AAFC
HEADER HOUSE
AND GREENHOUSE
PAD

INDIAN HEAD, SK

SPECIFICATIONS

Sections apply to either PHASE 1 or PHASE 2 or both as indicated on each Division # and Title

DIVISION 27 – COMMUNICATIONS (PHASE 1)

DIVISION 31 SITE WORK (PHASE 1 and PHASE 2)

DIVISION 32 SITE IMPROVEMENTS (PHASE 1 and PHASE 2)

END OF SECTION

DRAWINGS BOUND SEPARATELY

DRAWING NO. ARCHITECTURAL

ACOVER –SITE / BUILDING CODE MATRIX / PAGE INDEX
A2.1 - MAIN FLOOR, DETAILS, WINDOWS, DOOR SCHEDULES
A2.2 - ROOF PLAN, REFLECTED CEILING PLAN, SCHEDULES
A3.1 - BUILDING ELEVATIONS (PHASE 1)
A4.1- BUILDING SECTIONS AND WALL SECTIONS
A4.2 - WALL SECTIONS AND DETAILS

STRUCTURAL

S5.1 - FOUNDATION PLAN AND DETAILS
S5.2 - ROOF FRAMING PLAN AND DETAILS

MECHANICAL

M6.1 - SITE SERVICING PLAN
M6.2 - HVAC PLAN AND PLUMBING LAYOUT
M6.3 - MECHANICAL SPECIFICATIONS AND DETAILS

ELECTRICAL

E1.0 – ELECTRICAL FLOOR PLANS (PHASE 1)
E2.0 – ELECTRICAL FLOOR PLAN (PHASE 2)

PART 1 GENERAL

1.1 Requirements Included

.1 Coordinate Work with other Sub Contractors under administration of General Contractor.

1.2 Description

.1 Coordination progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction work, with progress of work of other contractors, under instructions of G.C.

1.3 Construction Organization and Start-Up

.1 Comply with General Contractor's allocation of mobilization areas of site; for field offices and sheds, for, access, traffic, and parking facilities.

.2 During construction co-ordinate use of site and facilities through General Contractor's procedures for intra-project communications: Submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.

.3 Comply with instructions of General Contractor for used of temporary utilities and construction facilities.

.4 Co-ordinate field engineering and layout work with General Contractor

1.4 Schedules

.1 Submit preliminary construction progress schedule in accordance with Section 01310 to General Contractor co-ordinated with General Contractor's project schedule.

.2 After review, revise and resubmit schedule to comply with revised project schedule.

.3 During progress of work revise and resubmit as directed by General Contractor.

1.5 Submittals to General Contractor

.1 Submit preliminary shop drawings, product data and samples in accordance with Section 013300 for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to work of other contracts. After review, revise and resubmit for transmittal to Consultant.

.2 Submit requests for payment for review, and for transmittal to Consultant.

.3 Submit requests for interpretation of Contract Documents, and obtain instructions through General Contractor.

.4 Process substitutions and change orders through General Contractor.

.2 Deliver closeout submittals for review and preliminary inspections, for transmittal to Consultant.

1.6 Coordination Drawings

.1 Provide information required by General Contractor for preparation of coordination drawings.

.2 Review and approve revised drawings for General Contractor's submittal to Consultant.

1.7 Close-Out Procedures

.1 Notify General Contractor when Work is considered ready for Substantial Performance.

.2 Accompany General Contractor on preliminary inspection to determine items listed for completion or correction.

.3 Comply with General Contractor's instructions for correction of items of work listed in executed certificate of Substantial Performance.

.4 Notify General Contractor for instructions for completion of items of work determined in Consultant's final inspection

END OF SECTION

PART 1 GENERAL

Abbreviations may be used on the drawings and in the Project manual. Refer to this Section for interpretations.

AFF	Above Finished Floor
AD	Access Door
AP	Access Panel
ACFL	Access Floor
ADJT	Adjustable
ALT	Alternate
AL	Aluminum
ANOD	Anodized
ASPH	Asphalt
AUTO	Automatic
A/VR	Air/Vapour Retarder
BSMT	Basement
BRCG	Bracing
BIT	Bituminous
BLKG	Blocking
BS	Both Sides
BOT	Bottom
BRK	Brick
BLDG	Building
BBD	Bulletin Board
BUR	Built-up Roofing
CAB	Cabinet
CARP	Carpet
CB	Catch Basin
CLG	Ceiling
CEM	Cement
CPL	Cement Plaster
CT	Ceramic Tile
CLR	Clear
COL	Column
CONC	Concrete
CCB	Concrete Block
CONST	Construction
CONT	Continuous
CJT	Control Joint
CG	Corner Guard
CORR	Corrugated
CNTR	Counter
CFLG	Counter Flashing
CSE	Course
DP	Dampproofing
DMT	Demountable
DIAG	Diagonal
INSUL	Insulation
INTR	Interior
LAM	Laminate
LTL	Lintel
DIAM	Diameter
DIM	Dimension
DPR	Dispenser
DS	Downspout
DWG	Drawing
DF	Drinking Fountain
EF	Each Face
ELEC	Electrical
EL	Elevation
ELEV	Elevator
EQ	Equal
EXST	Existing
EXT	Exterior
FB	Face Brick
FOC	Face of Concrete
FOF	Face of Finish
FOM	Face of Masonry
FOS	Face of Studs
FSTNR	Fastener
FBRBD	Fibreboard
FBRGL	Fiberglass
FIN	Finish
FFE	Finished Floor Elevation
FEC	Fire Extinguisher Cabinet
FHC	Fire Hose Cabinet
FPRF	Fireproofing
FLG	Flashing
FLR	Floor
FD	Floor Drain
FTG	Footing
FDN	Foundation
FUR	Furring
GALV	Galvanized
GL	Glass Glazing
GLB	Glass Block
GB	Grab Bar
GR	Grade
GVEL	Gravel
GWB	Gypsum Wallboard
HDWD	Hardwood
HGT	Height
HC	Hollow Core
HM	Hollow Metal
HORIZ	Horizontal
REINF	Reinforce
RESIL	Resilient
REV	Revision

MH	Man Hole
MFR	Manufacture
MSNRY	Masonry
MO	Masonry Opening
MAX	Maximum
MECH	Mechanical
MC	Medicine Cabinet
MEMB	Membrane
MET	Metal
MTFR	Metal Furring
MIN	Minimum
MIR	Mirror
MISC	Miscellaneous
MOD	Modular
NOM	Nominal
NIC	Not in Contract
NTS	Not to Scale
OC	On Centre
OPG	Opening
OPP	Opposite
OPH	Opposite Hand
OD	Outside Diameter
OH	Overhead
PNT	Paint
PNL	Panel
PTD	Paper Towel Dispenser
PBD	Particleboard
PTR	Paper Towel Receptor
PTN	Partition
PLAS	Plaster
PLAM	Plastic Laminate
PG	Plate Glass
PLYWD	Plywood
PE	Porcelain Enamel
PCC	Precast Concrete
PFN	Pre-finished
PRF	Preformed
QT	Quarry Tile
RD	Roof Drain
RFH	Roof Hatch
RO	Rough Opening
RB	Rubber Base
SNT	Sealant
SECT	Section
SHTHG	Sheathing
SIM	Similar
SC	Solid Core
SD	Soap Dispenser
SND	Sanitary Napkin Dispenser
SNR	Sanitary Napkin Receptor
SPEC	Specification
SST	Stainless Steel
STD	Standard
STRL	Structural
SUSP	Suspended
TKBD	Tackboard
TLE	Telephones
TER	Terrazzo
THK	Thick
THR	Threshold
TPH	Toilet Paper Holder
TPTN	Toilet Partition
TPD	Toilet Paper Dispenser
T&G	Tongue and Groove
TSL	Top of Slab
TST	Top of Stair
TB	Towel Bar
TYP	Typical
UNFIN	Unfinished
VERT	Vertical
VCT	Vinyl Composite Tile
VIN	Vinyl
VF	Vinyl Fabric
WPF	Waterproofing
WDO	Window
WGL	Wired Glass
WPT	Working Point
WM	Wire Mesh

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included

.1 Requirements and procedures for installation of permanent identification labels and markers on process, mechanical, and electrical equipment installations.

