gate post and overhead frames, manufactured from structural HSS sections, including hinges, cremone locks and attachments installed.

.1 Fabricate gates and post frames following approval of shop drawings for Gate 2 mock-up at Kent Institution are reviewed by Departmental Representative. Commence fabrication of remaining gates and post frames after mockup of gate 2 at Kent Institution has been installed, approved and deficiencies in fabrication and installation have been resolved.

.2 Coordinate with Section 32 31 13 Chain Link Security Fencing and Gates for supply and installation of chain link components for gates specified in this section.

1.4 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A53 / A53M - 18 Standard Specification for Pipe, Steel, Black and Hot-Dipped,Zinc-Coated, Welded and Seamless.

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

.3 ASTM A193 / A193M - 17 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.

.4 ASTM A240 / A240M - 18 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.5 ASTM A307 - 14e1 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

.6 ASTM A413 / A413M - 07(2012) Standard Specification for Carbon Steel Chain.

.7 ASTM A786 / A786M-15 Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.

.2 Canadian Standards Association (CSA)

.1 G40.20-13/G40.21-13 - General requirements for rolled or welded structural quality steel / Structural quality steel.

.2 CAN/CSA-S16-14 Design of steel structures.

.3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

1.5 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 01 50 - General Instructions, Submittals clause.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section Section 01 01 50 - General Instructions, Submittals clause. Indicate VOC's:

.1 For manufactured items such as fasteners and hardware.

.2 Submit product data for paint.

.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 01 50 - General Instructions, Submittals clause.

.1 For structural designed gate/post assembly submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of British Columbia, Canada for nonstandard connections.

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

1.6 QUALITY ASSURANCE

.1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials in accordance with Section 01 01 50 - General Instructions, Common Product Requirements clause.

.2 Storage and Protection:

.1 Store materials on site in designated area protected from where where directed by manufacturer’s instructions.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal clause.

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

.3 Collect and separate for disposal packaging material in appropriate on-site containers for recycling in accordance with Section 01 01 50 General Instructions.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2 Products

2.1 MATERIALS

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

.2 Round steel pipe: to ASTM A53, Schedule 40, standard weight.

.3 Welding materials: to CSA W59.

.4 Bolts, stud anchors and anchor bolts: corrosion resistant types structural steel bolts to ASTM 307. Provide all required devices designed to support and secure work. All steel bolts, nuts and washers, hot dip galvanized or stainless steel for bolt sizes 11 mm Ø and larger. Stainless steel to AISI Type 304.

.5 Fasteners under 11 mm Ø to ASTM A193:

.1 Bolts: Grade B8M stainless steel bolts, with hex heads, spring washers and nuts as indicated.

.2 Machine screws: type 316 stainless steel machine screws, with countersunk six lobe security heads, washers and nuts as indicated.

.6 Thread compound: single component adhesive designed to lock and seal threaded fasteners to prevent loosening from vibration and prevent the rusting of threads and be disassembled with standard hand tools.

.7 Galvanizing: hot dipped galvanizing with minimum zinc coating of 600 g/m2 to ASTM A123. All ferrous metal in exterior locations galvanized after fabrication.

.8 Galvanize touch-up primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 HARDWARE

.1 Hinges: HDBY-SBB-SBB engineered hinge with double plate and drilled holes slotted (32 x 20) for bolt on application to gate post and gate frame. Note: 10 hinges are supplied by Departmental Representative. Provide remaining hinges to match supplied hinges as required to complete Work.

.2 Cremone locks:

.1 Folger Adams series 3800, three point and five point locking for single and double gates, keyed both sides, are supplied by Departmental Representative.

.2 Cremone locks are supplied with standard vertical bolts to suit a 2.1 m door height.

.3 Modify/ extend vertical bolt lengths to suit gate heights. See Clause 2.5.

2.3 CHAIN LINK MESH

.1 Chain link fabric mesh, tension bars, tension bar bands and wire ties are specified in Section 32 31 13 - Chain Link Security Fencing and Gates. Coordinate with section 32 31 13 for supply and installation of chain link mesh on gates specified in this section.

2.4 FABRICATION

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

.2 Fabricate items from steel unless indicated otherwise; all steel for exterior items hot dip galvanized, unless indicated otherwise.

.3 Use welded connections for all steel work, except as noted otherwise and as approved by Departmental Representative.

.4 Where possible, fit and shop assemble work, match mark, ready for erection.

.5 Ensure exposed welds are continuous for length of each joint. Where continuous welds may cause distortion of fabrication use stitch welds and plastic filler.

.6 Leave welds proud except in areas where critical tolerances occur to facilitate designed clearances where gates meet and at hardware attachments, grind welds flat.

.7 Provide holes in steel gate framework in semi concealed areas to facilitate drainage and hot dip galvanizing.

.8 Supply to respective trades and install gate post frame and bollards in accordance with reviewed shop drawings and details.

2.5 CREMONE LOCK BOLT EXTENSIONS

.1 Fabricate Cremone rod extensions using 26.67 mm OD round pipe to facilitate locking of shorter Cremone rods into gate top and bottom receivers on taller gates beyond the limits of standard height cremone rods supplied under this Contract. All single swing Maintenance gates and double swing Emergency Vehicle gates require cremone rods to be extended to suit gate height.

.2 Machine Cremone rod ends to suit inside diameter of pipe and weld extension to rod. Length of machined ends approximately 100 mm long. New rod extensions to suit required rod length in final assembly of swing gates as indicated.

.3 Weld rods and grind welds flat.

.4 Hot dip galvanized exterior steel.

.5 Install Cremone rods concealed inside 75 x 75 mm HSS gate framework as indicated .

2.6 GATE POST/FRAME AND SWING GATES

.1 Fabricate gate post and overhead frame and gate framework from square HSS members as indicated. All 90 degree corners mitred and exposed ends of HSS closed.

.1 Drill holes in HSS gate and gate post frames to accommodate hinge bolts.

.2 Drill holes in gate framework to facilitate passage and installation/removal of cremone lock vertical rods.

.3 Drill holes in HSS gate and post frames to suit drainage and hot dip galvanizing.

.2 Fabricate gate frames to size and configuration, as indicated, with square corners mitred and welded. All other connections butt welded and with exposed HSS ends closed with 6 mmm plate and welded.

.3 Hot dip galvanize framed gates and post frames after fabrication.

.4 Install hardware on gates and frames as indicated.

.5 Coordinate with Section 32 31 13 for supply and installation of chain link mesh.

2.7 CREMONE LOCK MOUNTING

.1 Angle Frame:

.1 Fabricate three sided lock mount from steel angle frame with 12 mm wide x 4.8 mm thickness flat bar closure welded to open end. Miter two angle corners and weld. Allow for adjustment between lock case and angle frame and provide stainless steel washers to take up the tolerance. Mount lock case aligned with edge of flat bar and with the end of angle frame.

.2 Drill seven holes in angle frame to accommodate 8 mm Ø machine screws with countersunk security five lobe Torx heads. Screws to not penetrate more than 2 mm through metal lock case. Drill and tap seven threaded holes in lock case to accommodate security screws.

.2 Install Cremone lock with angle frame into lock pocket area to face of 75 mm HSS frame with seven MS screws.

2.8 CREMONE LOCK FACE PLATES

.1 Single and Double Gates:

.1 Fabricate lock pocket face plate from 9.5 mm thickness type 304 stainless steel with 2B finish, to size indicated with opening for enlarged lock bolt and two holes to accommodate 10 mm security screws with countersunk flush heads. Exposed surfaces milled smooth.

.2 Slightly chamfer exposed corners 45 degrees. Fine sand smooth to eliminate milling or cutting marks.

.3 Drill and tap holes in gate framework to accommodate the two 10 mm stainless steel security screws.

.2 Install stainless steel face plate fastened to gates with two 10 mm stainless steel countersunk machine screws into tapped holes. Face place to protect lock face and deadbolt.

2.9 SINGLE GATE LOCK RECEIVER / STRIKE PLATE

.1 Fabricate receiver plate from 19 mm thickness type 304 stainless steel with 2B finish, to size indicated with opening for enlarged lock bolt and four holes to accommodate 10 mm security screws with countersunk flush heads for mounting to gate post.

2.10 CREMONE LOCK ROD RECEIVERS

.1 Upper Receiver:

.1 Fabricate plate and angle rod receivers to allow for adjustment and accommodate the cremone lock vertical rods. Weld fixed plate to underside of HSS horizontal overhead gate frame.

.2 Drill three slotted holes in fixed plate and two holes in adjustable angle to suit 10 mm bolts. Slotted holes for fastening bolts to allow for 25 mm vertical movement. Vertical adjustment in angle to prevent lower leg from raising higher than lower edge of fixed plate.

.3 Weld three captive 10 mm nuts to angle leg to accommodate bolts. Drill two holes in lower leg to accommodate Cremone vertical bolts. Make holes slotted for Cremonerods to allow for 25 mm lateral movement.

.4 Note: receiver for single swing gates are shorter in length and have two adjusting bolts and one hole to receive Cremone bolt rod.

.2 Lower Receiver:

.1 Fabricate formed plate rod receivers to accommodate the Cremone lock vertical rods. Weld stiffening plate or formed hat section to underside of formed plate as indicated.

.2 Drill two elongated holes to receive Cremone rods. Allow for 25 mm elongation.

.3 Drill four holes to accommodate expansion anchors.

.4 Note: receiver for single swing gates are shorter in width and have one elongated hole for Cremone rod.

.3 Paint lower receiver plate safety yellow.

2.11 GATE BOLLARD / HOLD OPEN

.1 Fabricate bollard from 114 Ø x 9.5 mm wall thickness HSS, 1.8 m long with welded on 6 mm Ø eye, all galvanized.

.2 Fasten 600 mm long galvanized steel grade 30 proof coil chain to welded on eye and attach hook to chain end using 6 mm Ø hex bolt with double nut. Chain links 6 mm Ø.

.3 Rubber bumper: solid rubber threaded into pipe facing gate.

.4 Paint bollard safety yellow.

.5 At Mission and Mountain Institution provide two custom retractable Gate Bollards mounted in fabricated steel box with hinged lockable lid as indicated. Include rubber bumper and chain as noted above for typical bollard.

.6 Make provision for mounting to concrete base using expansion anchors.

.7 Paint steel box with powder coated polyester thermal coating in safety yellow.

2.12 FINISHES

.1 Galvanizing: hot dipped galvanizing with minimum zinc coating of 600 g/m² to ASTM A123. for all ferrous metal fabrications at exterior locations to be galvanized after fabrication.

.2 Galvanize touch-up primer: zinc rich, ready mix to CAN/CGSB-1.181.

3 Execution

3.1 ERECTION

.1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections. Hold in place until concrete is cured.

.2 Provide suitable means of anchorage as indicated or as acceptable to the Departmental Representative, such as dowels, anchor clips, bar anchors, expansion bolts and shields, toggles. Submit alternate means of anchorage to Departmental Representative for approval.

.3 Make field connections with specified bolts or weld as approved by Departmental Representative.

.4 Hand items over to appropriate trades together with setting templates for installation.

.5 Touch-up galvanized surfaces with zinc primer where burned by field welding.

3.2 GATE POST/FRAME AND SWING GATES

.1 Erect gate post and frame assembly installed plumb, straight, and true and hold in place until concrete is cured.

.2 Following concrete cure Install swing gates with hinges through-bolted to posts and gate frames as indicated. Adjust gates for correct function and ensure exact gap tolerance at locks and at upper and lower Cremone rod receivers. After adjustment tolerances are set tighten bolts at hinges

.3 Chain link mesh can either be installed in shop or on site. Coordinate with Section 32 31 13 - Chain Link Security Fencing and Gates.

3.3 SINGLE GATE LOCK RECEIVER PLATE

.1 Drill and tap holes in gate post to accommodate the four stainless steel security screws.

.2 Install stainless steel washers to shim receiver plate to correct alignment.

3.4 CREMONE LOCK ROD RECEIVERS

.1 Upper Receiver:

.1 Adjust angle to accept Cremone rod from each gate to permit minimum capture depth of 10 to 15 mm. Fasten 10 mm bolts and spring washers to captive nuts and tighten. Use adhesive compound on threads.

.2 Lower Receiver:

.1 Set lower receiver at correct elevation using washer shims at expansion anchors.

.2 Ensure Cremone rods extend into elongated holes 10 to 15 mm lower receiver.

.3 Allow clearance between cremone rod and receiver of 3-5 mm when rods are retracted

3.5 GATE HINGES

.1 Spot weld hinge nuts to steel HSS after gate installation is complete and accepted by Departmental Representative.

3.6 CUSTOM GATE BOLLARDS (Mission and Mountain Inst.)

.1 Install custom bollards, leveled to drain water, fastened to concrete base with four expansion anchors as indicated. Custom pipe bollards required for double gates 13 (at Mission Inst)and 9 (at Mountain Inst). Total 4 (four). Ref drawing 602.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions.

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

1.2 WORK INCLUDED

.1 Installation of four (4) crash barriers.

.2 Crash barrier assemblies supplied by Departmental Representative.

1.3 DESCRIPTION OF UNIT

.1 Crash Barriers:

.1 Tymetal TCRB-4 Manual Crash Rated Beam.

.1 Crash beam is powder coated with reflective traffic/vehicular tape. Stanchions are coated with zinc rich primer and painted black.

1.4 SUBMITTALS

.1 See Appendix F

2 Products

2.1 MATERIALS

.1 Crash Barriers:

.1 Four crash barriers supplied are currently stored at each Institution.

.2 Concrete foundation for crash barriers are shown on structural drawings.

.2 Fastenings: supplied with units.

3 EXECUTION

3.1 EXAMINATION

.1 Prior to installation, review design and installation information, carefully inspect the installed supplied crash barriers, report any missing parts to Departmental Representative. Proceed with installation when all missing parts are replaced.

.2 Visit each site and become fully informed of all conditions to ensure satisfactory delivery, installation and operation of Crash Barriers.

.3 Check all necessary field measurements and conditions. Inform Departmental Representative of discrepancies.

3.2 INSTALLATION

.1 Install Crash Barrier units in accordance with Appendix F documents and available manufacturer's instructions. Confirm exact locations for Crash Barriers with Departmental Representative.

.2 Install units level and plumb set into concrete foundations as indicated.

.3 Adjust operable parts for correct function.

3.3 CLEANING

.1 Clean Crash Barriers and touch up any marked or chipped paint coatings with compatible coating to match existing.

.2 Promptly remove all trash resulting from the unpacking and installation.

END OF SECTION

1.1 GENERAL

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenders/Bidders). This Section covers items common to Sections of Division 26, 27, and 28. This section supplements requirements of Division 01

.2 Reference to “Electrical Division” shall mean all related Electrical Sections and components including Division 26.

.3 The word “Provide” shall mean “Supply & Install” the product and services specified. “As Indicated” means that the item(s) specified are shown on the drawings.

.4 Provide materials, equipment and devices of specified design, performance, intent and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedule, ensure timely performance, ensure co-ordination and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this section, other electrical sections and drawings shall govern.

.6 All work shall be in accordance with the PROJECT Drawings and Specifications and their intents, complete with all necessary components, including those not normally shown or specified but required for a complete installation.

1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with Canadian Electrical Code, CSA C22.1-2018.

.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender at time of tender submission.

.3 Perform work in accordance with CSA Z462 - Workplace Electrical Safety and Worksafe BC.

1.3 DEFINITIONS

.1 Electrical and Electronic terms: unless otherwise specified or indicated, terms used in these specifications and on drawings are those defined by IEEE SP1122.

1.4 PERMITS, FEES

.1 Submit to Electrical Inspection Department necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Obtain and pay for an electrical permit to cover all electrical, and Telecommunications work.

.4 Submit an electronic pdf copy of electrical permit to the Departmental Representative prior to commencement of work on site.

.5 Departmental Representative will provide drawings and specifications required by Electrical Inspection Department at no cost.

.6 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.

.7 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Departmental Representative.

1.5 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with Section 01 01 50 – General Instructions.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, single line and schematic diagrams.

.4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

1.6 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Additional maintenance material requirements are included under various other Sections.

1.7 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 01 50 – General Instructions.

.2 Include in operations and maintenance data:

.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.3 Wiring and schematic diagrams and performance curves.

.4 Names and addresses of local suppliers for items included in maintenance manuals.

.5 Copy of reviewed shop drawings.

1.8 CARE, OPERATION AND START-UP

.1 Instruct departmental representative and operating personnel in the operation, care and maintenance of equipment.

.2 Provide these services for such period, and for as many visits as necessary to put equipment in operation and ensure that operating personnel are conversant with all aspects of its care and operation.

1.9 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83 (R1996).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.10 MATERIALS AND EQUIPMENT

.1 Equipment and material to be new and CSA certified, and manufactured to standard quoted.

.2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Department.

1.11 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Lamicoid 3 mm thick plastic engraving sheet, white face and black core, self adhesive unless specified otherwise.

NAMEPLATE SIZES

Size 1 10 x 50 mm 1 line 3 mm high letters
Size 2 12 x 70 mm 1 line 5 mm high letters
Size 3 12 x 70 mm 2 lines 3 mm high letters
Size 4 20 x 90 mm 1 line 8 mm high letters
Size 5 20 x 90 mm 2 lines 5 mm high letters
Size 6 25 x 100 mm 1 line 12 mm high letters
Size 7 25 x 100 mm 2 lines 6 mm high letters

.2 Wording on nameplates and labels to be approved by departmental representative prior to manufacture.

.3 Allow for average of twenty-five (25) letters per nameplate.

.4 Identification to be English.

.5 Nameplates for junction boxes to indicate system and/or voltage characteristics.

.6 Nameplates for pull boxes to indicate system and type of cable.

1.12 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding for 347/600 V, and 120/208V wiring throughout.

1.13 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.14 MANUFACTURERS AND CSA LABELS

.1 Visible and legible after equipment is installed.

1.15 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department and Departmental Representative.

.2 Use decal signs, minimum 175 x 250 mm size.

1.16 CONDUIT AND CABLE INSTALLATION

.1 Refer to drawings for type of conduit and cable to be used.

1.17 POWER INTERRUPTIONS

.1 Contractor shall work closely with Institutional personnel to arrange all interruptions of any portion of the existing electrical distribution systems.

.2 Contractor shall submit request for any shutdown 10 working days prior to such shutdown. Request shall indicate start time of interruption and duration of interruption. Indicate in request exactly what buildings and/or systems will be affected by the requested shutdown.

.3 No interruptions shall be carried out without the approval of the Departmental Representative.

1.18 CLEANING

.1 Do final cleaning in accordance with Section 01 01 50 – General Instructions.

1.19 RECORD DRAWINGS

.1 Refer to Section 01 01 50 – General Instructions.

.2 Indicate conduit and cable runs, junction boxes and circuit numbers.

1.20 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

.1 Refer to Section 01 01 50 – General Instructions.

.2 Refer to Section 01 01 50 – General Instructions.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger, minimum size 12 AWG.

.2 Copper conductors with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 – Conduits, Fastenings and Fittings.

.2 In underground duct bank systems in accordance with Section 26 05 44 – Installation of Cables in Ducts.

.2 Provide a green insulated bond conductor in all conduits, sized in accordance with CSA C22.1, Canadian Electrical Code, Part 1.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 26 05 00 - Common Work Results – Electrical

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

.3 Minimum size: 104 mm square.

2.2 RPVC BOXES

.1 RPVC, watertight, grey.

.2 Dimensions as indicated.

.3 Front Cover: Gasketted, watertight.

3 Execution

3.1 JUNCTION AND PULL BOX INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Install size 2 identification lamicoids indicating system name on pull boxes and junction boxes.

.3 Install size 6 identification lamicoid.

END OF SECTION

1 General

1.1 LOCATION OF CONDUIT

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

1.2 CONDUIT SIZES

.1 Note that conduit sizes referenced in the 2018, Canadian Electrical Code are used.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 - Waste Management.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 CONDUITS

.1 Underground ducts: rigid PVC, size as indicated.

.2 Rigid steel conduit: to CSA C22.2 No. 45, galvanized steel, threaded.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole steel straps for conduits larger than 50 mm.

.2 Channel type supports for two or more conduits at 1.5 m on center

.3 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Threaded steel couplings and connectors for Rigid Steel Conduits.

2.4 FISH CORD

.1 Polypropylene.

3 Execution

3.1 INSTALLATION

.1 Install wiring in underground RPVC Conduit where indicated on drawings.

.2 Install wiring in threaded Rigid Steel Conduit where indicated on drawings.

.3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.4 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.5 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.6 Mechanically bend steel conduit over 21 mm diameter.

.7 Dry conduits out before installing wire.

.8 Install fish cord in empty conduits.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

END OF SECTION

1 General

1.1 REFERENCES

.1 CSA C22.1-2018 Canadian Electrical Code, Part 1.

1.2 RELATED WORK

.1 Section 01 01 50 – General Instructions.

.2 Section 26 05 00 – Common Work Results – Electrical.

.3 Section 26 05 21 – Wire and Cables 0 – 1000 V.

.4 Section 26 05 34 – Conduits, Fastenings and Fittings.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 INSTALLATION

.1 Install cables as indicated in ducts.

.2 Do not pull spliced cables in ducts.

.3 Install multiple cables in ducts simultaneously.

.4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.5 Use specified rope to pull cables into ducts.

.6 Before pull cables into ducts and until cables are properly terminate, seal end ofcables with moisture seal tape.

.7 After installation of cables, seal duct ends with duct seal compound.

.8 Provide pull string in all ducts for future use.

3.2 FIELD QUALITY CONTROL

.1 Perform tests of each type of cable and system as indicated.

.2 Remove and replace entire length of cable if cable fails to meet any test criteria.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 32 31 13 – Chain Link Security Fencing and Gates

1.2 REFERENCES

.1 Perform work in accordance with the following references:

.1 Senstar Corporation

.1 Intelli-FLEX Product Guide (multiplex version)

.2 Correctional Service Canada

.1 ES/SPEC-0402 Electronics Engineering Specification, PIDS Public Address System for use in Federal Correctional Institutions

.2 ES/SPEC-0405 Electronics Engineering Specification, Fence Disturbance Detection System for use in Federal Correctional Institutions

.3 ES/STD-0405 Electronics Engineering Standards, Perimeter Intrusion Detection System, Performance Testing

1.3 QUALIFICATIONS FOR FDS & PIDS PA WORK

.1 Trained and certified by Senstar Corporation to install Intelli-FLEX FDS systems.

.2 Experience in the installation of Senstar FDS systems.

.3 Persons not trained or certified by Senstar Corporation are not permitted to install or remove FDS or PIDS PA components. One exception is that persons not trained or certified by Senstar Corporation may remove existing FDS sensor cable and non- sensitive feed-in cable when fence fabric is being removed but are not permitted to disconnect cables from FDS processors or remove the processors from the fence.

.4 Submit qualifications to Departmental Representative for approval.

.5 Provide certified documentation from Senstar Corporation of qualifications of all persons for work described above. Failure to meet or provide such documentation will be the basis of rejection of sub-contractor proposed for under this Section.

1.4 SPECIALIZED SERVICES

.1 Include coordination, provision of materials, services and all costs for Senstar Corporation to provide the following as specified:

.1 overall technical advice

.2 components

.3 Installation, termination, & testing of FDS System and PIDS P/A Components

.4 training and all testing work

.5 commissioning

.6 reprogramming of PIDS System as required

.2 Provide certified documentation from Senstar Corporation that they will provide these materials and services. Failure to meet or provide such documentation will be the basis of rejection of sub-contractor proposed for under this Section

1.5 ABBREVIATIONS AND DEFINITIONS

.1 FDS - Fence Disturbance Detection System: This is a fence-mounted system which detects the location (sector) if inmates attempt to climb a perimeter fence. The cables are fastened to the inner perimeter fence.

.2 PIDS P/A - Perimeter Intrusion Detection System – Public Address System

.3 CSC – Correctional Service Canada

.4 FDS Sector – A portion of the fence length that is annunciated as a single FDS alarm point. A sector may also be referenced as a zone. The FDS Sector boundaries are shown on the site plans. The FDS Sector boundaries are defined by:

.1 Overlapping of FDS cables from adjacent FDS sectors and;

.2 Locations of FDS Processors

.5 MCCP – Main Communication and Control Post – This is the location where FDS alarms are annunciated and where PIDS P/A announcements are made.

.6 Cross Fence – An interior fence installed at an angle to the inner perimeter fence. A short section of the cross fence abutting the inner perimeter fence is protected with FDS cable.

.7 MDS – Motion Detection System: This is a buried cable system which detects the location (sector) if inmates attempt to cross the area between the two perimeter fences.

.8 PIDS - Perimeter Intrusion Detection System – Integrated security system including the FDS, MDS, PIDS CCTV and PIDS P/A systems.

1.6 SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions and ES/SOW-0101.

.2 Submit detailed work plan clearly stating sequence of work elements, schedule and time required for each element of work. Break down work plan into each gate location.

.3 Include Work Plan within the Preliminary and Final Design Reports as specified in ES/SOW-0101.

.4 Include Work Plan, testing, verification and commissioning within the Preliminary and Final Design Reports specified in ES/SOW-010

.5 Obtain approval of the Work Plan from the Departmental Representative prior to commencement of work.

.6 Provide Acceptance Test Plans (ATP) as specified in ES/SOW-0101.

.7 Provide sign-off sheets for verification of initial and final testing/commissioning.

1.7 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.1 Include: Marked up record drawings showing all changes.

2 Products

2.1 FDS MATERIALS

.1 Senstar Corporation Intelli-FLEX components, acceptable products:

.1 Sensor cable:

.1 Mission Medium Institution - Mark 2

.2 Kent Institution – Mark 2

.3 Mountain Institution – Mark 2.

.4 Matsqui Institution – Mark 2.

.5 Fraser Valley Institution – Mark 2.

.6 Pacific Institution – Mark 2.

.2 Non-sensitive feed-in cable, part number C6CA0400

.3 Composite power/data cable, part number G5SP0300

.4 UV resistant cable ties, black, for all fence-mounted cables including PIDS P/A cables, part number GH0916

.5 Cable splice and terminator kit, part number C6KT2600

.6 Self-test terminator kit, part number C6KT0301

.2 PIDS P/A cables, to match existing.