1.2 Related Requirements

.1 Section 013300 - Submittals: Product data and samples.

.2 Section 017839 - Contract Closeout: Project Record Documents.

1.3 Quality Assurance

.1 Comply with CSA B53 project specifications for colours, designations, markings, sizes, and band widths.

1.4 Submittals

.1 Submit typed copy of preliminary schedule of name plates, tag coding, and colour coding for review by Consultant prior to start of work.

.2 Submit 2 additional final typed copies of schedules for nameplates and valve tags 15 days prior to inspection for Substantial Performance or 5 days prior to date scheduled for instruction of Owner's personnel, whichever is first.

.3 Incorporate copies of final schedules for nameplates and valve tags into Record Documents, Section 01720.

1.5 Schedules

.1 Nameplate schedules shall list: Pump, control, fire system, alarm system and electrical equipment nameplates.

.2 Include nameplate designation, manufacturer's nameplate data, equipment and component parts; numbers, location of equipment, and switch location and normal operating position of switch.

.3 Valve tag schedules shall list each tag by systems. Include reference number, valve location and usage, system identification, colour code, and function, size and valve manufacturer with model number, and normal operating position of valve.

1.6 Colour Identification Schedules

.1 Refer to related systems technical specification.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

PART 1GENERAL

1.1 Requirements Included

.1 Schedule, form, and content.

.2 Scheduled revisions

1.2 Related Requirements

.1 Review PWGSC requirements

1.3 Schedules Required

.1 Submit the following schedules:

- .1 Construction Progress Schedule
- .2 Submittal Schedule for Shop Drawings and Product Data
- .3 Submittal Schedules for Samples
- .4 Product Delivery Schedule.

1.4 Format

.1 Prepare schedule in the form of a horizontal bar chart.

.2 Provide a separate bar for each trade or operation.

.3 Provide horizontal time scale identifying the first work day of each week.

.4 Format for listings: The chronological order of the start of each item of work.

.5 Identification of listings: By systems description.

1.5 Submission

.1 Submit initial schedules within fifteen (15) days after award of Contract.

.2 Submit one (1) opaque reproduction, plus two (2) copies to be retained by the Consultant.

.3 Consultant will review schedule and return review copy.

.4 Resubmit finalized schedule within 7 days after return of review copy.

.5 Submit revised progress schedule with each application for payment.

.6 Distribute copies of the revised schedule to:
- .1 Job site office
- .2 Subcontractors
- .3 Other concerned parties.

.7 Instruct recipients to report to the Contractor within 10 days, any problems anticipated by the timetable shown in the schedule.

1.6 Construction Progress Schedule

.1 Include the complete sequence of construction activities.

.2 Include the dates for the commencement and completion of each major elements of construction, but not limited to the following:

- .1 Site clearing
- .2 Site utilities
- .3 Foundation Work
- .4 Structural framing
- .5 Special subcontractor work
- .6 Equipment Installations (if any within the scope of Base Building work).
- .7 Finishes (Exterior)
- .8 Mechanical
- .9 Electrical

.3 Show projected percentage of completion of each item as of the first day of the month.

.4 Indicate progress of each activity to date of submission schedule.

.5 Show changes occurring since previous submission of schedule:

- .1 Major changes in scope.
- .2 Activities modified since previous submission.
- .3 Revised projections of progress and completion.
- .4 Other identifiable changes.

.6 Provide a narrative report to define:

- .1 Problem areas, anticipated delays, and the impact on the schedule.
- .2 Corrective action recommended and its effect.
- .3 The effect of changes on schedules of other prime contractors.

1.7 Submittals Schedule

.1 Include schedule for submitting shop drawings, product data, samples.

.2 Indicate dates for submitting, review time, resubmission time, float time, last date for meeting fabrication schedule.

.3 Includes dates when delivery will be required for Owner furnished products.

.4 Include dates when review submittals will be required by the Consultant.

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included

.1 Shop drawings and product data

.2 Record drawings

.3 Certificates and transcripts

1.2 Related Requirements

.1 Section 014000 - Quality Control: Submission of test and mix design mill tests.

.2 Section 017839 - Project Record Documents: Submission of contract closeout documents.

1.3 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 the Work. 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.

.2 Work affected by the submittal shall not proceed until review is complete.

.3 Review, and sign submittals prior to submission to the 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 the requirements of the Work and the Contract Documents. Submittals not stamped, signed, dated and identified as to the specific project will be returned without being examined and shall be considered rejected.

.4 Verify field measurements and affected adjacent Work is coordinated with shop drawings and General Contractor. Advise consultant of conflicts prior to final approval of shop drawings.

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

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

.7 Keep one reviewed copy of each submission on site. Distribute copies of reviewed submissions to all persons involved in that item of work.

1.4 Shop Drawings and Product Data

.1 The term "shop drawings" means drawings, diagrams, illustration, schedules, performance charts, brochures and other data which are to be provided by the Contractor to illustrate details of a portion of the Work.

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

and installed. Indicate cross references to design drawings and specifications.

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

.4 Make changes in shop drawings as the Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify the Departmental Representative in writing of any revisions other than those requested.

.5 Submit six (6) prints of shop drawings for each requirement requested in specification Sections and as the Departmental Representative may reasonably request.

.6 Submit six (6) copies of product data sheets or brochures for requirements requested in specification Sections and as the Departmental Representative may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.

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

1.5 Record Drawings

.1 After award of Contract the Departmental Representative may provide two (2) sets of drawing prints for the purpose of maintaining record drawings. Accurately and neatly record deviations from Contract Documents caused by site conditions and changes ordered by the Departmental Representative.

.2 Record locations of concealed components of mechanical and electrical services.

.3 Depth of various elements of foundation in relation to floor level.

.4 Horizontal and vertical location of underground utilities and appurtenances concealed in construction, referenced to permanent surface features.

.5 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

.6 Field changes of dimension and detail.

.7 Changes made by Change Order or Change Directive.

.8 Locations and elevations of permanent benchmarks.

.9 Identify drawings as "Project Record Copy". All changes must be noted on this Project Record copy as the work proceeds and in chronological order of events. Maintain in new condition and make available for inspection on site by Departmental Representative.

.10 On completion of Work and prior to final inspection, neatly transfer "as-built" notations to the second set and submit both sets to the Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 This section specifies general requirements and procedures for contractors submissions of shop drawings, product data, samples and mock-ups to Departmental Representative for review. Additional specific requirements for submissions are specified in individual sections of Divisions 2 through 32.

.2 Do not proceed with work until relevant submissions are reviewed by Departmental Representative.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

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

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

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

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review of submission, unless Departmental Representative gives written acceptance of specific deviations.

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

.9 Notify Departmental Representative, in writing, when re-submitting, of any revisions other than those requested by Departmental Representative.

1.2 Submission Requirements

.1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Allow 10 days for Departmental Representative review of each submission.

.3 Accompany submissions with transmittal letter, in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shopdrawing, product date and sample.

.5 Other pertinent data.

.4 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.

.4 Contractor's stamp, signed by Contractors authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of work as applicable:

.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

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

1.3 Shop Drawings

.1 Original drawings, or modified standard drawings provided by Contractor, to illustrate details of portions of work, which are specific to project requirements.

.2 Maximum sheet size: 850 x 1050 mm.

.3 Submit shop drawings as follows:

.1 Submit digital copies of shop drawings (in pdf format) or (8) eight sets hardcopies.

.4 Cross-reference shopdrawing information to applicable portions of Contract Documents.