2.2 DIN RAIL MOUNTED TERMINAL BLOCKS

.1 DIN Rails:

.1 35 mm, Type 3 DIN mounting rails.

.2 Compatible with terminal blocks.

.3 Length suitable for mounting in Security Cabinet mounting rails.

.2 Terminal Blocks:

.1 Push-in, compression clamp.

.2 Switchable lever disconnect.

.3 DIN 3 Type, rail mounting.

.4 10 mm block, wire size; 24 – 12 AWG stranded or solid.

.5 Rating: 300 V, 10 A.

.6 Numbered plastic inserts of same manufacture of terminal blocks.

.7 End stops on each end of each group of blocks as required.

.8 CSA Approved.

2.3 FDS PROCESSOR AND PIDS P/A SPLICE BOX

.1 RPVC, watertight, grey.

.2 Dimensions as indicated.

.3 Front Cover: Gasketted, watertight.

.4 Lexan mounting plate (two per splice box) to isolate splice box from fence.

3 Execution

3.1 GENERAL INSTALLATION INSTRUCTIONS

.1 The existing FDS cabling is configured as a “double-pass” (two cable) system due to the height of the fence.

.2 Install the FDS in compliance with the Senstar Intelli-FLEX Product Guide and the referenced standards.

.3 Provide temporary support for all cables, conduits and boxes to ensure no damage to systems.

.4 Perform all adjustments to ensure the FDS system is functioning in accordance with the referenced documents.

.5 Perform all work in accordance with ES/SOW-0102.

.6 If required the Departmental Representative will loan a Fence Test Module for testing purposes.

.7 Replace all cables damaged by activities of this contract.

.8 Any down time of FDS sectors and PDS P/A system affected by this contract must be minimized.

.9 Install self-test terminators.

.10 Modify the existing PIDS-FDS maps to include all changes to the inner and outer perimeter fences including all new gates, gates removed and all gate position switches removed within this contract.

3.2 PIDS P/A SYSTEM

.1 The PIDS P/A will be affected by work under this Contract because the cables will be re-routed along and/or spliced to accommodate the new gate configurations. Remove, splice, re-install and install new cable as indicated. Test PIDS P/A cabling asrequired.

.2 Cutting, re-routing and splicing PIDS P/A cable must be started, completed, and tested within the same working day. The entire PIDS P/A system must be fully operational at the end of that day.

.3 Provide new shielded PIDS P/A cable to match existing where indicated.

3.3 FDS PROCESSOR CABLING

.1 The entire FDS system will be affected by work under this Contract because the FDS Processor cables will be re-routed and/or spliced to accommodate the new gate configurations. Remove, splice, re-install and install new cable as indicated. Test Processor cabling as required.

.2 Cutting, re-routing and splicing FDS Processor cable must be started, completed, and tested within the same working day. The entire FDS system must be fully operational at the end of that day.

.3 Provide new FDS Processor cable to match existing where indicated.

3.4 PIDS MAPS

.1 Modify all PIDS maps to indicate all modifications to gates on inner and outer perimeter fences, including all gates removed and added, and all gate position switches removed.

3.5 EXISTING GATE POSITION SWITCHES

.1 Disconnect existing gate position switch wiring from associated FDS Processor and modify connections within Processor as required.

.2 Modify existing PIDS data base as required to eliminate the gate position switch alarms from the PIDS system and PIDS Maps.

3.6 WORK STAGES

.1 The physical fence barrier, FDS and PIDS P/A are critical to the security of the institution. Proceed in sequential planned stages to ensure minimum downtime of the fence fabric, FDS and PIDS P/A.

.2 Test, verify and obtain sign-offs for each FDS sector as soon as all FDS, PIDS P/A and fence/gate work has been completed for each gate modification location. This stage is separate from the Final Commissioning.

3.7 WORK PLAN & SCHEDULE

.1 Submit work plans with details of work in conjunction with other trades.

.2 Provide an overall schedule, a schedule with the next week's activities and a daily update.

.3 The daily update includes:

.1 Use gate locations as reference points.

.2 Include start and finish times.

.3 Include which FDS and PIDS P/A sectors will not be functioning.

.4 Include details on start and finish points for the removal and installation of

.1 fence fabric

.2 posts
.3 concrete
.4 FDS Sector Cable, and FDS Processor Cable
.5 PIDS P/A
.6 Temporary security fences
.7 other significant items

.4 Institutions require detailed work plans in advance to enable them to make security changes to accommodate the increased risk for specific areas.

3.8 SECURITY CONDITIONS

.1 Only one FDS Sector can be non-functional at any given time, for up to a maximum of 2 consecutive workdays. This includes overnight between the 2 working days.

.2 Minimize the number of FDS sectors that are non-functioning at any time. Except for the times that the FDS Processor cabling is being spliced, only the FDS sector where work on gate modifications is being carried out may be non-functioning at any time. Non- functioning is defined as the state when the FDS cables are removed from the fence and/or not detecting escape attempts. Non-functioning does not include the state when the FDS sector is fully operational and masked.

.3 All portions of the inner and outer perimeter fence fabric shall be installed securely on the fence posts at the end of each working day, preventing inmates from escaping outside normal working hours. The fence fabric is not required to be tensioned to the specified tension to meet the requirements of this paragraph.

.4 Additional Work Restrictions – Refer to Section 01 01 50 – Work Restrictions.

3.9 TESTING OF THE EXISTING FDS & PIDS PA

.1 The FDS & PIDS P/A are essential components of the institution’s security systems.

.2 The existing systems are tested daily by the institution to ensure correct operation.

.3 If any problems are found with the existing installation, inform the Departmental Representative immediately in writing.

3.10 INITIAL FENCE TEST SECTION

.1 Prior to commencement of work on the fence fabric and the FDS & PIDS P/A at each gate location, a test of the affected FDS Sectors and PIDS P/A is required to be completed.

.2 Provide the on-site services of Senstar Corporation designated staff to assist with the FDS and PIDS P/A tests.

.3 Cooperate with the Departmental Representative to understand acceptable fence tension testing procedures, testing, verification, commissioning and sign-off protocols, sequence of construction, communications channels and other security expectations. Once the Departmental Representative is satisfied all of the above criteria have been understood, work may commence on the balance of the work at the institution.

3.11 FENCE TENSION TESTING AND ADJUSTMENT

.1 Fence tension testing and adjustment specified in Section 32 31 13 – Fences and Gates.

.2 Install FDS cables on fence fabric after fence fabric has been adjusted to specified tension.

3.12 FENCE INSTALLATION AND FDS PERFORMANCE.

.1 Loose fence components will affect the performance of the FDS.

.2 Inform other Divisions of the importance of ensuring the fence does not create nuisance FDS alarms.

.3 Inspect fence work of other Divisions, document FDS-related fence deficiencies and ensure the deficiencies are corrected.

3.13 MDS CABLES

.1 A Senstar OmniTrax MDS security system is installed.

.2 The MDS includes two cables run parallel to the inner perimeter fence and buried below grade in the area between the inner and outer perimeter fences.

.3 The cables are buried approximately 230mm below grade.

.4 The cables are centered between the inner and outer perimeter fences.

.5 Depending on the soil conditions, the two cables are spaced approximately 200mm to 600mm apart.

.6 Obtain buried cable depth and spacing information from the Departmental Representative.

.7 Take care when disturbing soil conditions in the area between the inner and outer perimeter fences, ensuring no damage is done to the MDS cables.

3.14 FDS SECTOR TESTING, VERIFICATION AND SETUP

.1 Once the gate installation, fence fabric installation, FDS and PIDS P/A systems have been completely installed at each location, complete the following:

.1 Visually inspect each fence panel for loose connections or improper installation. Vigorously shake each fence panel to ensure there are no rattles, bangs or squeaks. Fence fabric tension and connections should be sufficiently tight to produce no noise when shaken. Make all adjustments as required.

.2 Re-verify the fence fabric deflection.

.3 Test the PIDS P/A pathway by both initiating a PIDS alarm and using manual switching. In both cases, test for intelligibility. Perform the test procedures as listed in ES/SPEC-0402.

.4 Test the FDS in accordance with ES/STD-0405 and Senstar's recommended practice with tap tests on each fence panel and two equally-spaced climb tests on different fence panels. Ensure the FDS Sector is appropriately annunciated in the MCCP. Adjust the sensitivity of the FDS Sector to ensure positive detection of fence disturbance events. Note that existing sensitivity on some sectors has been adjusted to compensate for existing loose fence fabric conditions.

.5 Document all test results on sign-off sheets.

.6 Departmental Representative and designates to witness tests and to verify correct operation of the systems.

.7 At the time of the test, obtain signatures of Departmental Representative and designates on sign-off sheets. Hand over completed sign-off sheets to Departmental Representative.

3.15 FINAL COMMISSIONING

.1 Once all work on all FDS Sectors have been completed at an institution, provide on-site services of Senstar Corporation staff to perform the Final Commissioning of the FDS. Senstar Corporation staff are required to be on-site for the Final Commissioning.

.2 Perform Final Commissioning in accordance with Senstar Corporation's Intelli-FLEX Product Guide and the referenced standards.

.3 Include all FDS adjustments including cable changes as required. Include any adjustments of the FDS cables to the fence fabric.

.4 Include a final commissioning of the PIDS P/A.

.5 Use the Acceptance Test Plan (ATP) as the basis for the Final Commissioning process.

.6 Document all test results on sign-off sheets.

.7 Departmental Representative and designates to witness tests and verify correct operation.

.8 Obtain signatures of Departmental Representative and designates on sign-off sheets, at the time of the test. Hand over completed sign-off sheets to Departmental Representative.

3.16 CLEANING

.1 Leave work area clean at end of each day.

.2 Final Cleaning: upon completion remove every trace of debris including small pieces of cable, tie-wraps, tape, paper, etc.

.3 Dispose of all removed components and debris off site.

.2 Re-verify the fence fabric deflection.

.3 Test the PIDS P/A pathway by both initiating a PIDS alarm and using manual switching. In both

3.17 PROTECTION

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

.2 Repair damage to adjacent materials caused by FDS & PIDS P/A installation.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 01 50-General Instructions

.2 Section 31 23 10-Excavating, Trenching and Backfilling.

.3 Section 32 11 19-Granular Sub-Base.

.4 Section 32 11 23-Aggregate Base Courses.

1.2 REFERENCES

.1 ASTM; AWWA; CAN – As specified in the contract document.

1.3 SOURCE QUALITY CONTROL

.1 Submit samples in accordance with Section 01 01 50 – General Instructions.

.2 Inform Departmental Representative of proposed source and provide samples or access for sampling at least 2 weeks prior to commencing production.

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

.4 Should a change of material source be proposed during work, advise Departmental Representative 2 weeks in advance of proposed change to allow sampling and testing.

.5 Acceptance of material does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified.

.6 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL^

.1 Divert unused granular materials from landfill to local facility as approved by Departmental Representative.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Gravel to be composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. In absence of satisfactory performance records over a five year period for particular source of material, soundness to be tested according to ASTM test procedure C-88 or latest revised issue. Maximum weight average losses for course and fine aggregates to be 30% when magnesium sulphate is used after five cycles.

.2 All crushed gravel when tested according to ASTM C-136 and ASTM C-117, or latest revised issue, to have a generally uniform gradation and conform to following gradation limits and 60% of the material passing each sieve must have one or more fractured faces. Determination of the amount of fractured material shall be in accordance with the Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "A", which determines fractured faces by count. The Plasticity Index for crushed gravel to not exceed 6.0.

2.2 NATIVE MATERIAL

.1 To be any workable soil free of organic or foreign matter; any material obtained within limits of Contract may be approved by the Departmental Representative. Native material content or compact to specified density.

2.3 PIT RUN GRAVEL

.1 To be well graded granular material, substantially free from clay lumps, organic matter and other extraneous aterial, screened to remove all stones in excess of maximum diameter specified in material description (300 mm Pit Run Gravel, 200 mm Pit Run Gravel, 100 mm Pit Run Gravel). Material to compact to specified density and conform to following gradations:

Sieve Designation	**Percent Passing**
(300mm dia)	-100
(200mm dia)	-100
(100mm dia)	-100
75mm	100
50mm	70-100
25mm	50-100
4.75mm	22-100
2.36mm	10-85
0.75nn	2-8

Recycled concrete free from contaminated and other extraneous material, conforming to the specified gradations may be used as pit run gravel.

2.4 PIT RUN SAND

.1 To be well graded pit run sand, free from organic materials and conform to following gradations:

Sieve Designation	Percent Passing
12.5mm	100
4.75mm	35-100
2.36mm	20-70
1.18mm	13-50
0.600mm	8-35
0.300mm	0-50
0.150mm	2-15
0.075mm	0-6

2.5 RIVER SAND

.1 River sand to be free of organic material and conform to following gradations:

Sieve Designation	Percent Passing
19mm	100
4.75mm	80-100
0.600mm	20-100
0.420mm	10-100
0.250mm	0-80
0.150mm	0-50
0.075mm	0-4

2.6 DRAIN ROCK

.1 To consist of clean round stone or crushed rock conforming to the following gradations:

Percent Passing	Sieve Designation	
	Course	Fine
25.0mm	100	
19.0mm	0-100	
9.5mm	0-5	100
4.75mm	0	50-100
2.36mm		10-35
1.18mm		5-15
0.600mm		0-8
0.300mm		0-5
0.150mm		0-2
0.075mm		0

.2 Drain rock to be used only where specified on Contract Drawings. Use of drain rock other than as specified requires approval of Departmental Representative after examination of soils against which drain rock will be placed.

2.7 GRANULAR PIPE BEDDING AND SURROUND MATERIAL

.1 Crushed or graded gravels to conform to following gradations:

Percent Passing	**Sieve Designation**	
	Type 1*	**Type 2***
25.0mm	100	100
19.0mm	90-100	90-100
12.5mm	65-85	70-100
9.5mm	50-75	
4.75mm	25-50	40-70
2.36mm	10-35	25-52
1.18mm	6-26	15-38
0.600mm	3-17	6-27
0.300mm		3-20
0.075mm	0-5	0-8
Type 1* standard gradation Type 2* to be used only in dry trench conditions and with Departmental Representative's prior approval		

.2 Recycled concrete free from contaminated and other extraneous material, conforming to the Type gradations, may be used as pipe bedding and surround material.

.3 Other permissible materials: only where shown on Contract Drawings or directed by Departmental Representative shall drain rock, pit run sand or approved native material be used for bedding and pipe surround.

2.8 SELECT GRANULAR SUB-BASE

.1 To be well graded granular material, substantially free from lumps and organic matter, screened if required to conform to following gradations:

Sieve Designation	**Percent Passing**
75mm	100
25mm	50-85
0.150mm	0-15
0.075mm	0-8

2.9 CRUSHED GRANULAR SUB-BASE

.1 To be 75mm crushed gravel conforming to following gradations:

Sieve Designation	Percent Passing
80mm	
75mm	100
38mm	60-100
25.0mm	-
19.0mm	35-80
12.5mm	-
9.5mm	26-60
4.75mm	20-40
2.36mm	15-30
1.18mm	10-20
0.60um	5-15
0.30um	3-10
0.18um	-
0.15um	-
0.075um	0-5

2.10 GRANULAR BASE

.1 To be 19mm crushed gravel on forming to following gradations:

Sieve Designation	Percent Passing
19.0mm	100
12.5mm	75-100
9.5mm	60-90
4.75mm	40-70
2.36mm	27-55
1.18mm	16-42
0.600mm	8-30
0.300mm	5-20
0.075mm	2-8

2.11 RECYCLED AGGREGATE MATERIAL

.1 Aggregates containing recycled material may be utilized if approved by the Departmental Representative. In addition to meeting all other conditions of this specification, recycled material should not reduce the quality of construction achievable with quarried materials. Recycled material should consist only of crushed Portland cement concrete; other construction and demolition materials such as asphaltic pavements, bricks, plaster, etc. are not acceptable.

Part 3 EXECUTION

3.1 HANDLING

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

.2 Do not use intermixed or contaminated materials. Remove and dispose rejected materials within 48 h of rejection.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 01 50-General Instructions.

.2 Section 31 05 16-Aggregate Materials.

1.2 REFERENCES .

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C 117, Standard Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ³).

.4 ASTM D 1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m ³)

.5 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

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

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

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001, Cementitious Materials for Use in Concrete.

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

1.3 DEFINITIONS

.1 Rock Excavation:

.1 Rock is defined as all solid rock in form of bedrock, masses, ledges, seams or layers and includes igneous rock of any sort, conglomerate, sandstone or shale, that requires breaking by continuous drilling and blasting before excavation and removal. Rock also includes rocks having individual volumes in excess of 1.0 m3, removed by blasting or other means.

.2 Trench rock removal is defined as rock to beremoved during excavation of utility trenches.

.3 Mass rock removal is defined as rock to be removed during roadway excavation, site grading, or other excavation work, generally, but not necessarily, in larger quantities, and not within the more confining limits of excavation specified for trench excavation.

.4 Dense tills, hardpan, partially cemented materials, clay or frozen materials which do not require breaking by continuous drilling and blasting before excavation and removal are not classified as rock.

.2 Common Excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, partially cemented materials, clay or frozen materials which can be ripped and excavated with heavy construction equipment.

.3 Over-excavation: excavation below design elevation of bottom of specified bedding, and including backfilling of resultant excavation with specified material, as authorized by Departmental Representative.

.4 Removals: removal and disposal at an approved location off-site of surface concrete structures and walks, curbs, gutters, manholes, catch basins, pipes, culvers, enwalls, and any other structure on surface or underground specifically designated on Contract Drawings for removal. Removals to include backfilling of resultant excavation with specified material.

.5 Native Topsoil: to Section 32 91 19-Topsoil Placement and Grading.

1.4 SAFETY REQUIREMENTS

.1 Comply with Section 01 01 50-General Instructions.

.2 Design and install trench shoring in accordance with the regulations of the Workers Compensation Act of British Columbia.

1.5 BLASTING OPERATION PROPOSAL

.1 Submit to Contract Administrator for approval, written proposal of operations for removal of rock by blasting.

.2 Indicate proposed method of carrying out work. Include details on protective measures, time of blasting and other pertinent details.

.3 No blasting to proceed without written approval of Contract Administrator.

1.6 DISPOSAL

.1 Dispose of all surplus spoil from excavations on-site and/or off-site as shown on Contract Drawings or as specified in Contract Documents. Suitability of excavated material for use as native bedding or trench backfill will be governed by Part 2 of this Section. Dumping of spoil on private property will be permitted only upon written approval from property owner and provided all necessary permits and approvals have been obtained.

1.7 LIMITATIONS OF OPEN TRENCH

.1 Excavate trenches only as far in advance of pipe laying operation as safety, traffic, and weather conditions permit and, in no case, to exceed 30m. Before stopping work on last day of work before each weekend or holiday, completely backfill every trench. If circumstances do not permit complete backfilling of all trenches, adequately protect all open trenches or excavations with approved fencing or barricades and, where required, with flashing lights.

Part 2 PRODUCTS

2.1 USE OF SPECIFIED MATERIALS

.1 Back filling for over-excavated trench orstructure excavations to be one of the following:

.1 Granular pipe bedding and surround material.

.2 Pit run sand.

.3 Drain rock (only where approved by Departmental Representative)

.4 Concrete.

.5 Controlled density fill.

.2 Trench and excavation backfill to be one ofthe following:

.1 Approved native material.

.2 Pit run gravel.

.3 Pit run sand.

.4 Controlled density fill.

.3 Surface treatment to be:

.1 Restoration to match existing conditions.

.2 Subgrade, subbase and base for works described in other Sections.

.3 Topsoil, grass, sod or requirements for landscaping works described in other

2.2 MATERIALS

.1 Refer to Section 31 05 16 – Aggregates and Granular materials for specifications for approved granular materials and approved native materials.

.2 Other granular materials: granular materials approved for roadwork (subbase, base,) also acceptable for trench backfill subject to approval of Departmental Representative.

.3 Concrete: Cast-In-Place Concrete to b minimum 20 MPa.

.4 Controlled Density Fill: to be maximum 0.5 MPa.

Part 3 EXECUTION

3.1 SITE PREPARATION

.1 Remove all brush, weeds, grasses and accumulated debris to an approved offsite location.

.2 Cut pavements or sidewalk neatly along limits of proposed excavation as shown on Contract Drawings in order that surface may break evenly and cleanly. Cut beyond limits shown only if authorized by Departmental Representative.

.3 Where trench passes through lawn, neatly cut and remove sod before trench excavation. Save sod for replacement upon backfilling trench.

.4 Strip topsoil after area has been cleared and stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2m. Avoid mixing topsoil with subsoil. Dispose of unused topsoil as specified. Do not handle topsoil while wet or frozen condition or in any manner in which soil structure is adversely affected.

3.2 STOCKPILING

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

3.3 EXCAVATION

.1 Connecting to existing mains:

.1 Prior to or at commencement forconstruction, check existing main for line and elevation at point of connection. If found different from Contract Drawings report such difference to Departmental Representative immediately.

.2 Connections to existing waterworks, sanitary and storm sewer systems to be made by the Contractor unless shown otherwise on Contract Drawings. Notify Departmental Representative minimum 48 hours in advance of schedule connection. Make connection in presence of Departmental Representative.

.3 To prevent damage to existing utilities, excavation last 300 mm over utility by hand.

.2 Surface Drainage:

.1 Provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction area and adjacent lands. Provide siltation controls to protect natural watercourses or existing drainage facilities.

.2 Comply with Section 01 11 55-General Instructions for environmental protection.

.3 Excavation to grade: excavation trenches to allow pipe to be laid to alignment and grades required with allowance for specified pipe bedding.

.4 Excavation below grade: when bottom of excavated trench at subgrade is unstable and in opinion of Departmental Representative, cannot adequately support pipe, install pipe using concrete bedding as shown on Contract Drawings or over-excavate trench to suitable subgrade or as directed by Departmental Representative. Backfill over excavated with specified materials and compact to minimum 95% Modified Proctor density in compliance with ASTM D1557. Use drain rock backfill only if authorized by Departmental Representative.

.5 Trench width: excavation trench to section and dimension shown on Contract Drawings. If width exceeds maximum allowable, Contractor may be required to demonstrate that specified pipe is still adequate or provide pipe with approved higher class bedding. All additional requirements as a result of excessive trench width to be to Contractor's cost.

.6 Hand excavation: excavate by hand if necessary to preserve or minimize damage to existing trees, shrubs, building and all similar existing features or facilities.

.7 Trench bottom conditions: remove disturbed or softened material from trench bottom before placing bedding material. Maintain trench free from water and soft materials during placement of pipe bedding, pipe installation and trench backfill to ensure proper compaction of granular materials.

.8 Trench drainage:

.1 See Drainage/Dewatering in Section 01 11 55– General Instructions.

.2 During pipe laying, jointing, bedding and backfilling, keep trench free of water by pumping or other appropriate means. Provide pumps and dewatering equipment and take precautions to prevent any damage to adjoining buildings, structures, roads or land from prolonged or excessive pumping by installing shoring, sheeting or other supportive measures. Discharge water from excavations in such manner as not to cause nuisance, injury, loss or damage. Contactor to be responsible for any claims or actions arising from such discharge of water.

.3 Keep bell holes free from water during jointing. Diverting trench water through newly laid system not allowed, unless authorized by Departmental Representative.

.9 Disposal of surplus soil: Dispose of surplus excavation soil off-site. Side-casting not allowed in restricted areas where, in opinion of Departmental Representative, side-casting would create interference with flow of traffic. In such case, temporarily store materials or dispose to an approved site. Provisions of Provincial Contaminated Sites Legislation must be met prior to disposal of soil offsite.

.10 Where native backfill is approved for re-use, and side- casting not allowed, transport approved material to other locations where material is required or temporarily store at approved site. Protect stored material from contamination, segregation and weather.

.11 Rock Removal:

.1 Strip rock of all earth.

.2 Notify Contract Administrator within reasonable time to enable Contract Administrator to obtain necessary measurements.

.3 Do blasting operations in accordance with bylaws.

.4 Remove rock to alignments, profiles, and cross sections as shown on Contract Drawings.

.5 Locations where explosive blasting is not permitted, if applicable, are shown on Contract Drawings.

.6 Use methods, techniques and procedures for control of all factors affecting operations in order to produce smooth and sound peripheral surfaces of all completed excavations, to minimize overbreak, and to avoid damage to adjacent structures.

.7 Excavate trenches in accordance with above sections.

.8 Excavate rock for concrete walls, columns and footings to horizontal surfaces not exceeding slope shown on Contract Drawings. Scale, pressure wash and broom clean rock surfaces to assist concrete bond.

.9 Except as specified otherwise or as directed by Contract Administrator employ pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques to achieve final excavation surfaces.

.10 Remove boulders and fragments which may slide or roll into excavated areas.

.11 Correct unauthorized rock removal at no extra cost, in accordance with backfilling requirements specified in Section 31 23 01 - Excavating, Trenching and Backfilling.

.12 Maintain roads used for transporting materials and equipment in clean condition. Clean, flush and/or sweep on daily basis and more frequently if directed by Departmental Representative.

3.4 BACKFILL AND COMPACTION

.1 General: Place backfill carefully in trench to prevent damage to installed pipe.

.2 Shoring: during backfill and compaction of trench, remove shoring in such a manner as to allow proper compaction and to prevent trench walls from collapsing. Remove all bracing and/or shoring from trench.

.3 Backfill Materials:

.1 Boulevards and easements: for trenches in boulevards, easements or other areas not subjected to vehicle loading, and outside of ditch lines, backfill with approved native materials except as shown otherwise on Contract Drawings.

.2 Roads, driveways and shoulders: for trenches in paved or graveled roads, driveways, shoulders or other areas subjected to vehicle loading, backfill with imported granular material or approved native material as specified on Contract Drawings. Road shoulder is that portion of right- of-way between travelled, and road ditch. Where no ditch exists, ensure shoulder width minimum of 1.5 m.

.3 Ditches: backfill with imported granular material or approved native material as specified on Contract Drawings.

.4 Departmental Representative may permit native materials for all above uses subject to suitability of native material for said use. Native material approved for re-use to be handled, stockpiled and compacted using construction method appropriate for given moisture content and weather conditions.

.4 Compaction: place backfill and compact to following Modified Proctor densities in compliance with ASTM D1557. (All following references to density imply compliance with ASTM D1557).
  .1 Boulevards and easements to minimum 90%.
  .2 Roads, driveways, shoulders, re-shaped ditches and sidewalks to minimum 95%.
  .3 Use caution in pipe zone to ensure no damage to pipe.

3.5 SURFACE RESTORATION

.1 General:
  .1 Restore all disturbed surfaces to condition at least equal to which existed prior to construction.
  .2 Make good any damage to adjacent lands or improvements.
  .3 Resolve all reasonable claims arising from Contractor's actions and obtain written releases from Departmental Representative following final restoration.

.2 Boulevards and easements:
  .1 Restore surface to minimum 100 mm depth.
  .2 Restore unimproved surfaces with material equal to that removed at surface.
  .3 Restore gardens with approved top soil or bark mulch to match existing conditions.
  .4 Restore lawns with approved topsoil and seed or sod to match existing lawn.
  .5 Restore gravel surfaces with matching granular materials.
  .6 Complete final restorations immediately upon completion of trench backfilling.

.3 Graveled roads and driveways:
  .1 Restore surface with minimum 75 mm to 100 mm thick lift of 19 mm granular road base material.
  .2 Compact to minimum 95% Modified Proctor density.
  .3 Complete final restoration immediately upon completion of trench backfilling.

.4 Ditches:
  .1 Re-shape ditches to specified lines, grades and sections as specified to ensure stability of ditch slopes and bottom.
  .2 Compact to minimum 95% Modified Proctor Density.
  .3 Complete final restoration immediately upon completion of trench backfilling.

.5 Base preparation for paved surfaces:
  .1 Paved surfaces to include all paved roads, driveways, sidewalks and parking areas.
  .2 If native material used for backfill provide specified depth of subbase as shown on Contract Drawings.

.6 Temporary pavement patching:
  .1 Patch arterial and collector roads same day excavation made.
  .2 Patch all other roads within 24 hours of closing trench.
  .3 Patching material to be hot-mix asphalt on all roads unless specified otherwise, cold-mix may be used only where directed by Departmental Representative.

.4 Place temporary pavements to 50 mm minimum thickness.

.5 Maintain temporary patch to ensure safe and smooth conditions.

.7 Permanent pavement restoration:

.1 Install permanent pavement within 30 days of placement of temporary patch or sooner where directed by Departmental Representative.

.2 Remove broken or cracked pavement as well as any paves areas showing settlement and dispose off- site.

.3 Remove underlying granular road base material as required to permit placement of specified-thickness of permanent pavement. Ensure remaining base meets specified thickness. Material and placement of road base to Section 32 11 23-Aggregate Base Courses

.4 Compact base to minimum 95% Modified Proctor density.

.5 Restore pavement as detailed on Contract Drawings. If thickness of existing pavement permits, grind 40 mm depth along edge of pavement. Dry if necessary and paint clean, dry edge with asphalt emulsion (tack coat).

.6 Place and compact hot-mix pavement material to minimum thickness as shown on Contract Drawings.

.7 Material and placement of hot-mix pavement to Section 32 12 16-Asphalt Paving.

.8 Restore surface to smooth condition and match with grade of adjacent pavement.

.9 Where shown on Contract Drawings place hot-mix overlay over restored trench section and adjacent pavement to Section 32 12 16-Asphalt Paving.

.10 Maintain restored pavements in complete repair during Maintenance Period. Effect repairs within 14 days from receipt of written notice from Departmental Representative or immediately if so directed by Departmental Representative if dangerous situation exists.

.8 Landscape Restoration:

.1 Landscape restoration to following sections:

.1 Section 32 91 19-Topsoil Placement and Grading

.2 Restoration of planted areas to consist of restoration to original condition by replacement to original depth of approved topsoil (minimum 100mm), seeding or sodding of grassed areas and replacement of any killed or removed plants or shrubs by ones equal quality, type and maturity to originals.

.3 Plant replacement trees and shrubs at a suitable time of year in accordance with good horticulture practice, to provide maximum assurance of plant survival. If tree or shrub has died, or shows signs of dying, as a result of environmental disturbance, cutting of roots, or other causes directly attributed to Contractors work, close to but not actually within excavation areas, replace with new tree or shrub of a similar variety, age and size, up to limits of maximum available size.

.9 Restoration acceptance: no restoration work to be considered satisfactory until acceptance by Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTION

.1 Section 32 91 19-Topsoil Placement and Grading.

1.2 MEASUREMENT PROCEDURES

.1 Payment for all work performed under this Section will be included under payment for work described in other Sections unless specifically shown otherwise as separate pay items.

.2 Payment for topsoil stripping including disposal will be treated as common excavation under Section 31 24 13-Roadway Embankments.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ^{3}).

.2 British Columbia Landscape Standards.

.3 Canadian System of Soil Classification.

1.4 SITE CONDITIONS

.1 Examine site with Departmental Representative and obtain approval of previous work prior to commencing site grading.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Fill material: in case of deficit of in-place or specified materials, all additional materials necessary to bring site up to specified grade to comply with material specified in appropriate Section or shown on Contract Drawings.

.2 Obtain approval from Departmental Representative for excavated or graded material to be used as fill for grading work. Protect approved material from contamination.

.3 Fill material to be placed under areas to be landscaped, i.e., with grass, sod, groundcover, shrubs and trees, to be non-toxic to plant and animal life in part or in concentration (leachate).

Part 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

.1 Strip all organic material to specified limits and specified depth. Stockpile for re-use as shown in Contract Documents. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected. Remove all debris and unusable material as specified in the Contract Documents.

.2 Surface drainage: provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction area and adjacent and other affected properties. Provide siltation controls to protect natural watercourses or existing drainage facilities.

3.2 GRADING

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as shown on Contract Drawings.

.2 Compact subgrade to consistent 80% Modified Proctor Density in compliance with ASTM D1557.

.3 Excavate soft and unstable areas below subgrade that cannot be compacted to this standard and fill with approved fill material, except in locations where special environmental conditions have been identified. In such cases, comply with details shown on Contract Drawings.

.4 Remove and dispose to approved off-site disposal area, all debris, roots, branches, stones, building material, contaminated subsoil, visible weeds and anything else that may interfere with proper growth and development of planned finished landscaping.

.5 Place fill materials to elevations and sections shown on Contract Drawings. Place in maximum 200mm lifts and compact each lift to 80% Modified Proctor Density.

.6 Scarify areas showing excessive compaction to minimum depth of 150mm and compact to 80% Modified Proctor Density immediately before placing growing medium (topsoil).

.7 Ensure gradients within ranges shown in Table 1, except where Contract Drawings show variations from this standard.

.8 Grade transitions of subgrade smooth and even, such that ponding cannot occur on subgrade surface.

TABLE 1: Maximum and Minimum Gradients in Landscaped Areas		
Location	Minimum	Maximum
Lawn and Grass	50:1 (2%)	3:1
Grass Swales (without additional erosion protection)	300:1* (0.3%)	10:1 (10%)
.1 Slope along inverts	6:1 (Preferred)	3:1
.2 Side Slopes		
Unmowed Areas	100:1 (1%)	2:1*
Planted Areas	50:1 (2%)	2:1*

*Unless directed otherwise by Departmental Representative

3.3 TOLERANCES

.1 Accuracy of subgrade elevations to be within tolerances shown in Table 2.

TABLE 2: Tolerances for Subgrades Where Growing Medium (Topsoil) to be Placed Over Subgrade.		
Conditions within 3m from fixed elevations (e.g., paving edges, curbs, etc.)	Intended Growing Medium Depth	Tolerance
	0 – 150 mm	± 25 mm
	151 – 300 mm	± 25 mm
	301 – 600 mm	± 50 mm
Other areas	0 – 150 mm	± 25 mm
	151 – 300 mm	± 50 mm
	301 – 600 mm	± 50 mm

3.4 SURPLUS MATERIAL

.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site at approved disposal area.

3.5 TOPSOIL AND FINISH GRADING

.1 See Section 32 91 19-Topsoil Placement and Grading for placement and finish grading of growing medium (topsoil).

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 01 50-General Procedure.

.2 Section 31 05 16-Aggregate Materials.

.3 Section 31 23 10-Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.3 DEFINITIONS

.1 Excavation classes: only two classes of excavation will be recognized:

.1 Rock excavation: to Section 31 23 10-Excavating, Trenching and Backfilling.

.2 Common Excavation: to Section 31 23 10- Excavating, Trenching and Backfilling.

.2 Native Topsoil: to Section 32 91 19-Topsoil Placement and Grading.

.3 Embankment (subgrade fill): material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.

.4 Imported embankment fill: approved granular material, supplied by Contractor and obtained from off-site sources, to be used for embankment fill up to subgrade elevation.

.5 Pavement structure: combination layers of unbound or stabilized granular subbase, base and asphalt or concrete surfacing.

.6 Subgrade elevation: elevation immediately below pavement structure.

.7 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.

.8 Borrow Material: material obtained from areas outside limit of work and required for construction of embankments or for other portions of work.

1.4 BLASTING

.1 All blasting operations to comply with Section 31 23 10- Excavating, Trenching and Backfilling.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Divert excess materials from landfill to site approved by Departmental Representative.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Unless shown otherwise on the Contract Drawings, the following specified materials are approved for their respective uses. Backfill for embankment fill (subgrade fill) to be:

.1 Approved native or imported granular material.

.2 Pit run gravel.

.3 Pit run sand.

.2 Refer to Section 31 05 16-Aggregate Materials for specifications for approved granular materials.

Part 3 EXECUTION

3.1 GENERAL

.1 Strip all organic material to specified limits and specified depth or as directed by Departmental Representative. Do not handle topsoil while wet or frozen condition or in any manner in which soil structure is adversely affected. Remove all debris. Stockpile and place topsoil as specified.

.2 Surface drainage:

.1 Provide suitable temporary ditches or other approved means of handling drainage prior to excavation and during construction to protect construction are and adjacent and other affected properties. Provide siltation controls to protect natural watercourses or existing municipal drainage facilities.

.2 Comply with Section 01 11 55-General Instructions.

3.2 EXCAVATION

.1 Notify Departmental Representative sufficiently in advance of excavation operations for initial cross-sections to be taken.

.2 Notify Departmental Representative whenever unsuitable materials are encountered in cut sections and remove unsuitable materials to depth and extent as directed by Departmental Representative.

.3 If, during excavation, material appearing to conform to classification for rock is encountered, notify Departmental Representative in sufficient time to enable measurements to be made to determine volume of rock.

.4 Rock excavation: Rock excavation to Section 31 2310- Excavating, Trenching and Backfilling.

3.3 INSPECTION OF NATIVE SURFACE

.1 Prior to placing embankment fill, proof roll graded native surface using fully loaded single or dual axle dump truck. Departmental Representative may authorize use of other acceptable proof rolling equipment. Remove soft or other unstable material. Replace with approved embankment fill to Section 31 24 13-Roadway Embankments proctor density in compliance with ASTM D1557. (All following references to density imply compliance with ASTM D1557).

3.4 PLACING

.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

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

.3 Place materials using methods which do not lead to segregation or degradation.

.4 Place material to full width in uniform layers and compact to specified densities.

.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.6 Remove and replace that portion of any layer in which material becomes segregated during spreading.

.7 Where shown on Contract Drawings or as directed by Departmental Representative, scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.

.8 Where fill material consists principally of rock:

.1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case layer thickness to exceed 1 m.

.2 Individual rock fragments not exceeding 1.5 m in horizontal dimension permitted provided their vertical dimension does not exceed one third of fill section depth.

.3 Carefully distribute rock material to fill voids with smaller fragments to form compact mass.

.4 Fill surface voids at subgrade level with rock spalls or selected material to form an earth- tight surface.

.5 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

3.5 COMPACTION

.1 Compaction equipment to be capable of obtaining required densities in materials on project.

.2 Compact to density of not less than 95% Modified Proctor density.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted layers.

.4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers.

.6 Finish slopes to neat condition, true to line and grade.

.1 Remove boulders encountered in cut slopes and fill resulting cavities.

.2 Hand finish slopes that cannot be finished satisfactorily by machine.

3.6 FINISHED TOLERANCE

.1 Ensure finished subgrade within plus or minus 15 mm of specified grade and cross-section but not uniformly high or low.

.2 Ensure finished subgrade surface has no irregularities exceeding 15 mm when checked with a 3 m straight edge places in any direction.

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

3.7 PROOF ROLLING

.1 For proof rolling use fully loaded single or dual axle dump truck.

.2 Departmental Representative may authorize use of other acceptable proof rolling equipment.

.3 Proof roll top of embankment fill upon completion of fine grading and compaction.

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

.5 Where proof rolling reveals areas of unsuitable subgrade:

.1 Remove unsuitable embankment material to depth and extent directed by Departmental Representative.

.2 Replace with approved embankment material and compact in accordance with this section.

3.8 PLACE TOPSOIL

.1 Place, spread and grade topsoil as shown on Contract Drawings.

.2 Restore planted areas with topsoil, ground cover, and plants or shrubs to match existing planted areas as shown on Contract Drawings.

3.9 MAINTENANCE

.1 Maintain finished embankment fill in condition conforming to this section until succeeding material is applied or until granular base is accepted by Departmental Representative.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 31 24 13-Roadway Embankments

.2 Section 31 05 16-Aggregate Materials.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D 422, Standard Test Method for Particle- Size Analysis of Soils.

.5 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).

.6 ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m³).

.7 ASTM D 1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.8 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

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

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

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Material for road subbase to be:

.1 Select granular subbase.

.2 75 mm pit run gravel.

.3 75 mm minus crushed gravel.

.4 Pit run sand.

.5 Approved native material.

.6 Other approved materials.

.2 Refer to Section 31 05 16-Aggregate Materials for material specifications.

.3 Other granular materials: granular materials approved for road base or pipe bedding also acceptable for road subbase subject to approval of Departmental Representative.

Part 3 EXECUTION

3.1 INSPECTION OF UNDERLYING SUBGRADE SURFACE

.1 Ensure underlying subgrade surface true to cross- section and grade and compacted to specified density. Departmental Representative may accept satisfactory proof rolling as evidence of acceptable compaction of undisturbed native subgrade. Do not place granular subbase until subgrade is inspected and approved by Departmental Representative.

3.2 PLACING

.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

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

.3 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.4 Place material to full width in uniform layers not exceeding 300mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.6 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density of not less than 95% Modified Proctor Density.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

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

3.4 SITE TOLERANCES

.1 Ensure finished subbase within plus or minus 15 mm of specified grade and cross-section but not uniformly high or low.

.2 Ensure finished subbase surface has no irregularities exceeding 15 mm when checked with a 3 m straightedge placed in any direction.

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

3.5 PROOF ROLLING

.1 For proof rolling use fully loaded single or dual axle dump truck.

.2 Departmental Representative may authorize use of other acceptable proof rolling equipment.

.3 Proof roll at level in subbase as required. If alternative proof rolling equipment is authorized, Departmental Representative will 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 area of unsuitable subgrade:

.1 Remove subbase and subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade with approved embankment material and compact in accordance with Section 31 24 13-Roadway Embankments.

.3 Replace subbase material and compact in accordance with this section.

.6 Where proof rolling reveals areas of unsuitable subbase, remove unsuitable materials to depth and extent directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

3.6 MAINTENANCE

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

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTION

.1 Section 31 05 16-Aggregate Materials.

.2 Section 32 11 19-Granular Sub-Base.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).

.5 ASTM D 1557-[00], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m³).

.6 ASTM D 1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils

.7 ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

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

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

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Material for road base to be:

.1 19 mm crushed gravel.

.2 Refer to Section 31 05 16-Aggregate Materials for material specifications.

Part 3 EXECUTION

3.1 INSPECTION OF UNDERLYING SUBGRADE SURFACE

.1 Ensure underlying subbase surface true tocross-section and grade and compacted to 95% Modified Proctordensity in compliance with ASTM D1557. Do not place granular subbase until subgrade is inspected and approved by Departmental Representative.

3.2 PLACING

.1 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.

.2 Begin spreading sub-base material on crown line orhigh side of one-way slope.

.3 Place granular sub-base materials using methodswhich do not lead to segregation or degradation.

.4 Place material to full width in uniform layers not exceeding 150mm compacted thickness. Departmental Representative may authorize thicker lifts (layers)if specified compaction can be achieved.

.5 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.6 Remove and replace portion of layer in whichmaterial has become segregated during spreading.

3.3 COMPACTION .

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density of not less than 95% Modified Proctor Density.

.3 Shape and roll alternately to obtain smooth, evenand uniformly compacted sub-base.

.4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

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

3.4 SITE TOLERANCES

.1 Ensure finished base within plus or minus 10 mm of specified grade and cross-section but not uniformly high or low.

.2 Ensure finished surface has no irregularities exceeding 10 mm when checked with a 3 m straight edge placed in any direction.

.3 Correct surface irregularities by loosening andadding or removing material until surface is within specified tolerance.

3.5 PROOF ROLLING

.1 For proof rolling use fully loaded single or dual axle dump truck.

.2 Departmental Representative may authorize use of other acceptable proof rolling equipment.

.3 Proof roll top of base upon completion of fine grading and compaction.

.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 area of unsuitable subgrade:

.1 Remove base, subbase and subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade with approved embankment material and compact in accordance with Section 31 24 13-Roadway Embankments.

.3 Replace subbase material and compact in accordance with this Section 32 11 19-Granular Sub-Base.

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

.6 Where proof rolling reveals areas of unsuitable base or subbase, remove unsuitable materials to depth and extent directed by Departmental Representative and replace with new materials in accordance with Section 32 11 19-Granular Sub-Base at no extra cost.

3.6 MAINTENANCE

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

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and application of asphalt tack coat to an existing asphalt or concrete surface prior to asphalt paving.

1.2 RELATED SECTIONS

.1 Section 01 01 50-General Instructions.

.2 Section 32 12 13.23-Asphalt Prime.

.3 Section 32 12 16-Asphalt Paving.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D 140, Standard Practice for Sampling Bituminous Materials.

.2 ASTM D 633, Standard Volume Correction Table for Road Tar.

.3 ASTM D 1250, Standard Guide for Use of the Petroleum Measurement Tables.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.4 QUALITY ASSURANCE

.1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.

.2 Provide access on tanker for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with ASTM D 140.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused asphalt from landfill to facility capable of recycling materials.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1.

Part 3 EXECUTION

3.1 EQUIPMENT

.1 Refer to Section 32 12 13.23-Asphalt Prime.

3.2 APPLICATION

.1 Obtain Departmental Representative's approval of surface before applying asphalt tack coat.

.2 Apply asphalt tack coat only on clean and dry surface.

.3 Dilute asphalt emulsion with water at 1:1 ratio for application.

.1 Mix thoroughly by pumping or other method approved by Departmental Representative.

.4 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, but not to exceed 0.7 L/m² when diluted with water at 1:1 ratio.

.5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.6 Do not apply asphalt tack coat when air temperature is less than 5 degrees C or when rain is forecast within 2 hours of application.

.7 Apply asphalt tack coat only on unfrozen surface.

.8 Asphalt tack oil, is toxic to aquatic life. Provide extra caution near catch basins and storm drain inlets as all storm sewers in the worksite drain to an environmentally sensitive watercourse.

.9 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.10 Where traffic is to be maintained, treat no more than one half of width of surface in one application.

.11 Keep traffic off tacked areas until asphalt tack coat has set.

.12 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.13 Permit asphalt tack coat to set before placing asphalt pavement.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Section 32 12 13.23 refers to those portions of the work that are unique to the supply and application of asphalt prime coat. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.2 RELATED SECTIONS

.1 Section 01 01 50-General Instructions.

.2 Section 32 11 19-Granular Base.

.3 Section 32 12 16-Asphalt Paving.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D 140, Standard Practice for Sampling Bituminous Materials.

.2 ASTM D 633, Standard Volume Correction Table for Road Tar.

.3 ASTM D 1250, Standard Guide for Use of the Petroleum Measurement Tables.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.4 QUALITY ASSURANCE

.1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt prime coat material meets requirements of this section.

.2 Provide access on tanker for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with ASTM D 140.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused asphalt from landfill to facility capable of recycling materials.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Asphalt material: to CAN/CGSB-16.1 grade RM-20, MC-70 or CAN/CGSB-16.2 grade SS-1 h, as specified in Supplementary Specifications.

.2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.

Part 3 EXECUTION

3.1 EQUIPMENT

.1 Pressure Distributor:

.1 Designed, equipped, maintained and operated so that asphalt material at even temperature may be applied uniformly on variable widths of surface up to 5 m at readily determined and controlled rates from 0.2 to 5.4 L/m2 with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m2.

.2 Capable of distributing asphalt material in uniform spray without atomization at temperature required.

.3 Equipped with meter registering metres of travel per minute visibly located to enable truck driver to maintain constant speed required for application at specified rate.

.4 Pump equipped with flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump to operate by separate power unit independent of truck power unit.

.5 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.

.6 Equipped with accurate volume measuring device or calibrated tank.

.7 Nozzles to be of same make and dimensions, adjustable for fan width and orientation.

.2 Hand Sprayer: For small and/or inaccessible areas, a pressurized hand-held spray wand may be used.

3.2 APPLICATION

.1 Obtain Departmental Representative's approval of surface before applying asphalt prime.

.2 Cutback asphalt:

.1 Heat MC70 asphalt prime to 60 to 70°C for pumping and spraying in accordance with manufacturer's instructions.

.2 Apply asphalt prime to granular base at rate as required but do not exceed 2 L/m2.

.3 Apply on damp surface unless otherwise directed by Departmental Representative.

.3 Emulsified asphalt:

.1 Dilute asphalt emulsion with clean water at 1:1 ratio for application. Mix thoroughly.

.2 Apply diluted asphalt emulsion at rate as required but do not exceed 5 L/m2.

.3 Apply on damp surface unless otherwise directed by Departmental Representative.

.4 Paint contact surfaces of curbs, gutters, manholes and like structures with thin, uniform coat of asphalt prime material.

.5 Do not apply prime when air temperature is less than 5ºC or when rain is forecast within 2 h of application.

.6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.

.7 Prevent excessive overlap at junction of spreads.

.8 Do not prime surfaces that will be visible when paving is complete.

.9 Apply additional prime to areas not sufficiently covered.

.10 Keep traffic off primed areas until asphalt prime has cured.

.11 Permit prime to cure before placing asphalt paving.

3.3 USE OF SAND BLOTTER

.1 If asphalt prime fails to penetrate within 24 h, spread sand blotter material in amounts required to absorb excess material.

.2 Sweep and remove excess blotter material.

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for asphalt concrete paving for roads and airport runways.

1.2 RELATED SECTIONS

.1 Section 01 01 50-General Instructions.

.2 Section 31 05 16-Aggregate Materials.

.3 Section 32 12 13.16-Asphalt Tack Coats.

1.3 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M320, Standard Specification for Performance Graded Asphalt Binder.

.2 AASHTO R29, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.

.3 AASHTO T245, Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.2 Asphalt Institute (AI)

.1 AI MS2 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 American Society for Testing and Materials International, (ASTM)

.1 ASTM C 88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.

.2 ASTM C 117, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C 123, Standard Test Method for Lightweight Particles in Aggregate.

.4 ASTM C 127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.5 ASTM C 128, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

.6 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C 136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C 207, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 STM D 995, Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.10 ASTM D 2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.11 ASTM D 3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

.12 ASTM D 4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.4 Canadian General Standards Board (CGSB)

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

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

.3 CAN/CGSB-16.3, Asphalt Cements for Road Purposes.

1.4 PRODUCT DATA

.1 Submittals in accordance with Section 01 01 50 – General Instruction.

.2 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.

.3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 4 weeks prior to beginning Work.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

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

.3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.

.4 Divert unused asphalt from landfill to facility capable of recycling materials.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Asphalt cement: to CAN/CGSB-16.3-M90, grade: 80-100.

.2 Reclaimed asphalt pavement:

.1 Crushed and screened so that 100% of RAP material passes 37.5 mm screen before mixing.

.3 Aggregates: in accordance with Section 31 05 16 - Aggregate Materials: General following requirements:

.1 Crushed stone or gravel consisting of 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 C 136 and ASTM C 117.

.3 Table

Sieve Designation	% Passing	
	Lower Course #2	Upper Course #2
25 mm	-	-
19 mm	100	-
12.5 mm	84-99	100
9.5 mm	73-88	-
4.75 mm	50-68	55-75
2.36 mm	35-55	38-58
1.18 mm	27-46	28-47
0.600 mm	18-36	20-36
0.300 mm	10-26	10-26
0.150 mm	4-17	4-17
0.075 mm	3-8	3-8

.4 Coarse aggregate: aggregate retained on 4.75mm sieve and fine aggregate is aggregate passing 4.75mm sieve when tested to ASTM C 136.

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75mm sieve and stockpile separately from coarse aggregate.

.6 Do not use aggregates having known polishing characteristics in mixes for surface courses.

.7 Sand equivalent: ASTM D 2419 Min: 40.

.8 Magnesium Sulphate soundness: to ASTM C 88 Max% loss by mass after five cycles:

.1 Coarse aggregate: 15%.

.2 Fine aggregate: 18%.

.9 Los Angeles abrasion: Grading B, to ASTM C 131 Max % loss by mass:

.1 Coarse aggregate, upper course: 25%

.2 Coarse aggregate, lower course: 35%.

.10 Absorption: to ASTM C 127 Max % by mass:

.1 Coarse aggregate, upper course: 1.75%.

.2 Coarse aggregate, lower course: 2.00%.

.11 Loss by washing: to ASTM C 117 Max % passing 0.075 mm sieve:

.1 Coarse aggregate, upper course: 1.5

.2 Coarse aggregate, lower course: 2.0

.12 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 3): Max% by mass:

.1 Coarse aggregate, upper course: 10%.