1.4 Product Data

.1 Product Date: Manufacturers catalogue sheets brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.2 Submit 3 copies of product data.

.3 Sheet size: 215 x 280 mm, maximum of 3 modules.

.4 Delete information not applicable to project.

.5 Supplement standard information to provide details applicable to project.

.6 Cross-reference product data information to applicable portions of Contract Documents.

1.5 Samples

.1 Samples: Examples of materials, equipment, quality, finishes, workmanship.

.2 Where colour, pattern or texture is criterion, submit full range of samples.

.3 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

1.6 Shop Drawings Review

.1 The review of shop drawings is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall 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. 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 of all sub-trades, and for coordination of the work.

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included

.1 Testing, administrative and enforcement requirements.

.2 Testing and mix designs.

1.2 Inspections

.1 Refer to PWGSC

.2 The Owner and the Departmental Representative shall have access to the Work. If parts of the Work are in preparation at locations other than the Place of the Work, access shall be given to such work whenever it is in progress.

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

.4 If the 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 the inspections or tests satisfactory completed and make such good Work.

.5 The Departmental Representative may order any part of the Work to be examined if the Work is suspected to be not in accordance with the Contract Documents. If, upon examination such work is found not in accordance with the Contract Documents, correct such work and pay the cost of examination and correction. If such Work is found in accordance with the Contract Documents, t he Owner shall pay the cost of examination and replacement.

.6 The Contractor shall furnish promptly two (2) copies of certificates and inspection reports relating to the Work.

1.3 Independent Inspection Agencies

.1 The Contractor will appoint and will pay for the services outlined below.

- .1 Inspection and testing required by construction documents, law, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under the supervision of the Departmental Representative.
- .6 Additional tests may be required for rejected work.

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

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

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

1.4 Access to Work

.1 Allow inspection/testing agencies access to the Work, off site manufacturing and fabrication plants.

.2 Owner to provide reasonable facilities for such access.

1.5 Procedures

.1 Notify the appropriate agency and Departmental Representative in advance of the 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 responsible promptness and in an orderly sequence so as not to cause delay in the Work.

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

1.6 Rejected Work

.1 Refer to PWGSC.

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

.3 Make good other Contractor's work damaged by such removals or replacement promptly.

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

1.7 Reports

.1 Submit four (4) copies of test reports to the Departmental Representative.

1.8 Tests and Mix Designs

.1 Furnish tests results and mix design as may be requested. An appointed Testing Agency is to review supplier's mix design and provide approval and recommendations to the Departmental Representative

.2 The costs of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Departmental Representative and may be authorized as recoverable.

END OF SECTION

PART 1 GENERAL

1.1 Refer to PWGSC General Procedures and Standards 2011 Western Region.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 Barriers

.1 Provide barricades and covered walkways required by governing authorities for public rights-of-way and for access to building, if applicable.

.2 Provide barriers around trees and plants designated to remain. Protect from damage.

3.2 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

3.3 Weather Enclosures

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings;

.3 **PHASE 1** – Header House provide sheltering for winter construction of footing and foundation work.

.4 **PHASE 2** – Greenhouse work – provide sheltering and winter construction provisions for the greenhouse frame concrete piers and for Greenhouse 2 concrete floor slab (blankets, etc).

3.4 Dust Tight Screens

.1 Provide dust tight screens or partitions to localize dust generating activities, and for the protection of workers, finished areas of Work.

.2 Maintain and relocate protection until such Work is complete.

3.5 Scaffolding

.1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms.

3.6 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoist and cranes shall be operated by qualified operators.

3.7 Dewatering

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

3.8 Site Storage/Loading

.1 Refer to PWGSC General Procedures and Standards 2011 Western Region.

3.9 Access to Site

.1 Refer to PWGSC General Procedures and Standards 2011 Western Region.

3.10 Construction Parking

.1 Parking will be permitted on site provided it does not disrupt the performance of Work. Coordinate desginated parking areas with Owner.

3.11 Sanitary Facilities

.1 Provide sufficient sanitary facilities for workers and maintain in clean condition.

3.12 Water Supply

.1 Available adjacent to site.

3.13 Temporary Heating (PHASE 1 and PHASE 2 – separate provisions)

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside the building must be vented to the outside or be non-flame type. Solid fuel salamanders not permitted.

.3 Maintain temperatures of minimum ten (10) degrees C in areas where construction is in progress, unless indicated otherwise in specifications.

.4 Ventilated heated areas keep building free of exhaust or combustion gases.

.5 The permanent heating system of the building, or portions thereof, may be used upon receiving written permission from the Departmental Representative. Equipment warranty period to commence at time of substantial completion.

.6 Pay costs for maintaining temporary heat.

.7 Be responsible for damage to the Work due to failure in providing adequate heat and protection during construction.

3.14 Temporary Power and Light

.1 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.2 Temporary power for electric cranes and other equipment requiring in access of above is the responsibility of the contractor.

.3 Provide and maintain temporary lighting throughout the project. The level of illumination on all floors and stairs shall not be less than 15 foot candles 162 Lx.

3.15 Protection for Off-Site and Property

.1 Protect surrounding property from damage during performance Work.

.2 Be responsible for damage incurred.

3.16 Fire Protection

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

.2 Open and burning rubbish are not permitted on the site.

3.17 Protection of Building Finishes and Equipment

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screen, covers, and hoarding as required.

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

.4 The Contractor is responsible for all water penetrations and leakage into the building and the ensuing costs of replacement of damaged finishes and contents, during the execution of the work.

3.18 Security

.1 Refer to PWGCS.

3.19 Offices

.1 Provide and maintain in clean condition during progress of Work, adequately lighted, heated and ventilated Contractor's office with space for filling and layout of Contract Documents and Contractor's normal site office staff.

.2 Provide adequate required aid facilities.

.3 Subcontractors may provide their own offices as necessary. Direct the location of these offices.

3.20 Equipment/Tool/Materials 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 the least interference with work activities.

3.21 Project Cleanliness

.1 Refer to PWGSC.

3.22 Installation/Removal

.1 Provide construction facilities and temporary controls in order to execute the work expeditiously.

.2 Remove from site all such work after use.

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included
.1 Reference standards
.2 Product quality, availability, storage, handling, protection, transportation
.3 Manufacturer's instructions.
.4 Workmanship, co-ordination, cutting, fastenings.
.5 Existing facilities.

1.2 Related Requirements
.1 Section 014000-Quality Control: Quality control and inspection of Work.

PART 2 PRODUCTS

2.1 Material and Product Reference Standards
.1 Within the text of specifications, reference may be made to the following standards:

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
CEC	Canadian Electrical Code (published by CSA)
CEMA	Canadian Electrical Manufacturer's Association
CAN1	Standards Council of Canada designation for CGA
CAN2	Standards Council of Canada designation for CGSB
CAN3	Standards Council of Canada designation for CSA
CAN4	Standards Council of Canada designation for ULC
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CISC	Canadian Institute of Steel Construction
CLA	Canadian Lumberman's Association
CPCA	Canadian Painting Contractors' Association
CPCI	Canadian Prestressed Concrete Institute
CRCA	Canadian Roofing Construction Association
CSA	Canadian Standards Association
FM	Factory Mutual Engineering Corporation
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
NAAMM	National Association of Architectural Metal Manufacturers
NBC	National Building Code
NEMA	National Electrical Manufacturers' Association
TTMAC	Terrazzo, Tile and Marble Association of Canada
ULC	Underwriters' Laboratories of Canada

.2 Conform to these standards, in whole or part, as specifically requested in the specifications.

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

.4 The cost for such testing will be born by the Owner in the event of conformance with Contract Documents or by the Contractor in the event of non conformance.

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

2.2 Quality

.1 Refer to PWGSC.

2.3 Availability

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In the event of failure to notify the Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available products of similar character, at no increase in Contract Price.