.2 Coarse aggregate, lower course: 10%.

.13 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured face. Material to be tested according to ASTM C 136 and ASTM C117. Determination of amount of fractured material will be in accordance with Ministry of Transportation and Highways' Specification I- 11, Fracture Count for Coarse Aggregate, Method "B", which determines fractured faces by mass.

Passing	Retained on	
25 mm	to	12.5mm
12.5 mm	to	4.75mm

.14 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.4 Mineral filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.

.3 Mineral filler to be dry and free flowing when added to aggregate.

2.2 MIX DESIGN

.1 Mix design provided by the Contractor (to be developed by testing laboratory) for approval by Departmental Representative.

.2 Mix to contain maximum 20% by mass of RAP. Departmental Representative may approve higher proportion of RAP if Contractor demonstrates ability to produce mix meeting requirements of specification.

.3 Design of mix: by Marshall method to requirements below.

.1 Compaction blows on each face of test specimens: 75.

.2 Mix physical requirements:

Property	Roads	
Marshall Stability		5.5 upper course
at 60°C	kN min	6.4 lower course
Flow Value	mm	2-4
Air Voids in Mixture	%	3-5 upper course
		3-6 lower course
Voids in Mineral	% min	15 upper course 2
Aggregate		14 upper course 1
		14 lower course 2
		13 lower course 1
Index of Retained	% minimum	75
Stability		

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to ASTM D1559.

.2 Air voids: to ASTM D3203.

.3 Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D1559).

.4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be reviewed by Departmental Representative.

Part 3 EXECUTION

3.1 PLANT AND MIXING REQUIREMENTS

.1 Batch and continuous mixing plants:

.1 To ASTM D 995.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.

.3 Feed cold aggregates to plant in proportions to ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 Before mixing, dry aggregates to moisture content not greater than 0.5% by mass or to lesser moisture content if required to meet mix design requirements.

.6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.7 Store hot screened aggregates in manner to minimize segregation and temperature loss.

.8 Heat asphalt cement and aggregate to mixing temperature directed by Departmental Representative. Do not heat asphalt cement above 160 degrees C.

.9 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.10 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.

.2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45s.

.3 Do not alter mixing time unless directed by Departmental Representative.

.11 Where RAP is to be incorporated into mix:

.1 Feed from separate cold feed bin specially designed to minimize consolidation of material. Provide 37.5mm scalping screen on cold feed to remove oversized pieces of RAP.

.2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti- rollback device to prevent material from sliding backward on feed belt.

.3 Combine RAP and new aggregates in proportions as directed by Departmental Representative. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees C of mix temperature, as directed by Departmental Representative is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dried mix material is above 160 degrees C.

.2 Dryer drum mixing plant:

.1 To ASTM D 995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180 degrees C.

.5 Feed RAP from separate cold feed bin designed to minimize consolidation of material.

.6 Meter total flow of aggregate and RAP by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate RAP and asphalt entering mixer remain constant.

.7 Provide for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.

.8 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.

.9 Make provision for conveniently sampling full flow of materials from cold feed.

.10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.

.11 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.

.12 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each week, if required.

.13 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 0.5%.

.3 Temporary storage of hot mix:

.1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.

.1 Do not store asphalt mix in storage bins in excess of 12 hour.

.4 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	5.5
2.36 mm sieve	4.5
0.600 mm sieve	3.5
0.150 mm sieve	2.5
0.075 mm sieve	1.5

.2 Permissible variation of asphalt cement from job mix: 0.3%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

3.2 EQUIPMENT

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

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

.3 Vibratory rollers:

.1 Minimum drum diameter: 1200mm.

.2 Maximum amplitude of vibration (machine setting): 0.5mm for lifts less than 40 mm thick.

.4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows.

.1 Boxes with tight metal bottoms.

.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.

.3 In cool weather or for long hauls, insulate entire contact area of each truck box.

.4 Use only trucks which can be weighed in single operation on scales supplied.

.5 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.

.2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping ironS.

.3 Straight edges, 3.0m in length, to test finished surface.

3.3 PREPARATION

.1 Reshape granular road bed, if required.

.2 When paving over existing asphalt surface, clean pavement surface. When leveling course is not require, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.

.3 Adjust existing castings to new elevations and protect from asphaltic mix.

.4 When matching new pavement with existing pavement make vertical cut between existing pavement and new pavement as shown on Contract Drawings.

.5 Apply prime coat and/or tack coat in accordance with Section 32 12 14-Asphalt Prime and/or Section 32 12 15-Asphalt Tack Coats prior to paving.

.6 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

.3 Schedule delivery of material for placing in daylight unless Departmental Representative approves artificial light.

.4 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 125 degrees C.

3.5 PLACING

.1 Obtain Departmental Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as shown on Contract Drawings.

.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is above 5 degrees C. Place overlay pavement only when air temperature is above 10 degrees C.

.2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.

.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as shown on Contract Drawings:

.1 Levelling courses to thicknesses required but not exceeding 100mm.

.2 Lower course in layers of 100mm each.

.3 Surface course in layers of maximum 60mm each.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

.6 Spread and strike off mixture with self propelled mechanical finisher.

.1 Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.

.2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.

.3 Maintain constant head of mix in auger chamber of paver during placing.

.4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.5 Correct irregularities in alignment left by paver by trimming directly behind machine.

.6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

.7 Do not throw surplus material on freshly screeded surfaces.

.7 When hand spreading is used:

.1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly. Do not broadcast material.

.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.

.4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

.5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.6 COMPACTING

.1 Roll asphalt continuously to density not less than 97% of 75 blow Marshall density to ASTM D1559 with no individual test less than 95%.

.2 General:

.1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.

.3 Operate roller slowly initially to avoid displacement of material. For subsequent rolling do not exceed 5 km/h for static steel-wheeled and 8 km/h for pneumatic tired rollers.

.4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 20 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.

.5 Overlap successive passes of roller by minimum of 200mm and vary pass lengths.

.6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

.7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.

.8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.

.9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

.10 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.

.11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.3 Breakdown rolling:

.1 Commence breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.

.3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.

.4 Use only experienced roller operators for this work.

.4 Second rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has be thoroughly compacted.

.5 Finished rolling:

.1 Accomplish finish rolling with steel wheel rollers while material is still warm enough for removal of roller marks.

.2 Conduct rolling operations in close sequence.

3.7 JOINTS

.1 General:

.1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.

.2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.

.3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:

.1 Offset transverse joint in succeeding lifts by at least 600mm.

.2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.

.3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 150mm.

.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.

.1 For airfield runway paving, avoid cold joint construction in mid 30 m of runway.

.2 If cold joint can not be avoided, tack face with thin coat of hot asphalt prior to continuing paving.

.3 Overlap previously laid strip with spreader by 100mm.

.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.

.5 Roll longitudinal joints directly behind paving operation.

.6 When rolling with static roller over onto previously placed lane in order that 100 to 150 mm of drum width rides on newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until thoroughly compacted neat joint is obtained.

.7 When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.

.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joints as indicated.

.5 Construct butt joints as indicated.

.6 Wherever practical, locate joints under future traffic markings (paint lines.)

3.8 PAVEMENT PATCHING

.1 Ensure temporary and permanent pavement patching done by handwork conforms to all standards specified for machine place asphaltic concrete.

.2 Subbase and base preparation as specified in Section 32 11 19 and 32 11 23, respectively, unless shown otherwise on Contract Drawings.

3.9 SIDEWALKS, DRIVEWAYS AND CURBS

.1 Hot-mix asphalt concrete sidewalks, driveways and curbs as shown on Contract Drawings.

.2 Machine place where practical.

.3 Ensure placement by handwork conforms to all standards specified for machine placed asphaltic concrete.

.4 Other than requirements relating specifically to Portland cement concrete, ensure hot-mix asphalt concrete sidewalks and curbs comply with all requirements of Section 32 16 15-Concrete Walks, Curbs and Gutters.

.5 Ensure hot-mix asphalt concrete driveways comply with all requirements of Section 32 12 16-Asphalt Paving.

3.10 FINISH TOLERANCES

.1 Finished asphalt surface to be within 6mm of design elevation but not uniformly high or low.

.2 Finished asphalt surface not to have irregularities exceeding 6mm when checked with 3 m straight edge placed in any direction.

.3 Water ponding not permitted.

.4 Against concrete gutter, finished asphalt surface to be higher than the gutter by not more than 6 mm.

3.11 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

.2 Repair areas showing checking, rippling, or segregation.

.3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.12 CLEAN-UP

.1 Remove lids or covers from all castings and clean any prime, tack coat or hot-mix asphaltic concrete from frames, lids and covers of all castings.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 Refer to drawings for location of new fencing and gates.

.1 Construct new inner and outer temporary security fencing and gates to form a secure work area during construction of new swing gates and replacement fencing in the inner and outer perimeter security of the Institution, as indicated.

.2 Construct new permanent security fencing between the new gates and the existing perimeter security fencing. (where existing gates and adjoining fencing were removed)

.2 Emergency double vehicle gates and maintenance single swing gates and their post framework is specified in Section 05 50 00 - Metal Fabrications. Coordinate installation of chain link mesh on new gates with Section 05 50 00 for installation in shop or on site.

1.2 RELATED WORK

.1 Section 01 01 50 - General Instructions.

.2 Section 05 50 00 - Metal Fabrications.

.3 Section 28 16 00 - Electronic Security Systems.

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International):

.1 CAN/CSA A3001-2013 - Cementitious materials for use in concrete.

.2 CAN/CSA-A23.1/A23.2-2014, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete

.3 CAN/CSA-G164-18 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-138.1-96, Fence, Chain Link, Fabric.

.2 CAN/CGSB-138.2-96, Fence, Chain Link, Framework, Zinc-Coated, Steel.

.3 CAN/CGSB-138.3-96, Fence, Chain Link - Installation.

.4 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 ASTM International (ASTM):

.1 ASTM A53-/A53M -18, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A90/A90M-13(2018) - Standard Test Method for 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.

.4 ASTM A 121-13(2017) - Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.5 ASTM A392 - 11a(2017) - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

.6 ASTM F1043-18 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.

.7 ASTM F1379 - 95(2018) Standard Terminology Relating to Barbed Tape.

.8 ASTM F1712-11 Standard Specification for Steel Chain-Link Fencing Materials Used for High Security Applications.

.9 ASTM F2611-15 Standard Guide for Design and Construction of Chain Link Security Fencing.

1.4 SUBMITTALS

.1 Submit shop drawings or product data in accordance with Section 01 01 50.

.2 Product data to indicate: new overhang arms and custom hardware; construction details.

2 Products

2.1 MATERIALS

.1 Concrete mix designed to produce 20 MPa minimum compressive strength at 28 days and containing 20 mm maximum size, 5 mm minimum size coarse aggregate, with water/cement ratio to CAN/CSA-A23.1 Table 7 for Class F-2 exposure and 60 mm slump at time and point of deposit. Air entrainment to CAN/CSA-A23.1, Table 8.

.2 Chain-link fence fabric: to CAN/CGSB-138.1:

.1 All security fence fabric:

.1 Interwoven steel wire fabric, 50 mm x 50 mm, 4.88 mm ö (6 Ga), with minimum 610 gm/m² galvanized coating.

.2 Height of wire mesh: nominal 3660 mm.

.3 Twisted selvedge at top and bottom for all security fencing.

.4 Breaking tensile strength to 10,000 N-min.

.3 Posts and rails: to CAN/CGSB-138.2, ASTM F1043, Schedule 40 electro-galvanized steel pipe (550 g/m²) in the following sizes, except as noted otherwise:

.1 Line posts: 73 mm O.D, 8.6 kg/m. Posts shall be spaced a maximum of 2.4m center to center.

.2 Terminal posts: 114.3 mm O.D, 16.07 kg/m minimum.

.3 Corner and gate posts: 141.3 mm O.D, 21.7 kg/m.

.4 Horiz. rails 42 mm O.D, 3.4 kg/m.

.4 Tie wire fasteners: single strand, galvanized steel wire conforming to requirements of fence fabric, 3.76 mm diameter (9 ga). Secure chain link fabric to bottom rail, top rail, and line posts at 300mm spacing.

.5 Tension bar: 4.76 x 20 mm minimum galvanized steel.

.6 Tension bar bands: 3.2 x 20 mm minimum galvanized steel.

.7 Zinc pigmented paint: to CGSB 1.181.

.8 Fittings and hardware: cast aluminum alloy, galvanized steel or malleable or ductile cast iron. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.9 Galvanized steel wire: to ASTM 121.

.10 Galvanized steel arms provided on all posts where barbed concertina wire to be installed.

.1 Double or single Coil Arms to match each institution: double arm at 45° upward, (Y arms) projecting in opposite directions, extending 700 mm ± horizontally from either side of perimeter fence where coiled security topping to be installed.

.2 Overhang tops to provide waterproof fit, to hold top rails and an outward/ inward projection to hold barbed wire overhang. Y arms for double coil security topping, single arm for single coil barbed concertina to match existing coil arrangement at each location.

.3 Provide projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.

.4 Projection of approximately 300 mm long to project from fence at 45 degrees above horizontal.

.5 Turnbuckles to be drop forged.

.11 Where nuts and bolts are required for fastening, nuts to face yard exterior and be torqued tight.

2.2 SECURITY TOPPING

.1 Galvanized barbed tape concertina 20 x 0.5 mm clenched around a 2.5mm dia. spring steel galvanized core wire:

.1 Fence topping: to ASTM 1379, minimum 710 mm diameter (635 when installed) single coil concertina, fabricated from 0.64 mm thickness TYPE 430 stainless steel, minimum 25 mm wide, cold clenched 230° around a 2.5 mm diameter galvanized 1520 MPa tensile strength steel wire. Coils with shall have 20 mm long blade type barbs Barb clusters spaced approx. 45mm OC. Clips of 1.65 mm x 10 mm wide stainless steel sheet designed to withstand a pull load of 90 kg spaced at 1/3 points around circumference. Resulting coil, when stretched, shall form a cylindrical pattern with loop spacing 230mm max. Acceptable Product: RazorWire.

.2 For coil support at fence top, provide two barbed wires stretched and fixed to post arms.

.1 Barbed wire: two strands of 12 gauge wire with 4 point barbs at 130mm spacing, all galvanized. The barb tape concertina to be supported and tied at 230mm spacing onto each of the barbed wire. 3.76mm galvanized steel wire ties to ASTM A 121.

.3 Hog rings (securing security topping to barbed wire and fence fabric): galvanized steel wire, 3.65 mm size.

2.3 TEMPORARY SECURITY FENCE SWING GATES

.1 Temporary security fence gate framework: to ASTM A53 or galvanized steel pipe, conform to CGSB 138.4 with electronically welded joints and Galvacon finish:

.1 Pair of 3.6 m wide x 3.6 m high gate opening: 73 mm OD galvanized pipe, for outside frame and 42 mm OD galvanized pipe for interior framework. Weld horizontal pipe frame at 1200 mm from bottom gate frame.

.2 Allow space for locking mechanism.

.3 Fasten fence fabric on gate with twisted selvage at top and bottom.

.4 Clearance between gate perimeter framework and gate posts, top framework and grade maximum 115 mm.

.5 Furnish double swing gates with 3 pair of galvanized malleable iron hinges, half height drop pipe 25 mm ö and locking pin with provision for padlock which can be attached and operated from either side of installed gate. Provide two point locking; into pipe sleeve receiver at grade and 1200 above ground. Padlock to be installed at 1200 height.

.2 Padlocks: Supplied by Departmental Representative.

2.4 FINISHES

.1 Galvanizing:

.1 For chain link fabric: 610 g/m² to CAN/CGSB-138.1, ASTM A392.

.2 For posts, rails: 550 g/m² minimum to ASTM A90.

.3 For other fittings: to CSA G164, ASTM A123.

3 Execution

3.1 TEMPORARY AND PERMANENT SECURITY FENCE INSTALLATION

.1 Excavate for new fence foundations, by methods approved by Departmental Representative. Post size and depth into new concrete footings, varies with post size:

.1 73 mm ö line post: 350 mm ö by 1000 mm deep for 3.66 m high fence.

.2 114.3 mm ö straining and terminal post: 400 mm ö by 1200 mm deep.

.3 141 .3 mm ö corner and gate posts: 600 mm ö by 1500 mm deep.

.4 Center drop pipe locking mechanism at vehicle gates: 350 mm ö by 600 mm deep concrete support with pipe receiver in center.

.5 Coordinate with concrete trade to provide pipe sleeves in poured concrete structures to suit post sizes for welding or oversized sleeves for setting pipe in non-shrink grout.

.6 Concrete anti-tunneling wall at interior fence line where interior perimeter fence has been rebuilt adjacent to new security gates: 250 wide x 1000 mm deep. Top edge of wall 50 mm above finish grade with top surface sloped to drain away from posts.

.2 Excavate by hand for post footings adjacent to building foundations. Coordinate with Departmental Representative for location of existing services in new fence areas.

.3 Remove all excavated materials and dispose off site.

.4 Place concrete in post holes then embed posts into concrete to 150 from bottom of concrete post depth. Extend concrete footing 50mm above ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.1 Install restraining posts beside new gate posts in same foundation as new gate posts at all new emergency vehicular gates and maintenance gates.

.5 Do not install fence fabric until concrete has cured a minimum of 5 days.

.6 Install top rail between posts, through post overhang tops.

.7 Install bottom rail between posts fastened securely to posts with fence post brackets.

.8 Lay out fence fabric onto fences, stretch tightly to tension specified and fasten to terminal, corner, gate and straining posts with tension bars secured to post with tension bar bands spaced at 300mm intervals.

.1 Locate fastening nuts facing secure side of fence.

.2 Join end rolls of fabric by weaving a single strand of fabric into the ends of the rolls to form a continuous mesh.

.3 Join overlapped fabric with tie wires at 300 mm intervals along each exposed edge and stagger upper and lower ties 150 mm.

.4 Tighten fence fabric to meet paragraph 10.

.9 Secure fabric to line posts and to horizontal rails with tie wires at 300 mm intervals twisted on secure side of fence. Give tie wires minimum two twists.

.10 Fence Tension Testing and Adjustment:

.1 Following installation of fence fabric test and apply specified tension to the fence fabric.

.2 Demonstrate the fence tension in the presence of the Departmental Representative.

.3 Test method:

.1 While standing in the area between the outer and inner perimeterfences, place a straightedge horizontally between two adjacent posts.

.2 At the centre point of the panel, apply a perpendicular pulling force of 12 kg towards the straightedge.

.3 Measure the displacement from the fence fabric at rest.

.4 Adjust the fence fabric tension until the displacement is no more than 30 mm from the fence at rest plane.

.11 Fence Detection System (FDS) will be installed on inner perimeter fence at permanent and temporary fencing . See Section 28 16 00 - Electronic Security Systems.

3.2 INSTALLATION OF TEMPORARY ANTI-TUNNELING BARRIER

.1 Install anti-tunneling barrier along temporary security fence line using chain link mesh 900 mm deep. Attach top edge of mesh to lower horizontal rail of fence using tie wires at 300 mm o/c.

.2 Excavate trench 1000 mm wide x 900 deep and backfill with compacted granular material after 900 deep mesh is installed. Ensure fill is free of organic material or use pit-run granular material and remove excavated material to approved dump site on property. Compact trench flush with existing grade.

.3 Anti-tunneling barrier is required only at interior perimeter temporary fence line, as indicated and where concrete anti-tunneling barrier is not existing.

3.3 INSTALLATION OF SWING GATES

.1 Install double gates in temporary security fence where indicated.

.2 Set gate bottom approximately 75 mm above pavement surface/ground for swing gates.

.3 Install gate hardware. Adjust swing gates for correct function.

3.4 INSTALLATION OF BARBED WIRE

.1 Install two lines of barbed wire on each arm of overhang tops to suit new security topping fastening.

.2 Install barbed wire taut and secure to overhang top slots in arm frames. Provide additional ties at overhang tops to ensure barbed wire is anchored securely.

3.5 INSTALLATION OF SECURITY TOPPING

.1 Install coiled security topping to double arms on fence separation panel, attached to barbed wire on overhang tops with approved hog rings. Ensure coil tapes on security topping are spaced no more than 230 mm apart at each contact with barbed wire, in accordance with manufacturer's instructions.

3.6 TOUCH UP

.1 Repair damaged galvanized surfaces. Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of approved zinc pigmented (Galvacon) paint to damaged areas where zinc coating is removed.

3.7 CLEANING

.1 Clean areas disturbed by operations. Dispose of surplus material and repair damaged surfaces as directed by Departmental Representative.

.2 Dispose of all materials off Institution grounds, including ties. Ensure all metal objects are removed from grounds on inmate side of fencing.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 01 50 – General Instructions.

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada
  .1 The Canadian System of Soil Classification.
.2 Canadian Council of Ministers of the Environment
  .1 PN1340, Guidelines for Compost Quality.

1.3 DEFINITIONS

.1 Compost:
  .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  .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) (50)), and contain no toxic or growth inhibiting contaminates.
  .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 - General Instructions.
.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.

1.5 QUALITY ASSURANCE

.1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused soil amendments from landfill to official hazardous material collections site approved by by Departmental Representative.

.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 Tree planting, planting beds (shrub planting) and sodded areas shall meet the requirements as specified in Section 6.2 of the BC Landscape Standards and shall include a mixture of particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.

2.2 NATIVE TOPSOIL

.1 On-site native topsoil may be used provided it meets standard set for imported topsoil and can be modified to meet requirements set out for specified growing medium.

.2 If testing show on-site soil to be suitable for landscaping, a sufficient quantity of stripped topsoil to be stockpiled as directed by the Departmental Representative.

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

2.3 SOIL AMENDMENTS

.1 Fertilizer:

.1 Fertility: major soil nutrients present in the following amounts:

.2 Nitrogen (N): shall be 0.2% to 0.6% by weight.

.3 Phosphorus (P): 20 to 250 ppm

.4 Potassium (K): 50 to 1000 ppm

.5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.

.6 Ph value: 4.5-7.0

.2 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5mm.

.3 Sand: washed coarse silica sand (or locally available equivalent), medium to course textured.

.4 Organic matter: compost Category A in accordancewith CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability andcontaminant requirements.

.5 Limestone:

.1 Ground agricultural limestone.

.2 Gradation requirements: percentage passingby weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

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

2.4 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead timefor testing.

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

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

.4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

Part 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

3.2 STRIPPING OF TOPSOIL

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

.2 Strip topsoil to depths as indicated.

.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.2 Stockpile in locations as directed by Departmental Representative.

.3 Stockpile height not to exceed 2 m.

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

.4 Protect stockpiles from contamination and compaction.

.5 Any non-hazardous, granular or organic fill, unusable at site, may be dumped outside the perimeter fence, on CSC property, near the South West Guard Tower as directed by the Departmental Representative. Dump and spread fill, level with adjoining grades.

3.3 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50mm diameter and other deleterious materials.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75mm above surface.

.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Fr sodded areas keep topsoil 15mm below finished grade.

.4 Spread topsoil as indicated.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

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 Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep foot printing.

3.6 ACCEPTANCE

.1 Departmental Representative 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 materials except topsoil not required where directed by Departmental Representative off site.

3.8 CLEANING

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

END OF SECTION

Part 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for storm sewer.

1.2 RELATED SECTIONS

.1 Section 01 01 50-General Instructions.

.2 Section 31 05 16-Aggregate Materials.

.3 Section 31 23 10-Excavating, Trenching and Backfilling.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C 14M, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).

.2 ASTM C 76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).

.3 ASTM C 117, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.4 ASTM C 136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.5 ASTM C 443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

.6 ASTM C 506M, Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.

.7 ASTM C 507M, Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe (Metric).

.8 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

.9 ASTM D 1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

.10 ASTM D 2680, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

.11 ASTM D 3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.12 ASTM F 405, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.

.13 ASTM F 667, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

.14 ASTM F 794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

.2 Canadian General Standards Board (CGSB)

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

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

.3 CAN/CGSB-34.9, Asbestos-Cement Sewer Pipe.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000, Cementitious Materials Compendium

.2 CAN/CSA-A257 Series, Standards for Concrete Pipe.

.3 CSA B1800, Thermoplastic Non-pressure Pipe Compendium – B1800 Series.

.4 CSA-G401, Corrugated Steel Pipe Products.

1.4 MATERIAL CERTIFICATION

.1 Submit shop drawings in accordance with Section 01 11 55 – General Procedures.

.2 Products having CSA certification to be used where readily available. Certification by Standards Council of Canada approved independent third body that products conform to CSA standards in acceptable in lieu of CSA certification.

.3 At least 2 weeks prior to commencing work, submit manufacturer's recent test data and certification that materials to be incorporated into works are representative and meet requirements of this Section. Include manufacturer's drawings where pertinent.

1.5 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services. Maintain existing flow during construction.

.2 Submit schedule of expected interruptions to Departmental Representative for approval and adhere to interruption schedule as approved by Departmental Representative.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

.2 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

.3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.

.4 Handle and dispose of hazardous materials in accordance with the Regional and Municipal regulations.

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

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

Part 2 PRODUCTS

2.1 CONCRETE PIPE

.1 Non-reinforced circular concrete pipe and fittings: To ASTM C 14M maximum diameter 900 mm, strength class as shown on Contract Drawings, designed for flexible rubber gasket joints to ASTM C443M.

.2 Reinforced circular concrete pipe and fittings: to ASTM C76M for all pipe greater than 900 mm diameter, strength class as shown on Contract Drawings, designed for flexible rubber gasket joints to ASTM C443M.

.3 Reinforced concrete arch pipe: to ASTM C506M.

.4 Reinforced concrete elliptical pipe: to ASTM C507M.

.5 Lifting holes:

.1 Pipe 900mm and less diameter: no lift holes.

.2 Pipe greater than 900mm diameter: engineered lift insert systems designed for the weight of the pipe cast into the pipe walls during manufacture. Not to exceed two in each piece of pipe.

.3 Manufacturer to provide properly rated lifting clutches to be used with lift insert cast into pipe.

.4 Lift insert opening not required to be grouted provided it does not extend beyond the depth of the engineered design.

.5 At request of Departmental Representative, manufacturer shall supply design information confirming suitability of lift insert system used.

2.2 CORRUGATED STEEL PIPE

.1 Corrugated steel pipe and couplers: to CSA-G401.

.2 Gaskets: to ASTM D 1056.

2.3 PLASTIC PIPE, MAINLINE SMOOTH PROFILE AND PERFORATED DRAIN TILE

.1 Polyvinyl chloride pipe up to 1200mm in diameter, DR35. Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5.0% deflection, ASTM D2412. Pipe to be manufactured to specification for pipe size ranges as follows:

.1 100mm dia. – 375mm dia. to ASTM D3034

.2 450mm dia. – 1200mm dia. to ASTM F679.

.2 Pipes to be certified by Canadian Standards Association to standards for pipe size ranges below.

.1 100mm dia. – 1200mm dia. to CSA B182.2

.3 Joint: Pipe to include integral bell and spigot ends with stiffened wall section and formed groove for a rubber gasket; joints to conform to ASTM D3212, elastomeric gaskets to ASTM F477.

.1 Pipe joints to withstand minimum hydrostatic pressure of 345kPa without leakage.

.2 Pipe joints in pipes with pipe stiffness less than 320kPa to withstand 550kPa.

.4 Normal pipe length joint to joint to be 4.0 m.

.5 Maximum installed short term deflection not to exceed 5.0% of the base inside diameter.

2.4 SERVICE CONNECTIONS

.1 Storm sewer service connections to be 100mm minimum diameter; maximum diameter as specified on Contract Drawings.

.2 Storm sewer service connections 100mm and 150mm diameter to be PVC type DR28 sewer pipe.

.3 100mm and 150mm DR28 PVC storm service connection pipe to have a minimum pipe stiffness of 625kPa. Pipe to be manufactured to ASTM D3034 and certified by Canadian Standards Association to CSA B182.2

.4 Storm sewer service connections greater than 150mm diameter to be of size and material specified on Contract Drawings and to conform to applicable specifications for mainline pipe.

.5 Manufactured connections to non-reinforced or reinforced concrete mainline pipe to be made using sanded PVC pipe male end stub with integral bell by either:

.1 Stub grouted into neatly chipped hole in pipe wall by concrete pipe manufacturer. Grout to be Portland cement based grout.

.2 Stub epoxy resin cemented into neatly cored hole in pipe wall by concrete pipe manufacturer

.6 Stub and bell orientation to be 45˚ to centerline of mainline 2pipe (wyes) for concrete pipe less than 1050mm diameter. Orientation may be 90˚ to centerline of mainline pipe (tees) for concrete pipe 1050mm diameter or larger. No section of service stubs to protrude past inside of concrete pipe wall.

.7 Manufactured wye connections to PVC mainline pipe to be made with extrusion molded PVC or fabricated PVC fittings manufactured to ASTM D3034 and CSA B182.2

.8 Field installed tees and wyes:

.1 In-situ installation of tees and wyes into concrete or PVC mainline pipe shall be made with approved PVC swaddle installed to the manufacturers specifications into a neatly cored hole in the pipe wall.

.2 Connections to ribbed PVC pipe to be made with a preformed tee and wye fitting when connection is up to two sizes smaller than mainline pipe. For these pipes, in-situ installation of tees or wyes involving cutting across pipe ribs not permitted. For connections more than two sizes smaller than mainline pipe, an insertable tee for ribbed PVC pipe is permitted. When an insertable is used, hole cut into mainline pipe to cut as few ribs as possible.

.9 PVC service connection pipe and fitting joints: push-on type comprised of integral bell with single elastomeric gasket to ASTM D3212 and ASTM F477. Normal pipe laying length joint to joint to be 4.0m.

.10 Pipe and fitting joints for service connection pipe materials other than PVC type PSM sewer pipe to be as specified for applicable mainline pipe.

2.5 CONCRETE

.1 Concrete mixes and materials required for bedding cradles, encasement, and incidental uses: to Section 03 30 02 - Cast-in-Place Concrete.

.2 Concrete to be minimum 20 MPa.

2.6 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material in accordance with Section 31 05 16 - Aggregate Materials

.2 Concrete mixes and materials for bedding, cradles, encasement, supports in accordance with Section 03 30 02 - Cast-in-Place Concrete.

2.7 BACKFILL MATERIAL

.1 As shown on Contract Drawings.

.2 In accordance with Section 31 05 16-Aggregate Materials.

Part 3 EXECUTION

3.1 PREPARATION .

.1 Clean pipes and fittings of debris and water before installation and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Do not allow contents of sewer or sewer connection to flow into trench.

.3 Trench alignment and depth as shown on Contract Drawings.

3.3 CONCRETE BEDDING AND ENCASEMENT

.1 Do concrete Work in accordance with Section 03 30 02 - Cast-in-Place Concrete. Place concrete to details as indicated.

.2 Position pipe on concrete blocks to facilitate placing of concrete.

.1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

.3 Do not backfill over concrete within 24 h after placing.

3.4 GRANULAR BEDDING

.1 Fill over-excavation below design elevation of bottom of specified bedding with granular bedding placed and compacted. Drain rock may be used for backfill of over-excavation only with Departmental Representative's approval.

.2 Place granular bedding material across full width of trench bottom in uniform layers not exceeding 150mm compacted thickness to depth as shown on Contract Drawings.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% Modified Proctor Density in compliance with ASTM D1557. (All following references to density imply in compliance with ASTM D1557).

3.5 INSTALLATION

.1 Handle pipe in accordance with manufacturer's recommendations.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. Concrete pipe as specified herein, PVC pipe to CSA B182.11, Steel Spiral Rip Pipe to CAN3- G401.

.3 Horizontal tolerances: ± 50 mm from specified alignment.
Vertical tolerances: ± 10 mm from specified grade. Reverse grade is not acceptable.

.4 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.5 Commence laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.6 Pipes on curved alignments:

.1 For Concrete, PVC, profile PVC and open profile HDPE pipe do not exceed permissible joint defection recommend by pipe manufacturer.

.2 Smooth profile PVC pipe: for 100 mm to 300 mm sizes conform to required curvature by bending pipe barrel. In no case shall radius of curvature to be less than 300 times outside diameter of pipe barrel.

.7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.

.8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.9 Cut pipes as required, as recommended by pipe manufacturer, without damaging pipe and leave smooth end at right angles to axis of pipe.

.10 Joints:

.1 Install gaskets as recommended by manufacturer.

.2 Support pipes with hand slings or crane as equired to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes before joining.

.4 Maintain pipe joints free from mud, silt, gravel and other foreign material.

.5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.

.6 Complete each joint before laying next length of pipe.

.7 Minimize joint deflection after joint has been made to avoid joint damage.

.8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.11 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as specified otherwise.

.12 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative, to prevent "creep" during down time.

.13 Plug lifting holes with approved prefabricated plugs, to pipe suppliers recommendations for sealing methods.

.14 Make watertight connections to manholes.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.2 Core neat circular holes in walls of existing manholes. Do not hammer or chip except as approved by Departmental Representative.

3.6 PIPE SURROUND

.1 Upon completion of pipe laying, and after Departmental Representative has inspected work in place, surround and cover pipes as shown on Contract Drawings.

.2 Hand place surround material in uniform layers not exceeding 150mm compacted thickness simultaneously on each side of pipe. Do not dump material within 1 m of pipe.

.3 Compact each layer from pipe invert to underside of backfill to minimum 95% Modified Proctor Density.

3.7 CONNECTIONS TO EXISTING MAINLINE PIPES

.1 Use prefabricated saddles or approved field connection materials and techniques to connect service pipes to existing mainline sewer pipe.

.2 Where feasible, make connections to existing non- reinforced or reinforced concrete mainline pipe by coring or sawing circular holes in existing pipe walls. Where not feasible, make as follows:

.1 Break in to pipe by drilling small diameter holes, spaced at approximately 50 mm along pipe axis, using a drill or chipping gun. Use hammer to strike concrete adjacent to centre holes to create small core, and similarly expand core to suit outside dimensions of stub.

.2 Core dimensions to allow maximum 20 mm clearance around stub at any point.

.3 Trim stub to conform closely to shape of pipe interior when installed.

.4 Insert stub into core, ensuring that no portion of stub protrudes beyond interior of pipe.

.5 Prepare non-shrink, fast-setting cementious grout to “dry pack” consistency. Pack grout tightly into void between stub and pipe.

.6 Hand finish interior and exterior grout surfaces to smooth surface.

.7 Allow sufficient time for strength development of grout prior to installation of connecting pipe or trench backfill.

.3 For new connections to existing PVC mainline sewers, drill hole in mainline to exact dimension of new connection. Use saddle or insertable tee for connections more than two sizes smaller than mainline. Insertable tees may be used for all types of gravity mains provided insertable tee designed for applicable pipe thickness is used.

.4 For new connections to existing ribbed PVC pipe mainline sewers use performed tee or wye fitting when connection is up to two sizes smaller than mainline pipe. For these pipes, in-situ installation of tees or wyes involving cutting across pipe ribs not permitted. For connections more than two sizes smaller than mainline pipe, an insertable tee for ribbed PVC pipe is permitted. When an insertable tee is used, hole cut into mainline pipe to cut as few ribs as possible.

3.8 BACKFILL

.1 Place backfill in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.

.2 Backfill requirements, including type of material and compaction requirements, as shown on Contract Drawings.

.3 Under paving and walks, compact backfill to at least 95% Modified Proctor Density.

3.9 SERVICE CONNECTIONS

.1 Install service connections to 3.5 and as shown on Contract Drawings.

.2 Install inspection chamber at specified location set plumb and to specified elevation. If inspection chamber located in driveway, lane or paved surface install cover or lid as shown on Contract Drawings.

.3 Place location marker at ends of plugged or capped unconnected sewer lines.

.1 Each marker: 40 x 90 mm stake extending from pipe end at pipe level to 0.6 m above grade.

.2 Paint exposed portion of stakegreen with designation STM SWR LINE in black.

.4 Sawcut adjacent curb on alignment of service connection and paint green.

3.10 CLEANING AND FLUSHING

.1 Before flushing and testing, ensure sewer system is completely finished and make arrangements with Departmental Representative for scheduling of testing.

.2 Water may be supplied from Departmental fire hydrants upon application for a Hydrant Use Permit.

.3 Obtain Departmental approval prior to discharging flushing water to sewers or drainage ditches.

.4 Comply Section 01 35 44-Environmental Procedures in regard to discharge of flushing water.

.5 Provide Departmental Representative with all required approvals prior to discharging flushing water.

.6 Remove foreign material from pipe and related appurtenances by flushing with water. Main to be flushed at water velocities as high as can be obtained from available water sources. Continue flushing at least until flow from most distant point has reached discharge point and until water discharged is clean and clear.

3.11 VIDEO INSPECTION

.1 The Contractor shall video inspect completed storm sewers under 900 mm in diameter following completion of installation. The video inspection report shall be in the form specified by the Departmental Representative. Copies of the video tapes and written report shall be forwarded to the Departmental Representative when available.

.2 Should video inspection indicate apparent deficiencies, Departmental Representative may direct Contractor to perform additional testing as follows.

.3 Additional testing may include passing rubber ball, mandrel or test plug having a minimum dimension of 95% of diameter of sewer pipe completely through pipes and appurtenances. A light test may be performed in lieu of ball test at discretion of Departmental Representative.

3.12 INSTALLATION STANDARD

.1 Repair all deficiencies and visible leaks.

.2 Repair procedures and materials subject to approval of Departmental Representative.

.3 Departmental Representative reserves right to require Contractor to replace defective installations at Contractor's sole cost.

.4 Test Procedures, including video inspection, to be repeated and repairs made until satisfactory results are obtained.

.5 Acceptable Ponding:

.1 Connections: 10mm maximum ponding over 4m length of pipeline.

.2 Mainline Plastic sewers:

.1 300mm diameter or less: 20mm maximum ponding over 4m length of pipe

.2 Greater than 300mm diameter: 30mm ponding over 4m length of pipeline.

.3 Mainline Concrete sewers:

.1 300mm diameter: 20mm maximum ponding over a 5m length of pipeline

.2 Greater than 300mm diameter: 30mm maximum ponding over a 5m length of pipeline.

3.13 CONNECTIONS TO EXISTING MAINS

.1 Make connections to existing storm sewer systems unless shown otherwise on Contract Drawings. Notify Departmental Representative minimum 48 h in advance of scheduled connection.

.2 Make connection in presence of Departmental Representative. To prevent damage to existing utilities, excavate last 300 mm over utility by hand.

3.14 PERFORATEDDRAIN PIPE

.1 Where shown on Contract Drawings or where directed by Departmental Representative install perforated drain pipe adjacent to sidewalk or cub andgutter.

.2 Drain pipe to be 100 mm minimum.

.3 Connect to catch basins.

.4 Install other perforated drain pipes as shown on Contract Drawings.

.5 Install sweep bend and cap at ground grade at upstream end of run.

.6 Install with perforations downward.

END OF SECTION

APPENDIX A

Correctional Service Canada
Technical Services Branch
Electronic Systems

Electronic Engineering Specification
ES/Spec-0402
ES/Spec-0405
Electronic Engineering Standards
ES/STD-0405

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SPEC-0402
Revision 2
8 March, 2002

ELECTRONICS ENGINEERING SPECIFICATION

PIDS PUBLIC ADDRESS SYSTEM FOR USE IN FEDERAL CORRECTIONAL INSTITUTIONS

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Perimeter Intrusion Detection System (PIDS) Public Address (PA) systems in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by :

Manager,
Electronic Systems Research

Approved by :

Director,
Engineering Services

8 Mar 02

TABLE OF CONTENTS

ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
PA	Public Address
PIDS	Perimeter Intrusion Detection System
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirements

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

1.1 General

This specification defines the essential technical and functional requirements of the Correctional Service Canada (CSC) for the procurement and installation of a Public Address (PA) system to be used in conjunction with the Perimeter Intrusion Detection System (PIDS) in federal correctional institutions.

1.2 Purpose

The PIDS Public Address System provides the Main Communication and Control Post (MCCP) operator with one-way voice access into each zone of the PIDS-protected perimeter. The operator will use this system to communicate with intruders detected and observed by the PIDS system.

The system described herein would be applicable to new institutions to be constructed. It could also be retrofitted into existing institutions whenever it becomes necessary to add a perimeter Public Address capability or replace existing obsolete equipment.

1.3 Commercial-Off-The-Shelf Equipment

The PIDS PA system shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control consoles.

1.4 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of penal institutions. Maintaining national security, the safety of staff and offenders alike is CSC's commitment to the government and public. Electronic security systems operating in this unique environment shall maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that the equipment complies with the pertinent CSC specifications and standards.

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities or may be tested in a CSC facility to verify the effectiveness of the proposed technologies when subjected to the restrictive operational environment.

CSC shall also verify in depth any of the system technical specifications called up. CSC may, when it deems necessary, request the supplier to arrange for a full site demonstration. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.5 Equipment Procurement

Any ordering of equipment/material before the approval of the PIDS PA system design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

1.6 Quantity of Equipment

The quantity and location of the PIDS PA equipment required for CSC institutions will be contained in the specification identified in the Statement of Requirements (STR).

2.0 APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Electronic Systems for Correctional Service of Canada Institutions.
ES/SOW-0102	Statement of Work for Quality Control for installation of Electronic Systems in Federal Correctional Institutions.
ES/SPEC-0005	Specification for Main Communications and Control Post Integration Consoles
ES/SPEC-0401	Specification for Perimeter Intrusion Detection System Integration Units
EIA-310-C	Electronic Industry Association Standard for Racks, Panels and Associated Equipment

3.0 REQUIREMENTS

3.1 General

The contractor shall design, supply, install, test and provide documentation and training for a Perimeter Intrusion Detection System Public Address system in accordance with the Standards, Specifications and Statements of Work specified in Section 2.0.

3.1.1 System Configuration

The PIDS Public Address system elements shall be deployed zone by zone at the perimeter of the institution corresponding to the alarm and detection zones of the PIDS system. The system shall consist of the following elements in quantities to be determined by the contractor as required to support this requirement.

a. PIDS Public Address Switcher consisting of:

- a zone selector panel;
- a microphone; and
- test tone generator.

b. Loudspeaker assemblies, one or more per zone, consisting of:

- loudspeaker and matching transformer;
- horn; and
- mounting fixture.

c. Common equipment (amplifiers, power supply, etc.)

d. Interconnecting wire, cable, conduits, ducts, junction boxes, etc.

3.1.2 System Capacity

The number of loudspeaker assemblies and the number of zones served by each shall be as specified in the STR. The system shall be of a modular design and it shall be possible at a future date to add more associated equipment to the basic installed complement without requiring the existing hardware.

3.1.3 Period of Operation

The system and all associated equipment shall be rated for and capable of 24 hours per day, seven days per week operation.

3.2 System Requirements

3.2.1 Wires, Cables, Conduits, Ducts

The contractor shall supply all necessary terminations, cross connection cabinets, conduits, wire and cabling and any other items that may be required for the satisfactory completion of the specified system. All installation workmanship shall be performed in accordance with ES/SOW-0102, Statement of Work and all applicable national, provincial, and local electrical codes.

A wiring diagram shall be supplied in the Installation section of the Maintenance Manual to detail where module connections terminate and how wires are routed and terminated.

Conduits, cables, ducts, trays, etc. may be either Government Furnished Equipment (GFE) or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

3.2.2 Control Equipment

The maximum feasible amount of common control equipment (power supplies, logic boards, amplifiers, etc.) shall be located in Terminal Equipment Spaces (TES) and Common Equipment Room (CER) provided for the purpose. These areas will be identified in the STR. It is preferred that only equipment such as control panels, etc., which the operator must access directly, should be located in the Control Posts.

3.2.3 Interface to Data Logger

The contractor shall supply and install all necessary wiring and control equipment required to interface the system to the PIU Data Logger described in ES/SPEC-0005, Specification.

3.3 Design Requirements

3.3.1 General

To the maximum practical extent, off-the-shelf equipment should be selected for use in the system. New designs should be restricted to common interface areas, control panels and consoles, or unique devices for which an off-the-shelf item does not exist.

A design objective is to minimize the number of wires required between all elements of the system.

A space-diversity approach to system planning shall be employed to ensure that loss of one interconnection routing does not impair the operational capability of the complete system.

3.3.2 Wiring Supervision

Wiring shall be supervised in all system modes. An alarm shall occur if any system wiring is cut or shorted to other wires or if the system devices are tampered with by unauthorized people or environmental conditions.

3.3.3 Speaker Locations

Speakers shall be located to provide complete coverage of the assigned zones.

3.3.4 Speaker Output

At any point in the assigned zone, the voice output shall be intelligible in the presence of the highest level of background audio interference normally encountered at that point (e.g., high wind, etc.)

3.3.5 PA Switcher

The PIDS PA Switcher shall be controlled by the PIU processor. The switcher shall enable the selection of a one-way voice path to each perimeter zone on a mutually exclusive basis. The zone selected shall be visible on the front panel of the PIDS PA switcher.

The PIDS PA switcher shall meet the following requirements:

a. equipped with an adjustable test tone generator;

b. capacity for up to 15 perimeter zones;

c. installed in an Electronic Industries Association (EIA) standard 19" equipment rack;

d. equipped with connectorized inputs/outputs; and

e. system alarm outputs for power supply failure, loop continuity failure, and switching relay failure.

3.3.6 Microphone

The microphone shall be co-located with the PIDS Public Address Control Panel, and shall be used to communicate with the selected zone. The microphone shall be equipped with an integral push-to-talk switch which will permit the operator to open the voice path to the selected zone. The microphone shall be a hand-held type and attached to the PIU console via a spring clip retainer.

3.3.7 Speaker Mounting

The speakers shall be installed outdoors and shall be rugged, weatherproof units capable of satisfactory operation under the environmental conditions of this specification. The speaker units and their mountings shall exhibit high resistance to damage or destruction due to deliberate, physical abuse. The contractor shall submit a sample of the unit he proposes to use for approval prior to proceeding with procurement of these parts. Speakers shall be mounted so as to be unreachable without climbing aids such as ladders, etc. Speakers shall be mounted on the outside of the inner perimeter fence.

3.3.8 Matching Transformer

The matching transformer shall be part of the speaker assembly and shall have a number of selectable taps to permit on-site selection of the proper power level to be delivered to each speaker. The taps shall be provided with a secure cover to inhibit unauthorized adjustment.

3.3.9 Interchangeability

Speakers and associated equipment shall be readily interchangeable. Where feasible, all major components shall be of modular plug-in design.

3.3.10 Facilities

Power for this system is available at each institution from the domestic source through the Emergency Power Distribution System. The latter system consists of a diesel-electric set which typically requires twenty (20) seconds to take over the load on sensing failure of the domestic source.

3.3.11 System Performance on Switch over

The PIDS PA system shall incur no failure or damage directly attributable to switch over of power sources as described in this specification. On completion of a switch over action, this system shall provide normal system operation.

3.3.12 Sabotage, Tampering and Survivability

Elements of the system must operate in areas exposed to inmate access and shall have high resistance to damage, destruction, or conversion to other uses (including weapons). All interconnecting service must be secure against tampering or improper eavesdropping interference.

3.3.13 Power Failure

Loss or restoration of primary power to the system shall not produce spurious annunciations or outputs to the data logger. When power is returned after a power failure, the system shall resume normal operation without operator action.

3.3.14 System Failure

A system failure shall be deemed to have occurred when any required annunciation is not produced or when any required control function cannot be performed.

3.3.15 Human Factors

Elements of the system which are used directly by staff or inmates (i.e., control panels, etc.) shall conform with accepted principles of good human factors design.

3.3.16 Existing Equipment

In most installations, control elements of the system will share console space with other electrical/electronic equipment such as door controls, lighting controls, etc. and will be operated by the same staff member. In such cases it is important that effort be made to coordinate the functional and operational design of the system according to accepted human engineering principles to ensure a uniform appearance and commonality of a layout to assist the operator in the performance of his duties.

3.3.17 Control Panels

Mounting space within control posts is usually limited and the problem of determining a suitable equipment mounting location is minimized if the control panels are small. Therefore, the designer should make maximum possible use of control devices which combine two or more functions into a single unit.

The system shall use EIA standard display and control panels. The design of the display and control panel shall be in accordance with the ES/STD-0802, Standard.

3.4 Functional Requirements

3.4.1 PA Control

The Perimeter Intrusion Detection System Integration Unit shall control the PIDS PA. In the event of a perimeter alarm condition, the output of the PIDS PA shall be automatically switched to the perimeter sector being assessed by the CCTV system. The output of the PA shall be switched on a sector by sector basis under alarm conditions. The PIDS PA shall provide the MCCP operator one way voice communication to an alarmed sector. The activation of the PA shall be under the control of the operator using the push-to-talk switch on the microphone. Only the activation and actual use of the PIDS PA shall be logged by the PIU data logger.

3.4.2 PA Control Panel

The contractor shall provide a PIDS PA controls panel in the operator console. The panel shall contain a microphone input and test tone generator to permit access to and testing of the PIDS PA system on a sector by sector basis.

3.5 Environmental Requirements

The amplifier, microphone and speaker equipment shall comply with all requirements of this specification over the following environmental ranges:

3.5.1 Indoor Equipment

- temperature 0°C to 50°C; and
- humidity 0% to 95% Non Condensing.

3.5.2 Outdoor Equipment

- temperature -40°C to +55°C; and
- humidity up to 100% Condensing.

In addition, outdoor equipment shall continue to operate in full compliance with all parts of this specification and shall not be damaged by any of the following conditions in any combination:

- exposure to direct sunlight;
- any amount of frost;

- wind velocity up to 100 Km per hour;
- rain;
- snow;
- hail stones up to 2 cm in diameter;
- ice buildup to a thickness of 2 cm; and
- any air-to-ground or ground-to-air lightning strikes outside a 1 Km radius.

3.6 **Power Requirements**

The system shall use VAC power within the following limits:

3.6.1 Voltage: 120 VAC ±10%;

3.6.2 Frequency: 60 Hz ±1.5%;

3.6.3 Transients: up to 5 times nominal voltage for up to 100 msec durations. Changes in the input power or any fluctuations within the above limits shall not cause damage to the unit; and

3.6.4 Power: power consumption shall not exceed 100 watts.

3.7 **Installation Requirements**

The system shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

3.8 **Documentation Requirements**

All final system documentation shall be provided with a Copyright Release for the documentation delivered in support of the system. The documentation shall be in accordance with the ES/SOW-0101, Statement of Work.

3.9 **Support Requirements**

The system maintenance and spares support shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.10 Training Requirements

Operator training and maintenance training on the system shall be in accordance with the ES/SOW-0101, Statement of Work.

4.0 QUALITY ASSURANCE

4.1 General

The system Quality Assurance programme shall be provided as detailed in the ES/SOW-0101, Statement of Work.

All on-site installation work, test plans and system acceptance testing shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

4.2 System Check Out

During the system check out, the contractor shall measure PIDS PA system sound levels as follows:

For each speaker, measure the test tone & voice sound levels between the perimeter fences at two locations:

- directly in front of speakers; and
- the midpoint between two (2) speakers

The contractor shall record the sound level readings and submit the test results to the Design Authority.

4.3 Final Acceptance Test Procedures

The Design Authority will repeat the system check out tests with the contractor, using the same sound level metre that was used for the system check out.

5.0 DELIVERY

Delivery requirements for the system documents, drawings, plans, manuals, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/SPEC-0405
Revision 2
8 March 2002

ELECTRONICS ENGINEERING SPECIFICATION

FENCE DISTURBANCE DETECTION SYSTEM FOR USE IN FEDERAL CORRECTIONAL INSTITUTIONS

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Fence Disturbance Detection Systems (FDS) in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

Prepared by :

Manager,
Electronic Systems Research

Approved by :

Director,
Engineering Services

TABLE OF CONTENTS

ABBREVIATIONS

The following abbreviations are used in this specification:

ATP	Acceptance Test Procedure
CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
FDS	Fence Disturbance Detection System
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
MDS	Motion Detection System
PDR	Preliminary Design Review
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirements
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

1.1 General

This specification defines the essential technical and functional requirements of the Correctional Service Canada (CSC) for the procurement and installation of a Fence Disturbance Detection System (FDS) for federal correctional institutions.