2.4 Storage, Handling and Protection

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

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

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

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged Products at own expense and to the satisfaction of the Departmental Representative.

2.5 Transportation

.1 Pay costs of transportation of Products required in the performance of Work.

.2 Transportation cost of Products supplied by the Owner will be paid for by the Owner. Unload, handle and store such Products.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

.1 Unless otherwise indicated in the 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 the Departmental Representative in writing, of conflicts between the specifications and manufacturer's instructions, so that the Departmental Representative may establish the course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorized the Departmental Representative require removal and re-installation at no increase in Contract Price.

3.2 Workmanship

.1 Workmanship shall be the best quality, executed by the workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties. The Departmental Representative reserves the right to require the dismissal from sites, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Departmental Representative, whose decision is final.

3.3 Coordination

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

.2 Be responsible for co-ordination and placement of openings, sleeves and accessories.

3.4 Concealment

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform the Consultant if there is a contradictory situation. Install as directed by Departmental Representative.

3.5 Cutting and Remedial Work

.1 Refer to PWGSC

3.6 Location of Fixtures

.1 Consider the location of fixtures, outlets, and mechanical and electrical as approximate.

.2 Inform the Departmental Representative of a conflicting installation. Install as directed.

3.7 Fastenings

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

.4 Space anchors within their load or shear capacity and ensure they provide positive

permanent anchorage. Wood, or any other organic material plugs are not acceptable.

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

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

3.8 Protection of Work in Progress

.1 Adequately protect Work completed or in progress. Work damaged due to failure in providing such protection is to be removed and replaced, or repaired, as directed by the Departmental Representative, at no increase in Contract Price.

.2 Prevent overloading of any part of the building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.

3.9 Existing Utilities

.1 When breaking into or connecting to existing services utilities, execute Work at times directed by local governing authorities, with a minimum of disturbance to Work, and/or building occupants, and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in a manner approved by authority having jurisdiction and stake otherwise record location of capped service.

END OF SECTION

PART 1 GENERAL

1.1 Substitution During Construction

.1 The Contractor may propose substitutions on condition that either:

- .1 Previously disclosed data or specified material cannot be provided or incorporated into the work in time allowed due to conditions beyond control of the Contractor, or
- .2 Owner will benefit by reduced cost or improved project. Owner shall receive full benefit of any cost reduction.

.2 Requests for substitutions shall include:

- .1 Statement of cause for request with substantiating documents.
- .2 Documentary proof of equal or superior quality, delivery time, and costs in form of certified quotation from supplier of both specified and proposed material.
- .3 Change to Contract value in the form of an ADD or DEDUCT adjustment.

.3 When requesting a substitution, Contractor shall:

- .1 Include costs of additional consulting services and related costs required to incorporate the substitution into the work.
- .2 Refer to PWGSC.

.4 Requests for substitutions will be subject to approval by the Departmental Representative and acceptance by the Owner. Approved substitutions will be considered in accordance with PWGSC Contract.

.5 Until a decision is rendered on a proposed substitution, make no change in the execution of the specified work, unless written instructions to do so are issued by the Departmental Representative.

.6 Substitutions indicated or implied on shop drawings, schedules, samples or proposed in ways other than in the manner heretofore described, and not approved by the Departmental Representative, will be cause for rejection of shop drawings, schedules, or samples. Work previously approved, then found to contain substitutions not accepted, may be rejected in accordance with the terms of the Contract.

1.2 Documentation of Approved Substitutes

.1 Refer to PWGSC.

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included

.1 Provide testing organization services under provisions specified in Section 01400.

1.2 Quality Assurance

.1 Testing organization: Current member in good standing of AABC certified to perform specified services.

.2 Comply with applicable procedures and standards of the certification sponsoring association.

.3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.3 Submittals

.1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for co-ordination of entire testing, adjusting and balancing.

.2 Submit documentation to confirm organization compliance with quality assurance provision.

.3 Submit (3) preliminary specimen copies of each of the report forms proposed for use.

.4 Fifteen days prior to Substantial Performance, submit (3) copies of final reports on applicable forms.

1.4 Procedures - General

.1 Comply with procedural standards of certifying association under whose standard services will be performed.

.2 Notify Departmental Representative (3) days prior to beginning of operations.

.3 Accurately record data for each step.

.4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

1.5 Final Reports

.1 Organization having managerial responsibility shall make reports.

.2 Each form shall bear signature of recorder, and that of supervisor of reporting organization.

.3 Identify each instrument used, and latest date of calibration of each.

1.6 Contractor Responsibilities

.1 Prepare each system for testing.

.2 Cooperate with testing organization, provide access to equipment and systems.

.3 Provide personnel, operate systems at designation times, and under conditions required for proper testing, adjusting, and balancing.

.4 Notify testing organization (7) days prior to time project will be ready for testing.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 Preparation

.1 Provide instruments required for test.

.2 Make instruments available to Departmental Representative to facilitate spot checks during testing.

.3 Retain possession of instruments and remove at completion of services.

END OF SECTION

PART 1 GENERAL

1.1 Materials

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

1.2 Cleaning During Construction

.1 Provide on-site metal containers for collection of waste materials, and debris.

.2 Dispose of waste materials, and debris off site.

.3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 Project Cleanliness

.1 Maintain the work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.

.2 Remove waste material and debris from the site at the end of each working day.

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

1.4 Final Cleaning

.1 Remove grease, dust dirt, stains, labels, fingerprints, and other foreign materials, from interior and exterior finished surfaces including glass and other polished surfaces.

.2 Clean lighting reflectors, lenses, and other lighting surfaces.

.3 Remove snow and ice from access to building.

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

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

.6 Leave the work broom clean before the inspection process commences.

.7 Clean and polish glass, mirrors, hardware, mechanical and electrical fixtures. Replace broken scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

.9 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

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

.11 Broom clean and wash exterior walks, steps, and surfaced areas.

.12 Remove dirt and other disfiguration from exterior surfaces.

.13 Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment and clean roofs, downspouts, and drainage systems.

END OF SECTION

PART I GENERAL

1.1 Related Requirements
.1 Section 013300 - Submittals: Shop drawings, photographs.
.2 Section 014000 - Quality Control: Test and inspect reports.

1.2 Quality Assurance
.1 Instructions and data to be prepared by personnel experienced in maintenance and operation of described products.

PART 2 PRODUCTS

2.1 Format
.1 Organize data in the form of an instructional manual. Refer to PWGSC.

2.2 Contents – Each Volume
.1 Table of Contents: Provide title of project; names, addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
.2 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

2.3 Submission
.1 Refer to PWGSC

PART 3 EXECUTION

3.1 Record Documents and Samples
.1 Maintain at the site for Contractor, Owner and Departmental Representative use, one record copy of:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

.2 Label and file in accordance with Section number listings in Table of Contents of this Project Manual.
.3 Maintain Record Documents in a clean, dry and legible condition.
.4 Keep Record Documents and samples available for inspection by Consultant.

3.2 Recording As-Built Conditions
.1 Record information on a set of blue line opaque drawings, and in a copy of a Project Manual.

.2 Provide felt tip marking pens, maintaining separate colors for each major system, for recording information.

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

.4 Contract Drawings and shop drawings: Legibly mark each item to record actual construction, including:

.1 Measure depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction and any field changes of dimension and detail.

.4 Changes made by addenda and change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

.5 Specifications: Legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalog number of each project actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda, Change Orders and Field Orders.

.6 Other Documents: Maintain manufacturer's certifications, inspection certifications, field test records, and authority having jurisdiction certifications required by individual specifications sections.

3.3 Warranties and Bonds

.1 Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of work.

.4 Date of beginning of time of warranty shall be determined after the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

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

END OF SECTION

PART 1 GENERAL

1.1 Requirements Included

.1 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

1.2 Related Requirements

.1 Section 016600-Testing, Adjusting, and Balancing of Systems.
.2 Section 017839-Project Record Documents: Operation and Maintenance Data.
.3 Individual Sections: Demonstrating systems and equipment.