1.2 Purpose

The primary use of the system is to provide an intrusion detection capability at the perimeter fences.

Through the selection of certain options or alternatives, the system described herein would be applicable to new institutions to be constructed. It could also be retrofitted into existing institutions whenever it becomes necessary to add a perimeter motion detection capability or replace existing obsolete equipment.

1.3 Commercial-Off-The-Self Equipment

The FDS shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. New equipment designs shall be restricted to unique interfaces and common control console.

1.4 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of penal institutions. Maintaining national security, the safety of staff and offenders alike is CSC's commitment to the government and public. Electronic security systems operating in this unique environment shall maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that the equipment complies with the pertinent CSC specifications and standards.

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC shall verify in depth any of the system technical specifications called up. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a supplier. Any supplier can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

1.5 Equipment Procurement

Any ordering of equipment/material before the approval of the FDS design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

1.6 Quantity of Equipment

The quantity and location of the FDS equipment required for CSC institutions are specified in the Statement of Technical Requirements (STR).

2.0 APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Electronic Systems for Correctional Service of Canada Institutions
ES/SOW-0102	Statement of Work for Quality Control for installation of Electronic Systems in Federal Correctional Institutions
ES/SPEC-0005	Specification for Electronic Systems Integration into the Main Communications and Control Post in Federal Correctional Institutions
ES/SPEC-0400	Specification for Perimeter Intrusion Detection Systems
ES/STD-0401	Standard for Fence Sensors
ES/STD-0404	Standard for Proximity Sensors
ES/STD-0803	Standard for Video Display Units
EIA-310-C	Electronic Industry Association Standard for Racks, Panels and Associated Equipment

3.0 REQUIREMENTS

3.1 General

The contractor shall design, supply, install, test and provide documentation and training for an FDS in accordance with the Standards, Specifications and Statements of Work specified in Section 2.0.

3.1.1 System Capacity

The number of perimeter sectors or zones shall be as specified in the STR. The system shall be of a modular design and it shall be possible at a future date to add more sectors or zones and associated processing and control equipment to the basic installed complement without replacing existing hardware.

3.1.2 Period of Operation

The FDS and all associated equipment shall be rated for and capable of 24 hours per day, seven days per week operation. Components of the system located outdoors shall be designed to operate continuously over the range of temperature, wind, precipitation and humidity conditions expected on the site and as noted in this specification.

3.2 System Requirements

3.2.1 Wires, Cables, Conduits, Ducts

The contractor shall supply all necessary terminations, cross connection cabinets, conduits, wire and cabling and any other items that may be required for the satisfactory completion of the specified system. All installation workmanship shall be performed in accordance with ES/SOW-0102, Statement of Work and all applicable national, provincial, and local electrical codes.

A wiring diagram shall be supplied in the Installation section of the Maintenance Manual to detail where connections terminate and how wires are routed and terminated.

Conduits, cables, ducts, trays, etc. may be either Government Furnished Equipment (GFE) or supplied and installed by the contractor depending on the particular institution.

Connectors provided on the ends of any cable must mate with the corresponding connector on the equipment. Adapters from one type of connector to another are not acceptable.

3.2.2 Control Equipment

The maximum feasible amount of common control equipment (power supplies, logic boards, amplifiers, etc.) shall be located in Terminal Equipment Spaces (TES) and Common Equipment Room (CER) provided for this purpose. It is preferred that only equipment such as lights, switches, actuators, etc. which the operator must access directly should be located in the Control Posts (CP).

3.2.3 **Floor Space**

The contractor shall state in the Preliminary Design Review (PDR) proposal the requirements for floor space to house the electronic control and processing equipment.

3.2.4 **Equipment Racks**

The contractor shall provide all necessary racks to mount the control and processing equipment.

3.2.5 **Interface to Data Logger**

The contractor shall supply and install all necessary wiring and control equipment required to interface the system to the Data Logger described in ES/SPEC-0005, Specification.

3.3 **Design Requirements**

3.3.1 **General**

To the maximum practical extent, off-the-shelf equipment should be selected for use in the FDS. New designs should be restricted to common interface areas, control panels and consoles, or unique devices for which an off-the-shelf item does not exist.

A design objective is to minimize the number of wires required between all elements of the system.

A space-diversity approach to system planning shall be employed to ensure that loss of one interconnection routing does not impair the operational capability of the complete FDS.

3.3.2 **Wiring Supervision**

Wiring shall be supervised in all system modes. An alarm shall occur if any system wiring is cut or shorted to other wires or if the system devices are tampered with by unauthorized people or environmental conditions.

3.3.3 **Sabotage, Tampering and Survivability**

Elements of the FDS shall have high resistance to damage and destruction. All interconnecting service must be secure against tampering or improper interference.

3.3.4 **Power/Data Redundancy**

The FDS shall be powered from two independent DC power supplies connected to the system at two distinct points. Failure of a single supply shall not cause the system to fail, i.e. either power supply can power the entire system.

The FDS shall communicate with the system controller at two distinct points. Failure of one data line will not cause the system to fail, i.e. the communications shall be fully redundant.

3.3.5 **Power Failure**

Loss or restoration of primary power to the FDS shall not produce spurious alarms or outputs to the data logger. When power is returned after a power failure, the system shall resume normal operation without operator action.

3.3.6 **System Failure**

A system failure shall be deemed to have occurred when any required motion detection is not produced or when any required control function cannot be performed.

3.3.7 **Human Factors**

Elements of the system which are used directly by staff (i.e., control panels, etc.) shall conform with accepted principles of good human factors design.

3.3.8 **Existing Equipment**

In most installations, control elements of the system will share console space with other electrical/electronic detection equipment and will be operated by the same staff member. In such cases it is important that effort be made to coordinate the functional and operational design of the system according to accepted human engineering principles to ensure a uniform appearance and commonality of a layout to assist the operator in the performance of his duties.

3.3.9 **Control Panels**

Mounting space within control posts is usually limited and the problem of determining a suitable equipment mounting location is minimized if the control panels are small. Therefore, the designer should make maximum possible use of control devices which combine two or more functions into a single unit (e.g., a lighted push-button instead of a separate light and an unlit push-button).

The system may use EIA standard display and control panels or video display units. The design of either display and control method shall be in accordance with ES/STD-0802 or ES/STD-0803, Standards.

3.3.10 **Back-Up Power**

The contractor shall identify any built-in or optional power failure protection available with the equipment.

3.3.11 **Perimeter Signal & Power Cables**

Signal distribution cables for the FDS shall be mounted at the top of the inner perimeter fence. All cable runs from the top of the fence to sensors, pull boxes, etc. shall be carried in a steel conduit and buried where it leaves the fence. All cable runs from the perimeter to the equipment room and/or MCCP shall be carried in buried conduits. All conduits are to be rigid; rigid steel above ground, rigid PVC below ground.

If power is required on the perimeter for the FDS, the power cables shall be buried or run in rigid steel conduct along the outer perimeter fence.

All cables run from the perimeter to the common equipment room and/or Main Communication & Control Post (MCCP) shall be carried in buried conduits.

3.3.12 **Sector Calibration Requirements**

The FDS shall provide the capability to adjust the sensitivity thresholds remotely by sector. The contractor shall state the following requirements in the technical proposal:

a. number of personnel to complete the adjustments;

b. special calibration equipment (if required); and

c. length of time to adjust each sector's threshold.

3.3.13 **Sector Alignment**

A preferred sector may be made up of more than one FDS sector, however, the original boundaries must be maintained in order to coordinate with the MDS and CCTV subsystems. A preferred sector layout will be provided in the site specific documentation.

3.3.14 **Alarm Display and Control**

For each sector of the sensor system, the following functions shall be provided:

a. alarm annunciation (audible and visual);

b. alarm acknowledgement (common);

c. alarm cancellation;

d. sector mask;

e. sector secure;

f. sector test (enable and results displayed);

g. tamper annunciation (not necessarily sector related);

h. tamper acknowledge;

I. tamper cancel;

j. system failure annunciation (not necessarily sector related);

k. system failure acknowledge; and

l. system failure cancel.

A disable control shall be provided for the audible annunciator.

3.3.15 **Test**

The system shall incorporate a TEST capability activated from the remote control panel. The test function will permit the operator to verify correct operation of the complete system from the sensor to the annunciation panel. Any limitations on the test capabilities of the proposed system shall be clearly identified in the proposal.

3.3.16 **System Interface**

The sensor system shall be equipped with an interface providing for the complete status display and system control from a remote display and control panel.

It may not be necessary to provide a display and control panel if the interface requirements can be met via other terminal equipment.

3.3.17 **Interface Specification - Electrical**

The interface between the sensor processor and system controller shall be bidirectional. Each signal shall be available at the interface in either of the following forms:

a. Standard data link message following RS -232C specifications, or

b. Standard data link message following RS-485 specifications.

The interface between the system controller and the PIDS shall be bidirectional. Each Detection, Tamper or Jamming signal shall be available at the interface in one of the three following forms:

a. the equivalent of a dry relay closure for an output and be compatible with a dry relay contact closure for input,

b. Standard data link message following RS -232C specifications, or

c. Standard data link message following RS-485 specifications.

All RS232 or RS485 signals provided to, and received from, the PIDS must conform to either the Senstar-Stellar Sennet or StarCom protocols. Any driver required for another protocol will be the responsibility of the contractor.

3.3.18 **Interface Specification - Physical**

The interface shall be provided in one of two forms as follows:

a. barrier strip; or

b cable connector.

Where a cable connector is used, the contractor shall deliver both male and female components.

3.3.19 **Interface Specification - Functional**

The interface shall permit the remote control and display of the following functions:

a. Alarm annunciation;

b. Alarm acknowledgement;

c. Alarm cancel;

d. Sector mask;

e. Sector secure;

f. Sector test;

g. Sector tamper alarm annunciation;

h. Sector tamper acknowledge;

I. Sector tamper cancel; and

j. System fail annunciation.

Where additional annunciation and control functions are provided, these shall also be available at the interface.

3.4 Operational Requirements

3.4.1 General

The functional requirements of the FDS shall be in accordance with the ES/STD-0401, Standard.

3.4.2 Detection

The installed system shall detect an intruder with a mass of 45 kg or more using any of the following defeat methods employed around the inner perimeter fence.

Any swing or sliding gates forming part of the inner perimeter fence shall be provided permanent, continuous detection coverage.

3.4.2.1 Climbing Technique

The system shall detect any vigorous or careful climb by a climber having a mass of 45 Kg. or more which takes between zero and 7 seconds to get to the top of a minimum 3.60 metre high fence. Time is measured from the first point of contact with the fabric until the time when the top of the fence can be reached. Any attempt to breach the top of the fence must be detected.

3.4.2.2 Cutting Attempts

The system shall detect any cutting attempts using a minimum rate of one cut per 60 seconds.

3.4.2.3 Other Attempts

The system shall detect any valid target employing any method other than cutting which will damage or deform the inner perimeter fence.

3.4.3 Probability of Detection (P_d)

The FDS system shall provide continuous coverage of the specified detection zone using the identified detection criteria, and shall have, as a minimum, a statistical (P_d) as specified in Standard, ES/STD 0401.

3.4.4 Radiated Field / Proximity Detection

For systems which are mounted on the fence structure and which employ radiated field or proximity detection techniques to sense movement, the performance requirements shall be as defined in the Standard ES/STD-0404.

3.4.5 Dead Zones

Any point on the fence structure where reduced or non-detection can be repeated in two concurrent attempts shall be identified as a dead zone.

Any dead zone found in the system coverage during the 12-month period following system commissioning shall be corrected at the contractor's expense.

3.4.6 **Nuisance Alarms**

Nuisance Alarms are defined as those alarms which occur as a result of the detection of non-valid target within the specified environmental conditions. Nuisance Alarms may be caused by:

a. changes in atmospheric conditions;

b. Small animals (less than 45 kg);

c. Ground/air vibration;

d. Other observable causes (other than valid targets);

e. electrical or radio frequency interference;

f. Personnel, structures, or vehicles outside the detection zone; and

g. Alarms due to unknown causes but which cannot be classified as false alarms

Alarms caused by "Tests" are not classified as nuisance alarms.

Within the specified environmental conditions, the system's nuisance alarm rate shall not exceed:

a. 10 per 24 hour period;

b. monthly average of 0.60 alarms per day per sector; and

c. 7 alarms per sector in any one day.

The contractor shall state the expected nuisance alarm rate for this installation. This stated rate shall form part of any resulting contract. Persistent nuisance alarm rates in excess of the stated number during the 12-month period following commissioning shall necessitate corrective action by the contractor at his expense.

3.4.7 **False Alarms**

False Alarms are defined as those alarms which are caused by phenomena internal to the sensor. Such phenomena may include intermittent faults and transients due to changes in status of incoming power or may be related to the sensor's signal processing. The False Alarm Rate shall not exceed one per sector per year for the entire system.

3.4.8 **Tamper/Fault Alarm**

The sensor system shall be self-monitoring for short and open circuits, and shall generate an appropriate visual and audible sector alarm signal at the control panel whenever a transducer or associated interconnect circuit is shorted, cut, disconnected, or loss system power.

3.4.9 **Masking**

Each sector of the sensor system shall be capable of having its alarm indications rendered inoperative (masked) by a signal from the control panel, in order to permit maintenance or authorized traffic through the perimeter fence.

3.4.10 **System Test**

It must be possible to remotely test the operational status of the sensor system from the control panel by manually placing a sector or group of sectors in a "test" mode.

3.4.11 **Fail-Safe**

A power failure within the sensor, malfunction of processing or related circuitry, a short or open of any sensor cable or signal cable shall result in an output to the display and control system.

3.4.12 **Sector Audio**

The FDS must be able of providing an audio signal on a sector basis for testing and other maintenance purposes. A speaker and volume control shall also be included in the terminal equipment.

3.4.13 **Perimeter Sectors**

In order to provide prompt identification of the location of an attempted intrusion, the perimeter shall be divided into multiple sectors. The overall number and layout of sectors shall be arrived at by design review, subject to approval by the Design Authority.

3.4.14 **Sector Numbering**

FDS sectors shall be numbered sequentially from one (1) to the sector total, beginning beside the main gate of the institution, and continuing in sequence clockwise around the perimeter.

3.5 **Environmental Requirements**

The FDS shall operate over the environmental conditions in accordance with the ES/STD-0401, Standard.

3.6 **Power Requirements**

The FDS shall use VAC power within the limits in accordance with the ES/STD-0401, Standard.

3.7 **Installation Requirements**

The system shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

Depending on the configuration of the site or the sensor, the following installation methods shall be considered acceptable for the detection devices:

a. mounted directly on the inner perimeter fence;

b. mounted on a separate structure to be supplied by the contractor and installed on the existing fence; and

c. mounted on a freestanding structure, supplied by the contractor, which may or may not form a separate physical barrier in itself.

The sensor shall not reduce the effectiveness of existing perimeter facilities in deterring, impeding, detecting, or observing escape attempts.

Cables, pull boxes, distribution panels and all exposed equipment shall be secured against tamper and inmate attack. Steel enclosures shall be used throughout the installation; either locked or secured with a maximum of two (2) screws.

Cables, pull boxes, distribution panels and all exposed equipment shall be protected from damage due to lightning.

3.8 **Documentation Requirements**

All final system documentation shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.9 **Support Requirements**

The FDS maintenance and spares support shall be provided in accordance with the ES/SOW-0101, Statement of Work.

3.10 **Training Requirements**

Operator training and maintenance training on the system shall be in accordance with the ES/SOW-0101, Statement of Work.

4.0 QUALITY ASSURANCE

4.1 General

The system Quality Assurance programme shall be provided as detailed in the ES/SOW-0101, Statement of Work.

All on-site installation work, test plans and system acceptance testing shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

4.2 System Check Out

The FDS contractor shall provide, as a minimum, the following System Check Out Test results to the Design Authority prior to the scheduling of the on-site acceptance tests:

a. Sensitivity profile of each FDS sector, illustrating the sensor's normal status vs. the system's detection threshold level over a 24 hour period.

b. Climbs and simulated cutting attempts at two locations per fence panel around the entire perimeter.

c. Simulated wind test (for at least 30 seconds) for each FDS sector.

4.3 Acceptance Test Procedures

Based on a review of the System Check Out test results, the Design Authority will determine the appropriate number of locations to perform the official climb, cutting, and wind tests.

Special climbs may be attempted at Gate posts, mitred corners, and smaller-than-average fence panels to ensure 100% detection along the inner perimeter.

All climbs, cutting and wind tests must be successful before this section of the ATP is approved.

If any FDS sector requires the physical addition or relocation of sensor equipment or the adjustment of detection thresholds due to failed on-site tests, the System Check Out tests must be repeated for the failed sector(s).

5.0 DELIVERY

Delivery requirements for the system documents, drawings, plans, manuals, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

Delivery requirements of the system equipment shall be in accordance with the ES/SOW-0102, Statement of Work.

6.0 INTERFERENCE

Performance of the system shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment shall be in accordance with ES/SOW-0101, Statement of Work.

7.0 SAFETY

All system electrically powered elements shall meet the applicable Canadian Safety Association (CSA) standards.

Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/STD-0405
Revision 1
29 April 2002

ELECTRONICS ENGINEERING STANDARDS

PERIMETER INTRUSION DETECTION SYSTEM PERFORMANCE TESTING

Prepared by:

Manager,
Electronics Systems Research

Approved by:

Director,
Engineering Service

1.0 INTRODUCTION

This standard describes tests to ensure that the Perimeter Intrusion Detection System (PIDS) sensors provide adequate system performance and detection capability. Sites use different fence detection systems (FDS) and motion detection systems (MDS) sensor installations which require specific methods of performance testing. This standard will provide the minimum testing required to ensure that the systems continue to perform as technically designed.

2.0 DAILY TESTS

Daily tests will verify that an alarm condition on the perimeter will cause an appropriate annunciation on the PIDS display unit.

2.1 Procedures

The following procedure should be completed on a daily basis, as a minimum. It is recommended that these procedures be carried out at the start of each new shift:

a. Activate the automatic TEST for each sector for both MDS and FDS sensors.

It is recommended that a "longitudinal walk" be done on a daily basis in addition to the automatic sector TEST, for those MDS systems which use buried cable technology.

A "longitudinal walk" is a walk by an average-built person at a steady pace midway between the two perimeter fences. With the MCCP operator monitoring the sectors, the walker starts at the first sector and walks the entire perimeter. The MCCP operator will note whether or not each sector goes into an alarm state as the walker progresses along the perimeter.

b. Verify that the visual indication and the audible alarm are activated as each system sector is tested. Verify that the maintenance data logger printout records the results.

c. ACKNOWLEDGE and CLEAR each alarm, if applicable.

d. Verify at the completion of the test that all FDS and MDS sectors are normal.

e. In the event of a fault, repeat the test for the affected sensor or sector. If the fault continues to occur, advise the appropriate staff and the maintenance personnel.

f. Record the date, time and the results of the test.

3.0 WEEKLY TESTS

Weekly tests will verify the detection capability of the PIDS subsystem. One person conducts physical tests in all sectors for each FDS and MDS sensor, while the MCCP operator verifies the occurrence of alarm indications.

3.1 Procedures

The following procedures should be completed weekly as a minimum and involves the MCCP operator and a person of average build used as the perimeter walker.

NOTE: Reliable radio contact is essential.

3.2 Test Preparation

A coloured plastic disc, approx.10 cm in diameter should be securely fastened at the centre of each of the outer fence panels. A four-colour sequence should be used and the colour sequence is maintained around the total perimeter. The colour sequence will repeat itself after every fourth panel.

The fence panels are eight feet wide. The perimeter will be tested every eight feet after the fourth week. The total perimeter will be tested at the completion an eight-week cycle.

The actual test locations should be predesignated to guarantee uniform and repeatable testing around the total perimeter. Assuming a colour sequence of "white, red, green and black," the testing locations will progress as follows:

Week	Location
1	At the first posts of all "WHITE" panels.
2	At the first posts of all "GREEN" panels.
3	At the first posts of all "RED" panels.
4	At the first posts of all "BLACK" panels.
5	At all "WHITE" markers.
6	At all "GREEN" markers.
7	At all "RED" markers.
8	At all "BLACK" markers.

3.3 Test Method

Testing of the MDS, FDS and CCTV systems on a weekly basis at each predesignated location should use the following procedure:

a. At the outer fence at the first predesignated test location for that week, the perimeter walker establishes communications with the MCCP operator.

b. When advised by the MCCP operator, the walker walks at a normal pace from one fence to the other in the most direct manner, normally at right angles to the fence.

c. At the inner fence panel, the walker conducts an FDS test using procedures which are recommended for that specific institution.

d. The MCCP operator verifies that an alarm is generated in the sector(s) where the MDS crossing or the FDS testing occurs. The operator also verifies whether the proper CCTV camera(s) is (are) switched to the monitors for assessment when the alarm is received.

e. The walker remains near the fence until advised by the MCCP operator to proceed along the inner or outer fence to the next location.

f. Repeat the above steps at all predesignated locations for that particular week until the full perimeter has been tested.

g. If no alarm has occurred during an MDS crossing or an FDS test, repeat the appropriate test at the same location and proceed to the next location.

h. Record the date and time of the weekly test in the alarm log for the PIDS system. Describe the weather conditions and list the results. Advise the appropriate staff and notify the maintenance personnel if any tests did not produce an alarm condition.

4.0 MONTHLY REVIEW AND TESTING

The monthly review includes technical and performance checks of the sensors or any sector(s) which have been exhibiting high False/Nuisance alarm rates' and/or a degradation in detection capabilities.

The performance of the sensors should be reviewed by the electronic maintenance staff as well as other staffs who have the responsibility of keeping the PIDS operating in an optimum condition. The review should include false alarms and nuisance alarm rates, daily and weekly test results, problems reported by the staff conducting these tests and any other performance reports which are available.

4.1 Test Procedures

The following procedures will verify the sensor's performance and identify problem areas.

Efficient performance of sensors requires certain site conditions for the detection zone. The following conditions apply to the PIDS sensors and which must be to be adhered to:

a. No vegetation growth within the detection zone and near the perimeter fences.

b. No puddles, streams or runoff across the detection zone.

c. No items likely to attract birds or animals (garbage, vegetation, puddles, trees, overhanging branches, rodents, etc.).

d. No hills, ditches, gullies, gravel pits, or other ground obstructions.

e. No snow accumulation greater than specified by the Technical Maintenance procedure for the sensor.

f. No wind blown objects such as weeds, paper, cardboard, boxes, bags, etc. between or around the perimeter barriers.

g. No flags, loose fencing, temporary structures and other loose junction boxes, wire, conduit or razor ribbon coil ends.

h. Vigorous shaking of the FDS fence should produce NO rattles, bangs or squeaks. Fabric tension should be sufficient to produce NO noise when shaken.

I. Site maintenance staff will perform regular visual inspections of the perimeter to verify whether or not the above guidelines are being followed. Any differences are to be reported to the Chief, Plant Maintenance for immediate action.

Note - Site maintenance must be completed before the remaining tests can be accomplished.

Electronic maintenance staff should always perform technical tests before physical tests are considered and after site maintenance has been completed. Refer to the applicable documentation (e.g., suppliers' manuals) for technical test procedures.

Physical tests are to verify the sensor's ability to detect valid targets in its detection field. It is unrealistic to attempt thorough testing of each sensor throughout the entire sector. Therefore, the number of tests and choice of locations will depend on the following guidelines:

a. A nominal three sets of tests should be conducted. Each set of tests shall include the appropriate styles described in following paragraphs as well as any other(s) which have been developed.

b. Areas which are known to be less sensitive due to sensor or site characteristics, or areas which are prone to attack due to site characteristics should be considered.

c. If there are no known areas which are more vulnerable than others, the locations of the tests shall be chosen at random.

4.3 Test Description

The following are descriptions of basic physical tests which may be employed to establish whether or not a sensor is operating correctly depending on the sensor type and the severity of the problem. Personnel involved in testing are encouraged to improvise; however, the basic tests should be employed.

MDS Test Styles

Crawl Test - Belly crawl slowly, as flat to the ground as possible at a rate of no less than three cm/sec (approx. 3.5 min fence to fence). Belly crawls may be with the body perpendicular or parallel to the sector centre line, whichever has been shown to be the most difficult for the sensor to detect. (This test is most appropriate for microwave detection systems).

Jump Test - This involves standing outside of the detection area and with a running start jumping as high as possible above and as far as possible over the detection area.

Running Test - This involves starting at the inner fence and running as fast as possible to the outer fence. The speed limit specified for most systems is 6m/sec (1 second fence to fence).

Walk Test - This involves walking at a normal pace from the inner fence to the outer fence.

Other Tests - Any test or procedures which have been established by CSC through DES or the manufacturers research and testing. Refer to applicable documentation.

FDS Test Styles

Climb Test - From a standing start near the fence, the tester must climb up the fence fabric until he can touch the upper rail of the fence. This climb should not take more than seven seconds to complete. It is essential to complete each climb even though an alarm may have been received prior to reaching the top since the position on the fence where the alarm is received will provide information to all observers, including inmates.

NOTE: Personnel involved in the climb tests should wear gloves and soft-soled shoes.

Cutting Test - Since cutting of the fence is impractical, the tapping test has been developed to simulate the cutting attack. The following procedure should be followed:

a. Tap the fence with a metal object four times at intervals of five sec. Wait 60 seconds before repeating the test at the next location.

b. For each test, record whether or not an alarm occurs and the number of taps required.

If an alarm does not occur, repeat the test using the Woven Wire Cut method described below. This test should be conducted with the same time intervals described above.

a. Weave a solid wire (eg. COAT HANGER) through the fabric in a firm manner, ensuring maximum contact between the fence fabric and the wire.

b. Cut the woven wire in a number of places as described above.

c. Note whether or not an alarm occurs.

d. Remove all pieces of wire from the fence after the test has been completed.