1.3 Description

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
.2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed upon times.

1.4 Quality Control

.1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.5 Submittals

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Owner's approval.
.2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
.3 Give time and date of each demonstration, with a list of persons present.

1.6 Conditions for Demonstrations

.1 Equipment has been inspected and put into operation in accordance with Section 01600.
.2 Testing, adjust, and balance has been performed in accordance with Section 01660 and equipment and systems are fully operational.
.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

PART 2 PRODUCTS (Not Used).

PART 3 EXECUTION

3.1 Preparation

.1 Verify that conditions for demonstration and instructions comply with requirements, and that designated personnel are present.

3.2 Demonstration and Instructions

.1 Demonstrate start up, operation, control, adjustment, trouble shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment designated location.
.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction, and review contents of manual in detail.
.4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Form work system and supports for cast-in-place concrete, including pile caps, except as specified in Section 321313.
.2 Place dowels, anchor bolts/plates, embedded plates and assemblies supplied by others.
.3 Form work for isolation concrete slab.

1.2 Related Sections

.1 Drilled Cast-in-Place Augured Piles - Section 316323.
.2 Concrete Reinforcement Section 032000.
.3 Cast-in-Place Concrete Section 033000.
.4 Rough Framing Section 061000
.5 Mechanical Division 22 AND 23, and Electrical Division 26.

1.3 Work Installed Only; Supplied by Others

.1 Anchor Bolts/Plates; Embedded Plates and Assemblies, Shelf Angle Anchor Bolts, Conduit and Conduit Sleeves.

1.4 Design and Code Requirements

.1 Form work and supporting false work shall be designed and constructed in accordance with the requirements of CSA S269.1-1975 and CAN3-A23.1-94 (Latest Edition) and S269.3-M92, as applicable to the work.
.2 Assume full responsibility for the design and for the adequacy and safety of all form work and false work.
.3 Retain a Professional Consultant to design false work which consists of shoring more than one tier in height or which is a framed structure.
.4 The design and erection of form work and related supporting works shall comply with construction safety legislation and regulations.
.5 Design and construct form work for structural members over voids to ensure positive void. Materials used to form the void shall not produce toxic, odorous or other detrimental bi-products. The use of rigid boards of compressed straw, such as stramit, will not be permitted.

1.5 Submittals

.1 Prior to commencement of work, submit drawings for the Departmental Representative's file showing form work details and their supports, including re-shoring system for the slabs. These drawings may be required to be signed and sealed by a Consultant registered with the Association of Professional Consultants of the Province of governing jurisdiction.

1.6 Handling and Storage

.1 Deliver, handle and store form work materials to prevent weathering, warping or damage detrimental to the strength of the materials or to the surface to be formed.
.2 Ensure that form work surfaces, which will be in contact with concrete are not contaminated by foreign matter. Handle and erect the fabricated form work so as to prevent damage.

PART 2 PRODUCTS

2.1 Quality and Strength

.1 The quality and strength of form work materials shall comply with the requirements set forth in this Specification and CAN3-A23.1-94 (Latest Edition).

2.2 Finishes

.1 Form materials for concrete surfaces which will be exposed to view, or which require smooth and uniform surfaces for applied finishes or other purposes shall consist of square edges, smooth panels of plywood, metal or plastic to approval of the Departmental Representative. The panels shall be square and made in a true plane, clean, free of holes, surface markings and defects.

.2 Square edged, tongue and groove or shiplap lumber may be used to form concrete which will not be exposed to view or which does not require smooth uniform surface for other purposes.

2.3 Materials

.1 Form Plywood: Exterior grade, Douglas Fir conforming to CSA Standard 0121-M1978 (Latest Edition). Plywood shall be resin coated one side (in contact with concrete). Use sound undamaged plywood with clean true edges. Make up or patching strips between panels shall be kept to a minimum.

.2 Lumber for forms, false work, shoring and bracing: Conform to CSA Standard 0141-91 (Latest Edition) for Softwood Lumber, and the applicable authorized grading authority. All lumber shall be a grade to which allowable unit stresses may be assigned in accordance with the National Building Code. All lumber shall be grade marked by the authorized grading authority.

.3 Form Ties: Fabricated units having a minimum working strength when assembled of 21 MPa and shall be adjustable in lengths to permit tightening and alignment of forms. Ties shall be made with breakback ends or other means of removing the tie and to a depth of at least 25mm from the concrete surface after the forms are removed. Flat tie for architectural exposed concrete to include plastic cones leaving no metal within 20mm of surface.

.4 Form Release Agent: Proprietary material which will not stain the concrete or impair the natural bonding or colour characteristics of coating intended for use on the concrete.

.5 Waterstops: Purpose made polyvinyl chloride: 12 MPa minimum tensile strength, minus 46° Celsius working temperature range, conforming to CGSB 41 GP 35M, Type 2. "DURAJOINT' 150 by Sternson: Waterstop 76 by Greenstreak; Canadian Water Stop SS-11.

.6 Tubular Column Forms: Round spirally wound laminated fibre forms, internally treated with release material. CSA 0141(Latest Edition).

.7 Dovetail Anchor Slots: Minimum 0.6mm galvanized steel with insulation filled slots.

.8 Pre-Molded Joint Fillers:

- .1 Bituminous impregnated fibreboard: ASTM D1751-73. 13mm thick asphalt impregnated fibreboard.
- .2 Vinyl Foam: To ASTM D1752-67 1973 (Latest Edition) Type I, flexible grade.
- .3 Standard Cork: ASTM D1752-67 1973 (Latest Edition) Type II.

.9 Polyethylene film.

.10 Reglets: As detailed on drawings.

.11 Grounds and Nailing Strips: Pressure treated Hemlock-fir, utility grade.

.12 Steel Forms: Proprietary System to achieve intended result.

PART 3 EXECUTION

3.1 Condition of Surfaces

.1 Examine the excavations and foundations for adequate working room and support for the work of this section.

.2 Verify lines, levels and centre lines before proceeding with the work and ensure that dimensions agree with drawings.

.3 Report to the Consultant, discrepancies in other work which affects the work of this section.

3.2 Preparation

.1 Make form work with reference to building lines and levels.

.2 Protect survey reference points during construction

3.3 Assembly and Erection

.1 Construct the form work and shoring and bracing to meet the design and Code requirements accurately so that the resultant finished concrete shall conform to the shapes, lines and dimensions shown on the drawings, within the specified tolerances.

.2 Form work shall be so arranged and assembled as to permit easy dismantling and stripping so that the concrete will not be damaged during its removal. Fabricate forms for exposed concrete work using smooth, square edged material, free from surface defects. Chamfer exposed edges of columns, walls, beams and girders, 25mm, unless noted.

.3 Review locations of ties and form panels for exposed concrete work with the Departmental Representative.

.4 Check and correct form work as required both horizontally and vertically, during the placing of the concrete.

.5 Construction form work to maintain the following maximum tolerances:

- .1 Deviations from horizontal and vertical lines: 6mm in 3000 mm; 20mm in 1200mm
- .2 Deviation of building dimensions indicated on drawings and position of columns, walls and partitions: 6mm.
- .3 Deviation in cross sectional dimensions of columns or beams or in thickness of slabs and walls: plus or minus 6mm.
- .4 Camber slabs and beams: 10mm per 3000mm of span unless indicated on drawings.

.6 Obtain Departmental Representative's approval for use of earth forms.

3.4 Joints in Forms

.1 Make form joints tight in order to prevent leakage of mortar.

.2 Clean all edges and contact surfaces before erection.

.3 Where required, install PVC waterstop to manufacturer's instructions and without displacing reinforcement. Do not distort or pierce waterstop.

.4 Make form joints tight. Use minimum number of joints.