5.0 ATTACK SCENARIO TESTS

The attack scenario test procedure is an exhaustive check of the detection capability and sensor performance of all the components of the PIDS system. The intent is to provide site maintenance, technical and physical testing of the sensors on a seasonal basis. These tests should be scheduled to occur during average weather periods for each season and should be no more than four months or no less than two months apart.

The attack scenario should be preceded by a full monthly review and testing procedure outlined in the above paragraphs.

The procedures to be used during the attack scenario testing are free but should follow reasonable guidelines to duplicate methods which inmates might use during an actual escape. Items which are always under supervision or which are stored outside the institutional perimeter, or methods and tools which are normally not available to inmates should not be used in these tests.

It is recommended that the physical tests above be used as guidelines for the attack scenario tests.

- END OF TEXT -

APPENDIX B

Geotechnical Engineering Review and Assessment: (Kent Institution)
Appendix a: Kent Institution - Gates 1, 2, 3, 4, 5 & 6
Appendix b: Kent Institution - Seismic Design Criteria
Appendix c: Kent Institution - Soil Logs from Golder Associates
Appendix d: Kent Institution - Standard Field Inspection Requirements

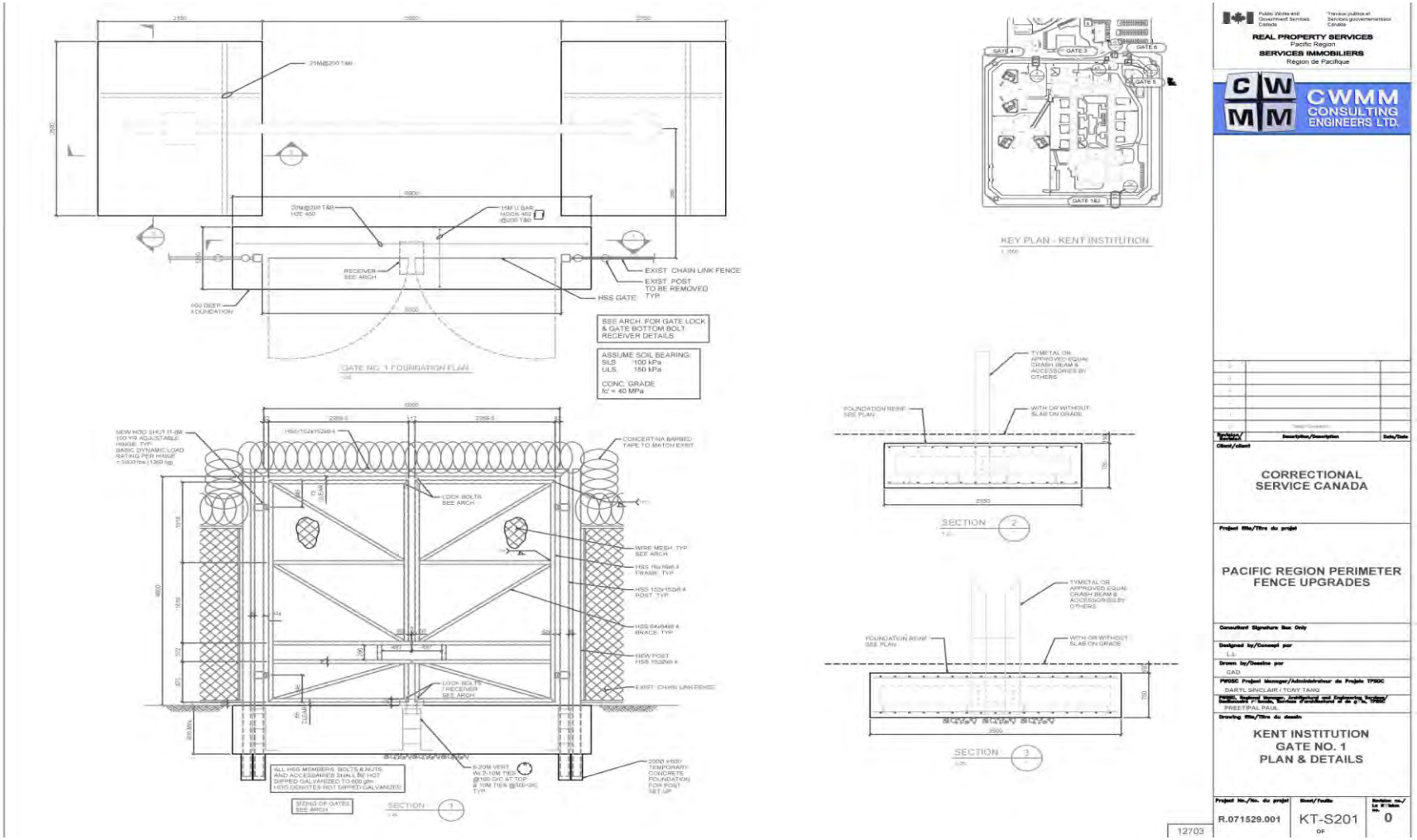
JECTH Consultants Inc.
Geotechnical & Environmental Engineers

APPENDIX "A"

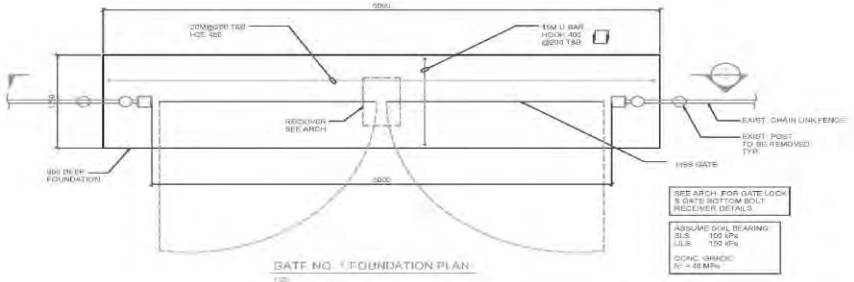
PROPOSED PERIMETER FENCE AND GATES UPGRADES
KENT INSTITUTION
4732 CEMETERY ROAD, AGASSIZ, BC

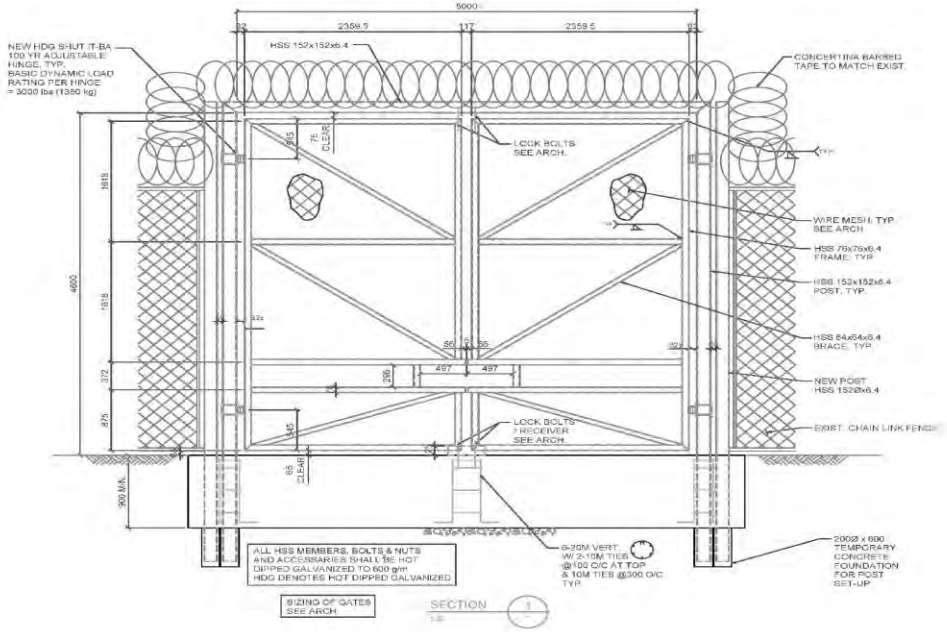
GATES NO. 1, 2, 3, 4, 5 & 6 PLAN AND DETAIL
(KENT INSTITUTION)

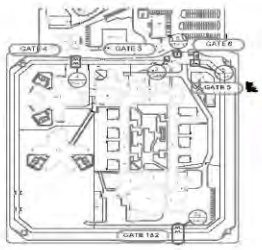
Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: 604-299-6617, Email: jecth@jecth.com



JECTH Consultants Inc. Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Gate No. 1 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**	Prepared by: FC	SCALE Not to scale
		Chk. HKM	Date: Nov. 2018
		Dwg. No.: 218C555A – Appendix "A"	







KEY PLAN - KENT INSTITUTION

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région du Pacifique

CWMM CONSULTING ENGINEERS LTD.

CORRECTIONAL SERVICE CANADA

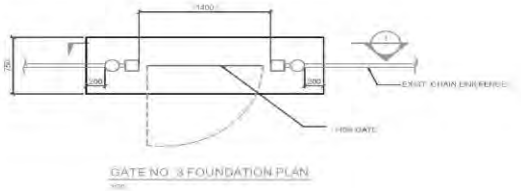
PACIFIC REGION PERIMETER FENCE UPGRADES

KENT INSTITUTION
GATE NO. 2
PLAN & DETAILS

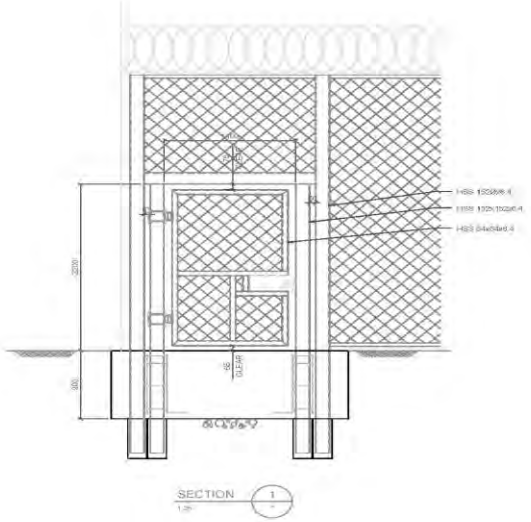
Project No./No. du projet	Sheet/Feuille	Revision no./ No. de révision
R.071529.001	KT-S202	0

12703

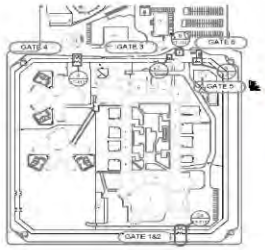
JECTH Consultants Inc.	**Gate No. 2 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**
Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	Prepared by: FC SCALE Not to scale Chk. HKM Date: Nov. 2018 Dwg. No.: 218C555A – Appendix "A"



GATE NO. 3 FOUNDATION PLAN



SECTION



KEY PLAN - KENT INSTITUTION

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région du Pacifique

CWMM CONSULTING ENGINEERS LTD.

CORRECTIONAL SERVICE CANADA

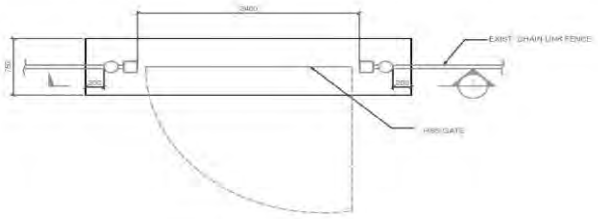
PACIFIC REGION PERIMETER FENCE UPGRADES

KENT INSTITUTION
GATE NO. 3
PLAN & DETAILS

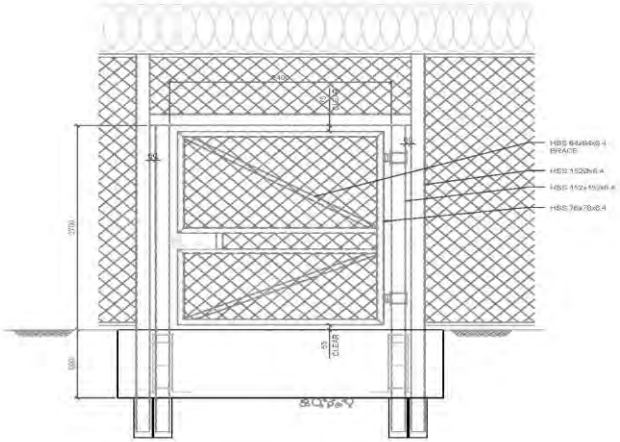
R.071529.001 | KT-S203 | 0

12703

JECTH Consultants Inc. Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Gate No. 3 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**	Prepared by: FC SCALE Not to scale Chk. HKM Date: Nov. 2018 Dwg. No.: 218C555A – Appendix "A"



GATE NO. 4 FOUNDATION PLAN



SECTION 1

KEY PLAN - KENT INSTITUTION

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région du Pacifique

CWMM CONSULTING ENGINEERS LTD.

CORRECTIONAL SERVICE CANADA

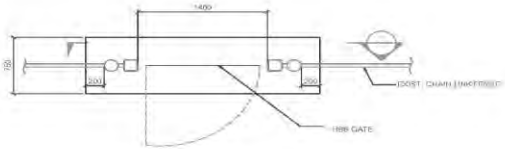
PACIFIC REGION PERIMETER FENCE UPGRADES

KENT INSTITUTION
GATE NO. 4
PLAN & DETAILS

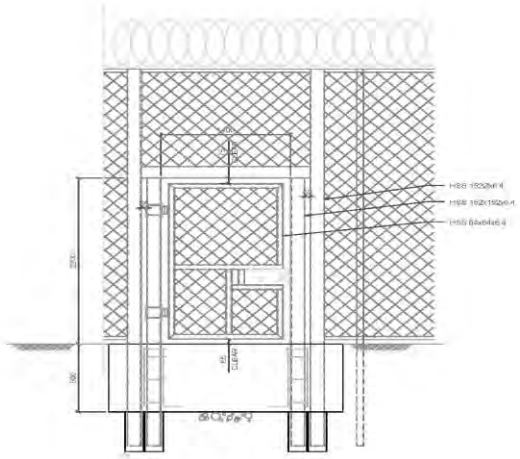
Project No./No. du projet	Sheet/Feuille	Revision no./ Le révision no.
R.071529.001	KT-S204	0

12703

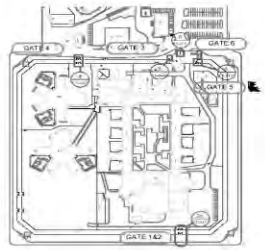
JECTH Consultants Inc.	**Gate No. 4 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**
Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	Prepared by: FC SCALE Not to scale Chk. HKM Date: Nov. 2018 Dwg. No.: 218C555A – Appendix "A"



GATE NO. 3 FOUNDATION PLAN



SECTION



KEY PLAN - KENT INSTITUTION

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Région du Pacifique

CWMM CONSULTING ENGINEERS LTD.

CORRECTIONAL SERVICE CANADA

PACIFIC REGION PERIMETER FENCE UPGRADES

DARYL SINCLAIR / TONY TANG

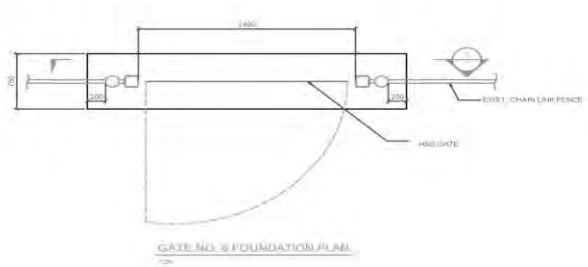
PREETIPAL PAUL

KENT INSTITUTION
GATE NO. 5
PLAN & DETAILS

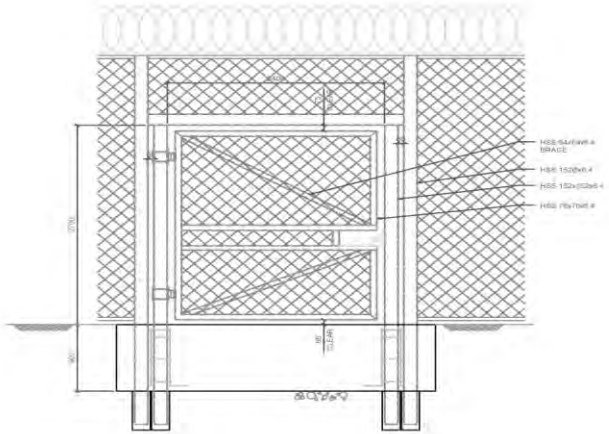
Project No./No. du projet	Sheet/Feuille	Revision no./ Le N° révision
R.071529.001	KT-S205	0

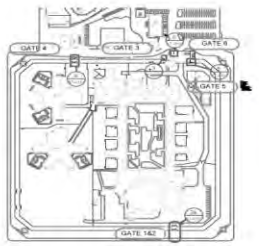
12703

JECTH Consultants Inc. Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Gate No. 5 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**	Prepared by: FC Chk. HKM Dwg. No.: 218C555A – Appendix "A"
		SCALE Not to scale Date: Nov. 2018



GATE NO. 6 FOUNDATION PLAN





KEY PLAN – KENT INSTITUTION

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Pacific Region
SERVICES IMMOBILIERS
Region de Pacifique

CWMM CONSULTING ENGINEERS LTD.

No.	Description/Description	Date/Date
1		
2		
3		
4		
5		
6		

Client/Client

CORRECTIONAL SERVICE CANADA

Project title/Titre du projet

PACIFIC REGION PERIMETER FENCE UPGRADES

Consultant Signature Box Only

Designed by/Concept par
L.I.

Drawn by/Dessiné par
CAD

PWGSC Project Manager/Administrateur de Projets TPSGC
DARYL SINCLAIR / TONY TANG

PWGSC Regional Manager, Architectural and Engineering Services/Gestionnaire régional, Services d'architecture et de génie TPSGC
PHEETIPAL PAUL

Drawing title/Titre du dessin

KENT INSTITUTION
GATE NO. 6
PLAN & DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./No de révision
R.071529.001	KT-S206 of	0

12703

JECTH Consultants Inc. Suite 208-3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Gate No. 6 Plan and Detail (Kent Institution)** **Proposed Perimeter Fence and Gates Upgrades** **Kent Institution, 4732 Cemetery Road, Agassiz, BC** **Client: CWMM Structural Engineers Consulting**	Prepared by: FC Chk. HKM SCALE Not to scale Date: Nov. 2018 Dwg. No.: 218C555A – Appendix "A"

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

APPENDIX "B"

PROPOSED PERIMETER FENCE AND GATES UPGRADES
KENT INSTITUTION
4732 CEMETERY ROAD, AGASSIZ, BC

SEISMIC DESIGN CRITERIA

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: 604-299-6617, Email: jecth@jecth.com

2015 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 franç ais (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

November 08, 2018

Site: 49.2596 N, 121.9309 W User File Reference: Kent Institution

Requested by: , Jecth Consultants

National Building Code ground motions: 2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.05)	Sa(0.1)	**Sa(0.2)**	Sa(0.3)	**Sa(0.5)**	**Sa(1.0)**	**Sa(2.0)**	**Sa(5.0)**	**Sa(10.0)**	**PGA (g)**	**PGV (m/s)**
0.258	0.387	**0.486**	0.469	**0.409**	**0.257**	**0.164**	**0.060**	**0.020**	**0.218**	**0.323**

Notes. Spectral (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are given in units of g (9.81 m/s^2). Peak ground velocity is given in m/s. Values are for "firm ground" (NBCC 2015 Site Class C, average shear wave velocity 450 m/s). NBCC2015 and CSAS6-14 values are specified in **bold** font. Three additional periods are provided - their use is discussed in the NBCC2015 Commentary. Only 2 significant figures are to be used. ***These values have been interpolated from a 10-km-spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the directly calculated values.***

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.05)	0.054	0.124	0.174
Sa(0.1)	0.083	0.188	0.263
Sa(0.2)	0.111	0.246	0.338
Sa(0.3)	0.112	0.244	0.332
Sa(0.5)	0.093	0.209	0.288
Sa(1.0)	0.051	0.123	0.175
Sa(2.0)	0.029	0.073	0.108
Sa(5.0)	0.0069	0.021	0.035
Sa(10.0)	0.0026	0.0075	0.012
PGA	0.047	0.107	0.150
PGV	0.057	0.146	0.214

References

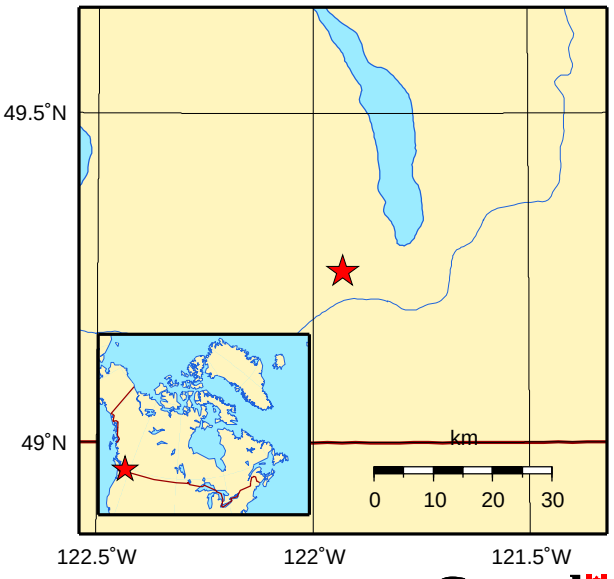
National Building Code of Canada 2015 NRCC no. 56190;
Appendix C: Table C-3, Seismic Design Data for Selected Locations in Canada

User's Guide - NBC 2015, Structural Commentaries NRCC no. xxxxxx (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File 7893 Fifth Generation Seismic Hazard Model for Canada: Grid values of mean hazard to be used with the 2015 National Building Code of Canada

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

Aussi disponible en français



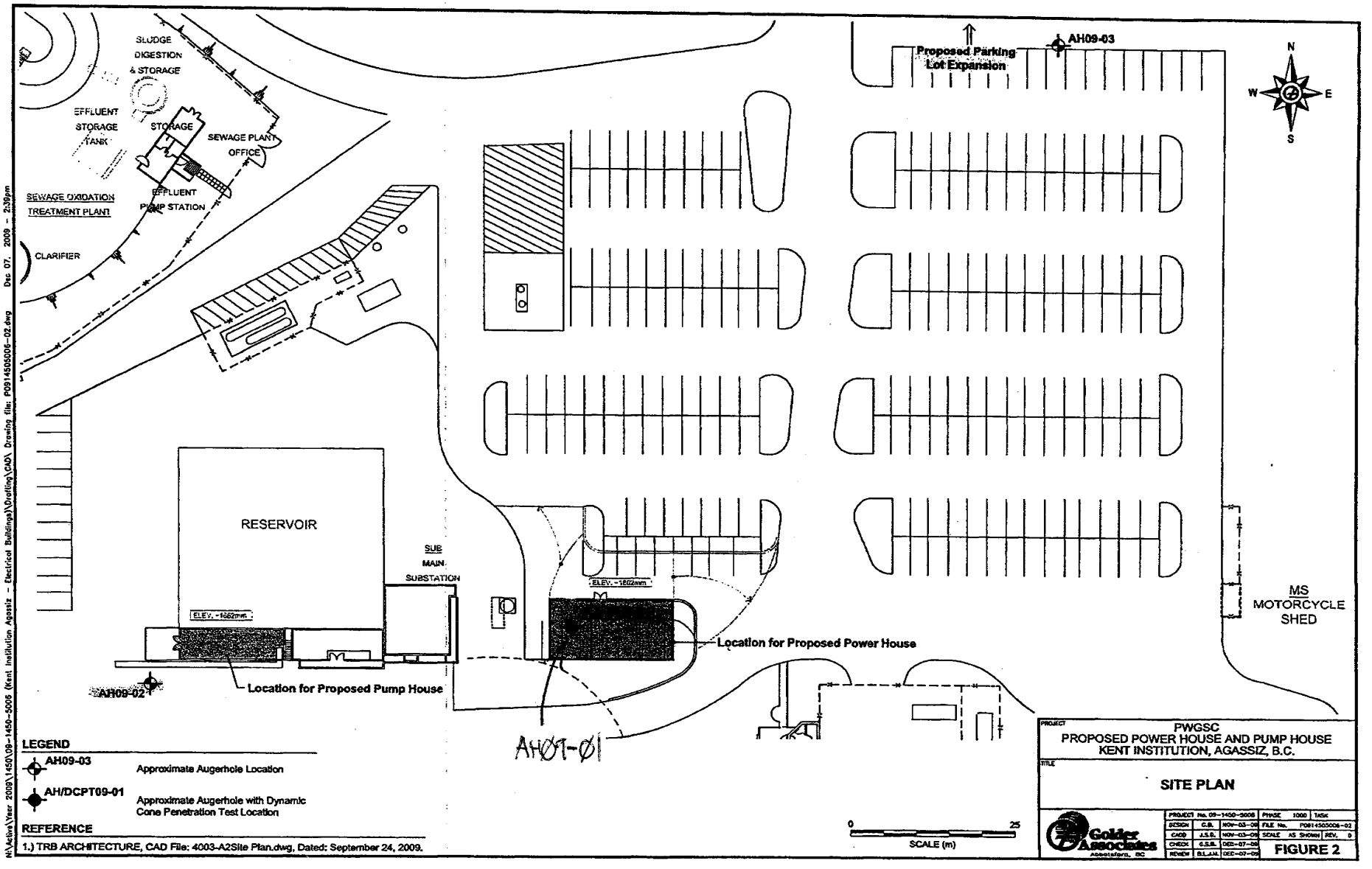
JECTH Consultants Inc.
Geotechnical & Environmental Engineers

APPENDIX "C"

PROPOSED PERIMETER FENCE AND GATES UPGRADES
KENT INSTITUTION
4732 CEMETERY ROAD, AGASSIZ, BC

SOIL LOGS FROM GOLDER ASSOCIATES

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: 604-299-6617, Email: jecth@jecth.com



N:\Active\Year 2009\1450\09-1450-5006 (Kent Institution Agassiz - Electrical Buildings)\Drafting\CAD\ Drawing file: P091450500G-02.dwg Dec 07, 2009 - 2:39pm

LEGEND

AH09-03 — Approximate Augerhole Location

AH/DCPT09-01 — Approximate Augerhole with Dynamic Cone Penetration Test Location

REFERENCE

1.) TRB ARCHITECTURE, CAD File: 4003-A2Site Plan.dwg, Dated: September 24, 2009.

PROJECT
PWGSC
PROPOSED POWER HOUSE AND PUMP HOUSE
KENT INSTITUTION, AGASSIZ, B.C.

TITLE
SITE PLAN

Golder Associates
Abbotsford, BC

PROJECT No. 09-1450-5006			PHASE 1000	TASK
DESIGN	C.B.	NOV-03-09	FILE No.	P091450500G-02
CADD	J.S.S.	NOV-03-09	SCALE AS SHOWN	REV. 0
CHECK	S.S.R.	DEC-07-09		
REVIEW	R.L.M.	DEC-07-09		

FIGURE 2

PROJECT No.: 09-1450-5006

RECORD OF AUGERHOLE: AH/DCPT09-01

SHEET 1 OF 2

LOCATION: See Figure 2.
N: ~585096 E: ~5457135
Note: Northing and Easting Coordinates have been determined by GPS in the field and are approximate only.

DATUM: Local

DRILLING DATE: October 23, 2009
DRILLING CONTRACTOR: Downrite Drilling Ltd.

SAMPLER HAMMER, 64kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface									
0	Track Mounted Auger Drill / Solid Stem Auger	ASPHALTIC CONCRETE.		0.08							Bentonite
1		Very dense, moist, brown SAND and GRAVEL, trace to some silt. [FILL]			1	AS					Sand
2		Loose to compact, moist, brown SAND and GRAVEL, trace to some silt. [FILL]		1.52							Water level observed in open hole during drilling
		Soft to firm, wet, grey SILT, some clay, trace sand and organics.		2.28	2	AS			W	A	Slotted PVC Pipe
3				2.74							
4		Loose to compact, wet, grey, fine SAND, some silt.			3	AS			O	M	
5				5.18							
6					4	AS					
7		Compact to dense, wet, grey, sandy GRAVEL, to SAND and GRAVEL, trace silt			5	AS					
8											
9					6	AS					
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: G.B.
CHECKED: B.L.J.M

File:09-1450-5006.GPJ Output Form:BOREHOLE (AUTO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB VWahlstrom 07/12/09

PROJECT No.: 09-1450-5006

RECORD OF AUGERHOLE: AH/DCPT09-01

SHEET 2 OF 2

LOCATION: See Figure 2.
N: ~585096 E: ~5457135
Note: Northing and Easting Coordinates have been determined by GPS in the field and are approximate only.

DRILLING DATE: October 23, 2009
DRILLING CONTRACTOR: Downrite Drilling Ltd.

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Truck Mounted Auger Drill / Solid Stem Auger	Compact to dense, wet, grey, sandy GRAVEL, to SAND and GRAVEL, trace silt. *(continued)*			7	AS							
11													
12					8	AS							
13					9	AS							
14													
15		Very dense, wet, grey SAND and GRAVEL, trace silt.		14.33	10	AS							
		End of Augerhole.		15.24									
16													
17													
18													
19													
20													

End of Dynamic Cone Penetration Test.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: G.B.
CHECKED: B.L.J.M

File:09-1450-5006.GPJ Output Form:BOREHOLE (AUTO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB VWahlstrom 07/12/09

PROJECT No.: 09-1450-5006

RECORD OF AUGERHOLE: AH09-03

SHEET 1 OF 1

LOCATION: See Figure 2.
N: ~585745 E: ~5457228
Note: Northing and Easting Coordinates have been determined by GPS in the field and are approximate only.

DRILLING DATE: October 23, 2009
DRILLING CONTRACTOR: Downrite Drilling Ltd.

DATUM: Local

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	Truck Mounted Auger Drill Solid Stem Auger	Ground Surface									
		Soft to firm, moist, dark brown SILT, some sand, trace gravel and root fibres. [TOPSOIL]		0.00	1	AS					
1		Loose to compact, moist, brown SAND and GRAVEL, trace to some silt. [FILL]		0.30	2	AS					
2		Firm to stiff, wet, mottled brown and orange SILT, trace sand, gravel, clay and organics (rootlets and reeds).		1.83	3	AS					Water level observed in open hole during drilling ▽
		Soft to firm, wet, grey SILT, trace to some clay, trace sand.		2.29	4	AS			O		
3		Loose, wet, grey, sandy SILT.		3.05	5	AS					
4		Loose, wet, grey, silty SAND.		4.27	6	AS					
5		Loose to compact, fine to medium SAND, some silt.		4.57	7	AS			O		
6		End of Augerhole.		6.10							
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: G.B.
CHECKED: B.L.J.M

File:09-1450-5006.GPJ Output Form:BOREHOLE (AUTO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB VWahlstrom 07/12/09

PROJECT No.: 09-1450-5006

RECORD OF AUGERHOLE: AH09-02

SHEET 2 OF 2

LOCATION: See Figure 2.
N: ~584645 E: ~5457127
Note: Northing and Easting Coordinates have been determined by GPS in the field and are approximate only.

DRILLING DATE: October 23, 2009
DRILLING CONTRACTOR: Downrite Drilling Ltd.

DATUM: Local

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-4} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Truck Mounted Auger Drill Solid Stem Auger	Compact to dense, wet, grey, sandy GRAVEL, to SAND and GRAVEL, trace silt. *(continued)*			11	AS							
11					12	AS							
12				12.19									
13		Compact, wet, grey, silty fine SAND, to SILT and SAND.			13	AS							
14				14.63	14	AS							
15		Very dense, wet, grey SAND and GRAVEL, trace silt.											
		End of Augerhole.		15.24									
16													
17													
18													
19													
20													

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: G.B.
CHECKED: B.L.J.M

File:09-1450-5006.GPJ Output Form:BOREHOLE (AUTO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB VWahlstrom 07/12/09

PROJECT No.: 09-1450-5006

RECORD OF AUGERHOLE: AH09-03

SHEET 1 OF 1

LOCATION: See Figure 2.
N: ~585745 E: ~5457228
Note: Northing and Easting Coordinates have been determined by GPS in the field and are approximate only.

DRILLING DATE: October 23, 2009
DRILLING CONTRACTOR: Downrite Drilling Ltd.

DATUM: Local

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (net V. +, rem V. ⊕; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	Truck Mounted Auger Drill, Solid Stem Auger	Ground Surface									
		Soft to firm, moist, dark brown SILT, some sand, trace gravel and root fibres. [TOPSOIL]		0.00	1	AS					
				0.30							
1		Loose to compact, moist, brown SAND and GRAVEL, trace to some silt. [FILL]			2	AS					
2		Firm to stiff, wet, mottled brown and orange SILT, trace sand, gravel, clay and organics (rootlets and reeds).		1.83	3	AS					Water level observed in open hole during drilling
		Soft to firm, wet, grey SILT, trace to some clay, trace sand.		2.29	4	AS			O		
3		Loose, wet, grey, sandy SILT.		3.05	5	AS					
4		Loose, wet, grey, silty SAND.		4.27	6	AS					
		Loose to compact, fine to medium SAND, some silt.		4.57	7	AS			O		
5		End of Augerhole.		6.10							
6											
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: G.B.
CHECKED: B.L.J.M

File:09-1450-5006.GPJ Output Form:BOREHOLE (AUTO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB Wahlstrom 07/12/09

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

APPENDIX "D"

PROPOSED PERIMETER FENCE AND GATES UPGRADES
KENT INSTITUTION
4732 CEMETERY ROAD, AGASSIZ, BC

STANDARD FIELD INSPECTION REQUIREMENTS

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: 604-299-6617, Email: jecth@jecth.com

Geotechnical Engineering Field Review and Inspection Requirements
BC Building Code 2012

Based on the BC Building Code 2012, the following Design and field review must be completed by JECTH Consultants Inc. (Geotechnical in Record, **GIR)** such that Letter of Compliance (Schedule "C") required by local municipality for Occupancy Permit can be issued.

7.0 Geotechnical - Temporary

7.1 Excavation

7.1.1 Foundation

Excavation depth more than 4 ft. must be certified by GIR as required by WorkSafe BC ☐

7.1.2 Buildings and Structures

Buildings and Structures within the 1H:1V stress influence line from the bottom of Excavation must be reviewed and approved by GIR ☐

7.1.3 Trench

Excavation for underground utilities for depth more than 4 ft. must be reviewed and approved by GIR ☐

7.1.4 Underground Utilities

All underground utilities (both on-site and off-site) within and along the site perimeter must be identified both on drawing and physical on site prior to any foundation excavation and slope excavation. ☐

7.2 Shoring

7.2.1 Vertical Shoring

Vertical Shoring must be design by GIR to ensure excavation perimeter is stable during foundation excavation before placement of perimeter backfill. ☐

7.2.2 Temporary Shoring

Temporary Shoring such as sheetpile and shotcrete with tie back anchors or other vertical features must be inspected by GIR ☐

7.2.3 Shoring Method

Shoring method such as sheetpile and shotcrete with tie-back anchors wall must be carried out under the supervision of GIR ☐

7.2.4 Underground Utilities

All underground utilities (both on-site and off-site) within and along the site perimeter must be identified both on drawing and physical on site prior to any foundation excavation and shoring work. ☐

7.3 Underpinning

7.3.1 Pre-Excavation

Pre-excavation inspection and Review must be conducted by both Structural and Geotechnical Engineers (both Geotechnical Engineers from the adjacent structures and GIR) prior to underpinning excavation. ☐

7.3.2 Monitoring Survey

Survey monitoring points must be installed at the underpinning building(s) and/any movement sensitive Structural Component before foundation excavation. The survey monitoring system must be conducted prior to any site activities and submit to GIR. ☐

7.3.3 Structural Inspection

Structural Inspection and photographs must be carried out prior to foundation excavation for future records and reference by Structural Engineer retained by either owner of adjacent property or subject property owner. ☐

7.4 Temporary Construction Dewatering

7.4.1 Perched groundwater and Surface Drainage

For perched groundwater and surface Drainage by precipitation, conventional pump can be used to maintain the site in relatively dry condition. □

7.4.2 Well point

Well point and other measure of temporary dewatering will be required if high groundwater level (actual ground water table) is encountered □

8.0 Geotechnical - Permanent

8.1 Bearing Capacity of Foundation Subgrade Soil ☐

8.1.1 Foundation Subgrade Excavation

Review exposed foundation subgrade excavation and ensure that all remove all unsuitable soil/material until suitable bearing subgrade is exposed ☐

8.1.2 Foundation Subgrade Protection

In the event that the exposed foundation subgrade soil is sensitive to moisture, foundation subgrade might be protected by a layer granular soil such as crushed gravel due to wet condition and construction traffic. A lean concrete can be used instead of crushed gravel. ☐

8.1.3 Structural FILL

Review Structural Fill if over-excavated or raise of grade is required. Compaction Density test must be conducted by Certified Laboratory and submit to GIR. ☐

8.2 Geotechnical - Deep Foundation

8.2.1 Piling Inspection

Full time piling inspection such as timber and steel pile etc must be conducted by GIR. All piling record for refusal must be available to review such that the pile capacity can be certified. ☐

8.2.2 Sheetpile Installation

Sheetpile installation as temporary / permanent support must be installed and inspected by Geotechnical Engineer ☐

8.3 Engineering FILL

8.3.1 Structural FILL

Structural Fill (imported or non-native material) at and below the proposed foundation elevation must be compacted to density as specified by GIR and must be certified by qualified soil laboratory / testing company ☐

8.3.2 Underslab FILL

Underslab fill density must also be tested prior to placement of slab-on-grade concrete to the specified density as required by GIR. ☐

8.4 Slope Stability and Seismic Load

8.4.1 Slope Stability

Evaluate the slope stability along the site and building perimeter for both seismic and static design conditions according to APEBC Guidelines dated November 2010. ☐

8.4.2 Subsurface Stability

Subsurface stability under seismic condition such as densification specified by GIR and tieing of footing structurally must be accommodated by Structural Engineer in Record ☐

8.4.3 Seismic Design Criteria

The acceleration velocity design must be based on Nation Resources of Canada Seismic Hazard Criteria. ☐

8.5 Backfill

8.5.1 Backfill Material

Backfill material for foundation perimeter must be well drained granular soil, such as crushed gravel with waterproof membrane for below grade structure ☐

8.5.2 Sensitive Structure

If sensitive structure is founded on the Backfill material such as Sand and Gravel compaction density as specified by GIR of the backfill material must be tested by certified testing company ☐

8.6 Permanent Dewatering

8.6.1 Foundation Drainage

For convention foundation drainage, perforated PVC pipe will be used to collect any surface gravity drained to city's storm system migrated and natural groundwater to a sump then ☐

8.6.2 Storm System

If City's storm system is higher than the sump elevation, pumping system must be installed with dual-pump and alarm system and may be with backup generator when power is unavailable during adverse conditions. Mechanical and Civil Engineer must be retained to design the system. ☐

8.6.3 Perforated Drainage

Underslab perforated drainage perforated PVC will be installed to improve the foundation drainage if groundwater table is higher than the slab elevation either seasonally or permanently ☐

8.6.4 Tanking

Tanking is also an option when the pumping system might not be capable to drain all below groundwater or foundation drainage system is not installed. Envelop Consultants must be retained for this option ☐

8.6.5 Retention Tank

Retention Tank with control valve may be required due to City's storm system limitation. Civil Engineer must be retained. ☐

8.7 Permanent Underpinning

8.7.1 Underpinning Loading

All underpinning loading must be reviewed and approved by Structural Engineer and GIR. ☐

8.7.2 Separation and Drainage

Bond separation and drainage (above and below grade) at the interface of the underpinning area must be reviewed to ensure no water migrate to the underpinning structure. Envelop Consultant must be retained. ☐

GEOTECHNICAL ENGINEERING REVIEW AND ASSESSMENT
PROPOSED PERIMETER FENCE AND GATES UPGRADES

AT
KENT INSTITUTION
4732 CEMETERY ROAD
AGASSIZ, BC

FOR

CWMM CONSULTING ENGINEERS LTD.

PREPARED BY

JECTH CONSULTANTS INC.

JOB NO.: 218C555

DATE: NOVEMBER 29, 2018

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: 604-299-6617, Email: jecth@jecth.com

GEOTECHNICAL ENGINEERING REVIEW AND ASSESSMENT PROPOSED PERIMETER FENCE AND GATES UPGRADES KENT INSTITUTION, 4732 CEMETERY ROAD, AGASSIZ, BC

1.0 INTRODUCTION

1.1 AUTHORIZATION

As authorized by CWMM Consulting Engineers Ltd. on October 22, 2018, JECTH Consultants Inc. (JCI) has carried out a Geotechnical Engineering Review and Assessment for the proposed Perimeter Fence and Gates Upgrade project, Kent Institution which is located at 4732 Cemetery Road, Agassiz, BC as shown in Figure 1 – Site Location Plan.

1.2 METHODOLOGY

The Geotechnical Engineering Assessment and Review includes:

- Reviewed of available Structural Plan for the Gates
- Obtained the Surficial Geological Map from Geological Canada.
- Reviewed available Geotechnical Report for a Pump House Construction at the Kent Institution.
- Conducted a site reconnaissance by our site staff at the subject site.
- Assessed the available subsurface soil conditions and profile based on desktop review and our local experience within the close vicinity of the subject site.
- Communicated with Institution staff and Structural Engineer.
- This report is prepared according to JECTH Consultants Inc. Proposal P218 -551 dated October 10, 2018.

1.3 OBJECTIVE

This Geotechnical Engineering Report summarizes our findings and provides Geotechnical Engineering Comments and Recommendations for the foundation design and construction of the Gates and Fence upgrade for existing perimeter security fences of the Institution Compound.

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

1.4 DESIGN DRAWING

This report is prepared based on the Design Drawings prepared by CWMM which received by our office on October 9, 2018. Any revision of the plan must be informed to JECTH Consultants Inc.

3.0 SITE LOCATION AND CONDITION

The Kent Institution is located at about 7 Km. west to the Town of Agassiz, Chilliwack, BC as shown in Figure KT01 – Site Location Plan. It is situated on a relatively level plain and surrounded by farm land. The Institution can be accessed by the Cemetery Road from the north of the compound. There are security fences surrounding the Institution. Utility Buildings and car parks are observed outside the security fences at the north of the compound.

A site reconnaissance was taken on October 31, 2018 around the perimeter security fences by our site staff. The reconnaissance at the proposed gates upgrade locations and local nearby area indicate there is no apparent subsidence of ground, nor any distress of asphalt surface along the surrounding access road. Water can be observed at the road culvert during a rainy day at the time of visit.

The perimeter fence is a double fence system with an outer and inner fence for security purpose. Gravel is observed at a corridor between the fences. The main security entrance building is located at the north west of the secure compound.

4.0 PROPOSED GATES UPGRADE

Based on a Site Plan supplied by CWMM Consulting Engineers as shown in Figure KT03, there will be 6 nos. of gates to be installed around the existing perimeter fences. The gates are either new gates, or replace existing gates as an upgrade as listed in the following:

Gate No.	Location	Gate Usage
1	South Perimeter	Emergency Vehicle
2	South Perimeter	Emergency Vehicle
3	Beside Security Building	Pedestrian

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

4	North Perimeter	Maintenance Vehicle
5	Beside Security Building	Pedestrian
6	Beside Security Building	Maintenance Vehicle

The structural details of the Gates are enclosed in Appendix "A" – Gates Upgrade for Kent Institution for ease of reference.

Gates for vehicle passage will have foundation design for transient vehicle load from Trucks and Fire Trucks. JCI estimate an equivalent surcharge load of 15 KPa for vehicle loading will be sufficient for the transient live load design.

5.0 SUBSURFACE SOIL CONDITIONS

Based on available Geological Map as shown in KT02 – Geological Map, the Kent Institution is situated in between 2 geological formation namely Fraser River Sediments and Salish Sediments. The former is a floodplain composed of Sand, SILT and Sand and Gravel Deposit from the Fraser River. The later is localized Bog and Swap deposit formed by shallow lakes at the surface of Fraser River Deposit.

It is anticipated the Institution compound is immediate underlain with soft SILT, loose SAND or Organic Soil. Sand and Gravel can be occur in deeper soil stratum which is common in Agassiz Area.

A geotechnical report for a pump house construction at the parking lot near the entrance security building (Gate No. 3, 5, and 6) is available for review from Public Work Department (PWGSC). The report for the Pump House geotechnical investigation dated December 7, 2009 was issued by Golder & Associates who was the geotechnical consultant for the pump house project.

The investigation involve 3 nos. of auger holes with Dynamic Cone Penetration Test at one of the auger holes. Based on the finding of the report, the following subsurface soil condition were found at the auger hole locations in the following table:

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

Depth (m)	Soil	Remark
0 - 2	Sand and Gravel FILL	Dense
2 - 3	SILT	Firm to medium stiff, low Plasticity SILT
3 - 5	SAND with Silt Lenses	Medium loose, Liquefiable
5 - 15	Sand and Gravel	Compact to Dense

A minor layer of Organic SILT of 0.3 m thick was found at one of the auger hole underlain the SAND and Gravel FILL. The localized Organic SILT is believed as a remain of incomplete stripping in past site preparation of the area. Groundwater was found at 1.2 m depth during the time of site exploration.

Basically the geotechnical report agree with the Geological Map. It is believed that previous organic soil at the surface had been removed and replaced with SAND and Gravel FILL when forming the Kent Institution ground.

6.0 GEOTECHNICAL FOUNDATION DESIGN

Due to light structural loading of a steel fence and gate superstructure, the gate foundation can be conventional shallow stripped and pad footing found on the dense Sand and Gravel FILL.

An allowable bearing capacity of 100 KPa for SLS design and ultimate bearing capacity of 150 KPa for ULS design are recommended. The minimum depth of footing should be at least 0.5 m below surface for frost protection. In the case that soil subgrade modulus is used for design of the footing, a modulus subgrade reaction at 10,000 KN / m^3 can be used for the analysis.

Settlement of the footing will be in the order of 25 mm. Settlement will likely completed during construction period. Differential settlement of the footings will likely minimal.

It is recommended that the foundation subgrade to be prepared by re-compaction of the existing SAND and Gravel to 100% Standard Proctor Density at the gates location. Groundwater will likely below foundation subgrade if construction is carried out in dry season. In the case groundwater occur, temporary de-watering will be necessary for the

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

foundation preparation work by introduction of temporary sump nearby with depth lower than the foundation subgrade.

7.0 SEISMIC DESIGN

Due to presence of 2 m. liquefiable SAND with Silt Lenses at shallow depth, the site is considered has a medium risk of liquefaction under strong earthquake and likely classified as Class F which required site specific spectrum analysis.

However, due to light loading nature of a steel gate structure, and the gate locations are underlain with 2 m. of dense SAND and Gravel FILL and 1 m. of firm to medium stiff SILT, **it can be re-classified as Class E for soft soil** in accordance to Table 4.1.8.4 A of BC Building Code 2012

Peak Ground Acceleration (PGA) and Spectrum acceleration for 2% probability of exceedance in 50 years can be obtained from Resource Canada for a **Class C** site in NBCC 2015 as follow:

Site Co-ordinate: Longitude 49.260^{o} North, Longitude 121.930^{o} West

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	Sa(5.0)	Sa(10.0)	PGA
0.486 g.	0.409 g.	0.257 g.	0.164 g.	0.060 g.	0.020 g.	0.218 g.

A copy of the search result from Resource Canada is enclosed in Appendix B - Seismic Design Criteria for ease of reference.

For seismic design for a Class E Site, the following Fa and Fv values are interoperated from Table 4.1.84 B and 4.1.8.4 C respectively from Building Code.

	Sa (0.2)	Sa (0.2)	Sa (0.2)
	0.25 g.	0.5 g.	0.486 g.
Fa	2.1	1.4	**1.44**

	Sa (1.0)	Sa (1.0)	Sa (1.0)
	0.2 g.	0.3 g.	0.257 g.
Fv	2.0	1.9	**1.94**

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

Based on the linear interpretation, of the obtained Fa and Fv respectively are **1.44** and **1.94** for **Class E** site.

Seismic Bearing Capacity can be taken for a $^1/_3$ increase of ultimate bearing capacity (in this case 200 KPa) with anticipation of short duration of Earth Quake.

Liquefaction of the site is likely due the presence of liquefiable Silty SAND in shallow depth. The dense SAND and Gravel and non-liquefiable SILT above the loose SAND will prevent punching shear failure of the gates and gate footing under liquefaction. Post liquefaction horizontal movement will likely within 1 m.

8.0 GEOTECHNICAL ENGINEERING FIELD REVIEW

JECTH Consultants Inc. will provide Field Review (Geotechnical Engineering) according to the 2012 BC Building Code and Letter of Assurance (Schedule "B") as well as municipality requirements.

The following general field reviews (Require 48 hour notification) are required prior to and during construction stage (see also Appendix "D" - Standard Geotechnical Inspection Requirements).

The general contractor or PWGSC must inform JECTH Consultants Inc for site inspection as required by Local Municipality for the followings:

- Temporary Construction Drainage (if required)
- Foundation Bearing Capacity (confirmation and Certification)
- Compaction of Structural FILL.
- Perimeter backfill (Material requirements, compaction and Drainage)
- Other site inspections as specified in BC Building Code 2012
- Unforeseen subsurface soil and groundwater conditions as encountered prior to, during and after construction stage.

Other Geotechnical Engineering technical requirements and in-situ testing will be performed by certified laboratory/testing company and will be reviewed by JECTH Consultants Inc. during construction stage.

Specific Site Geotechnical Engineering issues must be addressed by JECTH Consultants Inc. prior to and during construction stage.

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

9.0 FINAL FOUNDATION DESIGN REVIEW

JECTH Consultants Inc. should be given an opportunity to review the followings:

1. The detail and final Structural Engineering Drawing must be reviewed by JECTH Consultants Inc. prior to Building Permit Application such that the above comments and recommendations can be confirmed and modified.

2. Any other Electrical and Mechanical as well as Civil Engineering and Landscape Architect Drawings, if likely affect the foundation design and construction, must be reviewed and approved by JECTH Consultants Inc.

3. A consultant coordination meeting must be arranged prior to Building Permit Application or prior to construction start such that all design team members can confirm all design parameters for the project.

4. JECTH Consultants Inc. will review the exposed subsurface soil and groundwater conditions prior to and during construction stage. It is possible that the Geotechnical recommendations provided in this report be modified due to unforeseen circumstances and change in subsurface soil as well as groundwater condition.

12.0 FIELD INSPECTIONS AND PRE-CONSTRUCTION MEETING

A pre-construction meeting must be organized between the site superintendent/contractor representatives and JECTH Consultants Inc. at a minimum of two weeks before **any site construction activities** such that appropriate field work can be carried out.

JECTH Consultants Inc. must be notified (48 hours) of all fieldwork prior to any site work in particular before site clearing, stripping and preparation. This will allow JECTH Consultants Inc. to provide final comments for the project with respect to Geotechnical Engineering.

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

13.0 CLOSURE

We trust this report meets your immediate requirements. If you have any questions regarding this report, please do not hesitate to contact the undersigned @ 604-299-6617.

JECTH Consultants Inc.

November 29, 2018

Ivan Chu, P.Eng.

Attachments: List of Figures

Figure KT01 – Site Location Plan
Figure KT02 – Geological Map
Figure KT03 – Site Plan

List of Appendixes

Appendix "A" – Gates No. 1, 2, 3, 4, 5 and 6 Plan and Detail (Kent Institution)
Appendix "B" – Seismic Design Criteria
Appendix "C" – Soil Logs from Golder Associates
Appendix "D" – Standard Field Inspection Requirements

Suite 208-3823 Henning Drive, Burnaby, BC, V5C 6P3, Phone: (604) 299-6617, Email: jecth@jecth.com