3.5 Shoring and Bracing

.1 Provide bracing to ensure the stability of the form work as a whole.

.2 Prop or strengthen all previously constructed parts liable to be overstressed by construction loads.

.3 Arrange forms to allow stripping without removal of the principal shores, where these are required to remain in place.

3.6 Embedded Parts and Openings

.1 Provide formed openings where required for pipes, conduit, sleeves and other work to be embedded in and passing through concrete members. Accurately locate and set in place items, which are to be cast directly into the concrete. Coordinate the work of other sections and cooperate with the trade involved in the forming and setting of openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts. No such forming or setting of openings, slots, recesses, chases, sleeves or parts shall be done unless specifically shown on the drawings or approved prior to installation.

.2 Obtain Departmental Representative's approval before framing openings in concrete beams or columns specifically detailed on structural drawings.

.3 Provide temporary ports or openings where required to facilitate cleaning and inspection. Openings at the bottom of forms shall be located so that flushing water will drain from the forms.

.4 Close the temporary ports or openings with tight fitting panels, flush with the inside face of the forms, neatly fitted so that the joints will not be apparent in exposed concrete surfaces.

.5 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval in writing of all modifications from the Departmental Representative before placing concrete.

.6 Coordinate work with pre-engineered metal building supplier / erector.
.7 Accurately locate and set in place items which are to be cast directly into concrete.

3.7 Field Quality Control

.1 Inspect and check the completed form work, shoring and bracing to ensure that the work is in accordance with the form work design, and that the supports, fastenings, wedges, ties and parts are secure. The Departmental Representative responsible for the design of the form work shall assist in this inspection.
.2 Inform the Departmental Representative when the form work is complete and has been cleaned. Obtain the approval of the Departmental Representative responsible for the design of the form work and the general approval of the Departmental Representative before placing concrete.

3.8 Cleaning

.1 Clean the forms as erection proceeds to remove foreign matter.
.2 Remove cuttings, shavings and debris from within the forms.
.3 Flush the completed forms with water or air jet to remove remaining foreign matter. Ensure that water and debris drain to the exterior through the clean-out ports.

3.9 Winter Construction (not-applicable)

.1 Remove ice and snow from within the forms.
.2 The use of de-icing salts is not permitted.
.3 Unless form work and concrete construction proceed within a heated enclosure, do not use water to clean out completed forms. Use compressed air or other means to remove foreign matter.

3.10 Removal of Form Work

.1 Notify the Departmental Representative before removing form work.
.2 Remove form work progressively and in accordance with the reference Code requirements, and so, that no shock loads or imbalanced loads are imposed on the structure.
.3 Do not remove forms and shoring before concrete has attained sufficient strength to ensure safety of structure. If evidence to verify concrete strength is not available, the forms and shores shall not be removed before the following minimum intervals after concrete in placed.
  .1 Footings, walls and grade beams: 4 days
  .2 Columns: 7 days
  .3 Beams, soffits and slabs 21 days
.4 Loosen forms carefully. Do not wedge pry bars, hammers or tools against concrete surfaces.
.5 Leave forms loosely in place, against vertical surfaces, for protection, until, complete removal is approved by Departmental Representative.
.6 Store removed forms, for exposed architectural concrete, in a manner that surfaces to be in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.
.7 Re-shore structural members where required due to design requirements or construction conditions and as required to permit progressive construction.
.8 Remove forms so directly supporting weight of concrete as soon as stripping operations will not damage concrete.
.9 Reuse of form work and false work is subject to the requirements of CAN3-A23.1-94 (Latest Edition).
.10 Where curing conditions are such as to retard curing of concrete, or where earlier form removal is desired, obtain additional sets of stripping cylinders, cured adjacent to and under same conditions as work in question. Use test results of these cylinders as a guide in determining the time for removal of form work.
.11 Remove load supporting forms only when the concrete has attained 75 percent of the required 28 day compressive strength and re-shore. Verify strength of concrete by compression tests, prior to removing form work.

3.11 Special Form Work

.1 Construct void forms on a sand bed over graded earth to levels shown on drawings. Cover void forms with 0.15mm thick polyethylene film and seal joints. The intent is that the special form work shall provide a positive void, minimum 150mm high, under slab and 100mm under walls and grade beams, after curing of concrete.

.2 Provide special form work for exposed aggregate finishes where shown on drawings. Where flat surfaces are to be exposed, fabricate form work using new, square-edged plywood (Sonotube where circular) free from surface defects. Tape joints. Locate form ties to a regular pattern as recommended by the Departmental Representative. To form work used for exposed surfaces, apply retarding agent in strict accordance with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Furnish and install all bonded reinforcement and associated.

.2 Do reinforcing work in accordance with CSA A23.1-94.

1.2 Related Work

.1 Drilled Cast-in-Place Augured Pile Section 316323.

.2 Concrete Form Work Section 031000.

.3 Cast-in-Place Concrete Section 033000.

1.3 References

.1 Canadian Standards Association:

- .1 G30.5 (Latest Edition): Welded Steel Wire Fabric for Concrete
- .2 G30.12 (Latest Edition): Billet Steel Bars for Concrete Reinforcement.
- .3 W186 (Latest Edition): Welding of Reinforcing Bars in Reinforced Concrete onstruction.

.2 American Concrete Institute:

- .1 315 (Latest Edition): ACI Detailing Manual.

1.4 Submittals

.1 Prior to commencement of work, submit shop drawings in accordance with Section 01300, Submittals. Include placing drawings and cutting sheets. Indicate welding and identify by C.W.B. symbols. Show clearances and special finishes.

.2 Upon request by the Departmental Representative, submit mill test reports on materials supplied under this Section, indicating physical and chemical properties.

.3 All drawings and schedules shall be prepared and checked upon the direct supervision of a qualified professional Departmental Representative who is experienced in this work.

.4 Clearly indicate bar sizes, spacing, location and quantities of reinforcement, mesh, chairs, spacers and hangers with identifying code marks to permit correct placement without reference to structural drawings; to ACI - 315 Manual of Standard Practice and Metric Supplement (Latest Edition) by Reinforcing Steel Institute of Ontario.

.5 Design and detail lap lengths and bar development lengths to CSA A23.3 (Latest Edition), unless specified on drawings.

.6 Review of shop drawings for size and arrangement of principal and auxiliary members only. Such review will not relieve the Contractor of responsibility for general and detail dimension and fit, or any errors or omissions.

1.5 Substitutes

.1 Substitution of different size bars permitted only upon written approval of the Departmental Representative.

1.6 Delivery and Storage

.1 Reinforcing steel, welded wire fabric and accessories shall be delivered, handled and stored in a manner which prevents contamination from bond reducing or foreign matter and damage to its fabricated form.

PART 2 PRODUCTS

2.1 Materials

.1 All reinforcing steel, unless noted otherwise on the drawings or herein shall be deformed bars of new billet steel conforming to the current CSA Standard G30.18-M92 (Latest Edition), Grade

400, plain finish for all bars. Minimum splice for 10M bars to be 450mm. Minimum lap splice for all other bars to be 36 bar diameter or 675mm, whichever is greater.

.2 Weldable reinforcing bars: High strength ductile, deformed bars to CSA G30.16M, (Latest Edition), Grade 400.

.3 Column ties and beam stirrups shall conform to the current CSA G30.12 (Latest Edition), Grade 300.

.4 Welded wire fabric: To CSA G30.5-M1983 (Latest Edition). Provide in flat sheets only.

.5 Tie wires shall be 1.29mm or heavier annealed wire or a patented system approved by the Departmental Representative.

.6 Reinforcing steel supports shall conform to ACI Standard 315 (Latest Edition), unless otherwise approved by the Departmental Representative.

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

2.2 Fabrication

.1 Fabricated bends, splices and ties and supply bar supports and accessories in accordance with the arrangements of supports in accordance with CSA A23.3-94 (Latest Edition), unless noted otherwise.

.2 All intermediate and high strength steel grade reinforcing bars shall be bent cold without hickeying.

.3 Reinforcing bars shall not be straightened or re-bent.

.4 Location of reinforcement splices not shown on the drawings subject to approval by the Consultant and shall, for beams and slabs, be away from points of maximum stress in the steel.

.5 Welding of reinforcing bars: Use only weldable bars; preheat and weld to CSA W186 (Latest Edition).

PART 3 EXECUTION

3.1 Examination

.1 Examine the work upon which this section depends and report any discrepancies to the Consultant.

.2 Commencement of the work shall imply acceptance of conditions. Promptly report conditions which may, adversely affect work under this Section.

3.2 Installation

.1 Reinforcement of the size and shapes shown on the drawings, shall be accurately placed in accordance with the approved shop drawings, the structural drawings and the requirements of the current National Building Code.

.2 Clear distances between bars, except for columns, shall not be less than the nominal diameter of the bar, or 25mm or one and one-third the maximum size of the coarse aggregate. Bars placed in two or more layers shall have a minimum clear distance between the layers of not less than 25mm and shall be placed directly above and below each other.

.3 Clear distance between bars in columns shall be not less than one and one-half the nominal diameter of the bar or 40mm or one and one-half times the maximum size of the coarse aggregate.

.4 Reinforcing steel shall, where not otherwise shown on the structural drawings, be protected by the clear cover of concrete over the reinforcement, in accordance with CSA Standard A23.1-94, as follows:

  .1 Where concrete is formed against earth, not less than 75mm.

  .2 Where concrete placed against forms, is to be exposed to the weather or be in contact with the ground, not less than 50mm for bars larger than 15M, and not less than 40mm for bars 15M and smaller.

  .3 In slabs and walls not exposed to the ground or weather, not less than 20mm.

.4 In beams, girders and columns not exposed to the ground or weather, not less than 40mm to principal reinforcement, ties and stirrups.

The foregoing clear covers shall be maintained with 5m.

.5 Reinforcement shall be adequately supported by metal chairs, spacers or hangers and secured against displacement within the tolerance permitted and in accordance with the latest ACI Standard 315 (Latest Edition).

.6 For slabs on grade, footings or similar construction, concrete blocks may be used in place of metal chairs.

.7 Review with the Departmental Representative t, placement of reinforcement prior to concreting.

.8 Notify the Departmental Representative 24 hours prior to placing concrete.

.9 Place reinforcing steel to ACI 315 (Latest Edition) and in such a manner that steel will not be visible on exposed aggregate surfaces.

.10 Secure reinforcing steel to prevent displacement during concrete placement.

.11 Lap and splice bars as shown and scheduled on drawings. Minimum lap in accordance with current NBC, 500mm minimum.

3.3 Cleaning

.1 All materials shall be clean and free of all form oil or deleterious materials.

.2 All deleterious material shall be removed from the surface of the reinforcing steel in a manner acceptable to the Departmental Representative.

3.4 Welding

.1 Do welding to meet requirements of CSA W186 (Latest Edition). Have welding performed by workmen qualified under CSA W47.1 (Latest Edition). Welding only by written authority of the Departmental Representative

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Cast-in-Place concrete, with the exception of that specified.

.2 Cast-in-Place concrete required for this work is indicated on drawings and includes, but is not necessarily limited to:

- .1 Concrete slabs
- .2 Miscellaneous concrete (sidewalks, parking lot islands and curbs)
- .3 Finishing of all formed concrete surfaces
- .4 Concrete foundations

1.2 Related Sections

.1 Concrete Form Work Section 031000.

.2 Concrete Reinforcement Section 032000.

.3 Drilled Cast-in-Place Augured Piles - Section 326323.

1.3 References

.1 Canadian Standards Association, Latest Edition:

- .1 CAN/CSA-A5-M88: Portland Cements
- .2 CAN/CSA-A23.1-04: Concrete Materials and Methods of Concrete Construction
- .3 CAN/CSA-A23.2-94: Methods of Test for Concrete.
- .4 CAN3-A23.3-94: Design of Concrete Structures for Buildings.

.2 American Concrete Institute, Latest Update:

- .1 214: Evaluation of Compression Test Results of Field Concrete.

.3 American Society for Testing and Materials, Latest Update.

- .1 C260: Air-Entraining Admixtures for Concrete.

1.4 Submittals

.1 When requested by the Consultant, submit:

- .1 Concrete mix designs in accordance with CAN/CSA 23.1-04 for separate mixes required for the Work, accounting for concrete supplier's standard deviation, which is part of the new submittals of all performance concrete.
- .2 Evidence of the concrete supplier's standard deviation, or assume that standard deviation exceeds 4 MPa.
- .3 Grain size analysis of aggregates proposed for the Work.

.2 Before beginning work, submit a list of admixtures intended to be used.

.3 Submit layout drawings, one sepia and one print, showing sequence of pours and construction joint locations.

.4 Before beginning work, submit a 600mm x 600mm sample of exposed aggregate finish and sandblasted finish. Approved samples will be standard for the work.

.5 Submit statistical valid evidence of past performance of the mix design for each class of concrete to Consultant for approval 2 weeks prior to commencement of work. The testing authority engaged by the Contractor is to review and approve all evidence after consultation with Consultant and Owner.

.6 Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

1.5 Quality Assurance

.1 Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all work performed under this Section.

.2 For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeyman concrete finishers.

1.6 Product Handling

.1 Use all means necessary to protect cast-in-place concrete materials before, during and after installation and to protect the installed work and materials of all other trades.

.2 In the event of damage, immediately make all repairs and replacements necessary to approval of the Consultant, at no additional cost to the Owner.

1.7 Inspection and Testing

.1 Inspection and testing will be performed by a firm approved by the Consultant and paid for by the Contractor.

.2 Provide free access to all portions of work and cooperate with appointed firm.

.3 The testing agency will:

- .1 Take 3 cylinders in accordance with CAN/CSA-A23.2-94 3C for each $50m^3$ or less of concrete placed, a minimum of 1 test for each day's work, or as directed by the Consultant.
- .2 Take at least 1 slump test in accordance with CAN/CSA-A23.2-94-5C for each set of test cylinders taken.
- .3 Take at least 1 air test in accordance with CAN/CSA-A23.2-94 4C for each set of test cylinders taken.

.4 Copies of test results may be provided upon request.

.5 Concrete materials will be evaluated in accordance with CAN/CSA-A23.2-94.

.6 Strength tests will be evaluated in accordance with ACI 214 (Latest Edition).

.7 Six (6) additional test cylinders will be taken during cold weather concreting, and be cured on job site under same conditions of concrete it represents.

.8 One slump test and one air content test will be taken for each set of test cylinders taken.

.9 Testing of concrete will be performed in accordance with CSA-A23.2-94 (Latest Edition) "Method of Test for Concrete".

.10 Test results will be issued to the Contractor, Consultant and Owner. Test reports are to be numbered consecutively beginning with No. 1.

.11 The Consultant may order additional testing any time even though the required tests indicate the strength requirements have been met. In this instance, the Owner will pay for those tests that meet the specified requirements and the Contractor will pay for those that do not.

.12 Non-destructive methods for testing concrete shall be according to CSA A23.2-94 (Latest Edition) where noted on drawings or in Soils Report.

PART 2 PRODUCTS

2.1 Concrete Materials

.1 Cement: Sulfate Resistant Type 50 Portland Type to CSA-A5-93 (Latest Edition) Portland Cements" and CAN/CSA-A5-93 for all concrete in touch with soil and Type 10 for all other concrete, see Section 2.4.

.2 Fine and coarse aggregates, conforming to CSA-A23.1-94 "Concrete Materials and Methods of Concrete Construction". The fine and coarse aggregate for concrete slabs that are to be finished with dry shake hardener shall contain a maximum of 0.4% low density particles as determined by CSA A23.2-4A "Low Density Granular Material in Aggregate". Test results shall be submitted to the Consultant for review.

.3 Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material, conforming to CA/CSA-A23.1.

2.2 Admixtures

.1 Air Entrainment: To CAN/CSA A23.5 (Latest Edition) Air-Entraining Admixtures for Concrete", and ASTM C260-1974.

.2 Chemical: To CAN/CSA A23.5-M86 (Latest Edition) "Chemical Admixtures for Concrete"; water-reducing, strength increasing Type WN - normal setting.

.3 Pozzolanic Mineral: To CAN/CSA A23.5-M86 (Latest Edition) "Pozzonalic Mineral Admixtures for use in Portland Cement Concrete". Typcor Type F fly ash is permitted to a maximum of 15% by weight of total cementitious materials.

2.3 Accessories

.1 Vapour Barrier: 6 mil polyethylene film, to CGSB 70-GP-Al, Type 1 - low permeance heavy duty/Permalon X-150 crawlspace.

.2 Curing Compounds: Shall conform to the requirements of the latest issue of ASTM Standard C309.

.3 Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 20 MPa at 3 days and 50 MPa at 28 days; typical column bases. For equipment bases, Master Builders 885 metallic aggregate grout, CPD non-shrink grout (premixed) or approved equal or as per item (l).

.4 Void Form (if indicated in the Drawings):

.1 System made decomposible slab and beam forms as manufactured by Shearmat, Allied or approved equal. Top sheet to be 5mm thick hardboard. Cover and wrap edges with 6 mil poly-vapour barrier.

.2 Approved Equal:

.1 Frost Cushion Commercial Use void form system by AMC Foam Technologists Inc., Winnipeg, Mb.

.2 GeoSpan Compressible Fill by Plastifab; supplied by Brock White.

.5 Joint Filler: Premoulded bituminous impregnated can fibreboard flexcell, as manufactured by Sternson, or approved equal.

.6 Vertical Joint Sealant: Non-sag polyurethane sealant designed for use on vertical surfaces. Vulkem 116 as manufactured by Mameco Ltd. or approved equal as per item (l). Install strictly in accordance with manufacturers recommendations.

.7 Horizontal Joint Sealant: Three compound chemically curing, self-leveling, polyurethane joint sealant, THC-900, as manufactured by Tremco, or Vulkem 45 by Mameco. Color selection by Consultant. Install strictly in accordance with manufacturer's recommendations or approved equal as per item (l).

.8 Concrete Expansion Anchors: To be Hilti Kwik-Bolt, Redhead or approved equal. Sized as per drawings. Minimum embedment length of all Hilti Kwik-Bolt to be 150mm unless otherwise noted.

.9 Concrete Inserts and Bolt Extension: Concrete inserts to be Hilti HKD anchors or approved equal, sized as detailed on drawings. Bolt extensions to be mild steel threaded extensions sized as detailed on drawings.

.10 Concrete Patching Material: Pre-packaged, air-entrained, cementitious product containing graded natural aggregate allied floor patch with integral bonding agent.

.11 Bonding Agent: Approved high polymer polyvinyl acetate emulsion applied in strict accordance with manufacturer's recommendations for proposed application. Duraweld-C or Acrylbond or approved equal.

.12 Water Stop: PVC water stop by CPD, supplied by Wallace Construction Specialties or approved equal. Stop to be CPD Type 4, elastomeric plastic compound.

.13 Approved Equals:

.1 RC-1 Vertical Joint Sealant by Sternson Construction Products.

.2 RC-2S1 Horizontal Joint Sealant by Sternson Construction Products.

.3 Ferrogrout 939 Non-Shrink Grout by Sternson Construction Products.

2.4 Concrete Mixes

.1 Mechanical mix concrete in accordance with requirements of CSA A23.1 (Latest Edition).

.2 All concrete shall have the following minimum properties:

.2 All concrete shall have the following minimum properties:

TYPE/LOCATION	NOMINAL STRENGTH (MPa)	CEMENT SYMBOL	AGGREG MAX 9mm	SLUMP mm	TOTAL AIR %
Piling	32	50	20	75+25	4-7
Grade Beams, and Pile Caps	32	50	20	75+25	4-7
Columns	32	10	20	75+25	5+1
Topping	32	10	10	50-75	5+1
Grade Supported Slab	32	50	20	50-75	4-7

Minimum cement content to be 280 kg m3.
Maximum water cementing ratio 0.45.
Maximum free water/cement ratio for type 50 cement to be 0.4.
Cement to be exposed Class 5-2, HS or HS3 cement type.
All slabs finished with dry shake hardener to contain no artificially entrained air.
Maximum compressive strength 32 mpa @ 56 days (grade beams).

.3 Submit proposed statistical evidence on past performance of mix design to inspection and testing firm and to Consultant 2 weeks prior to commencement of work. Provide certification that mix proportions selected will produce concrete of specified quality and that strength will comply with CSA A23.1-04 (Latest Edition).

.4 Each load of ready-mixed or transit-mixed concrete delivered to the project site shall be accompanied by duplicate delivery slips providing the following information:
- .1 Name of ready-mix batch plant.
- .2 Serial number of ticket.
- .3 Date and truck number.
- .4 Name of Contractor.
- .5 Specific designation of project.
- .6 Specific class of concrete.
- .7 Amount of concrete in cubic metres.
- .8 Time of loading or first mixing of aggregate cement and water.

.5 Use accelerating admixtures in cold weather only when approved by Consultant. If approved, the use of admixture will not relax cold weather placement requirements. Use of calcium chloride strictly prohibited.

.6 Use set-retarding admixtures during hot weather only when approved by the Consultant.

.7 Use plasticizers only when approved by the Consultant.

.8 Product and deliver concrete in accordance with CAN/CSA-A23.1-94 (Latest Edition).

.9 Design and control mixes so that no more than one test in ten falls below specified strengths, and that average of any tree consecutive tests equals or exceeds specified strength. If strength requirements are not met, the Consultant may require, at no cost to the Owner, one or more of the following:
- .1 Changes in mix proportion for balance of work.
- .2 Obtain and test core samples in accordance with CAN/CSA-A23.2-94 (Latest Edition).
- .3 Load testing.
- .4 Removal of non-conforming material.
- .5 Additional or revised structural members.

.10 Fly ash may be incorporated into mix design as a partial replacement for cement. If used, substitute at rate of twice cement content replaced, by weight, to maximum of 15% of cement content required without use of fly ash.

.11 Patch and repair "pop-outs".

.12 No materials other than those specified may be incorporated into the mix without the Consultant's written approval.

2.5 Joint Sealer

.1 Catalyst cured epoxy rubber:
- .1 Loadflex by Sternson.
- .2 AC1210 by Allied Coatings.
- .3 Cural 337.
- .4 PR5480 by PRC Canada.

Refer to Section 03345, Clause 3.1.4. for other product specifications.

2.6 Surface Hardener

.1 Non-metallic, shake-applied hardener at 3 kg/m2. Approved products:
- .1 Diamag 7 by Sternson.
- .2 Non-metallic floor hardener by Target Products Ltd.
- .3 Elsro GenFloor Plane Hardener, distributed by Wallace Construction Specialties

.2 Refer to Section 03345, Clause 2.1.3. for other product specifications.

.3 Impact loading metallic hardener recommended for the following areas: Masterplate 200 by Master Builders, 14kg/m2 natural concrete colour or approved equal.
Armoured joint system for construction joints by Master Builders.

2.7 Liquid Sealer

.1 One component silicone penetrant for preventing intrusion of water and water borne salts into concrete topping. Approved products:
- .1 Masterseal SL 40 by Master Builders Technologies Ltd (broom faced, Concrete o/s).
- .2 Allied AL309A (clear sealer) distributed by Wallace Construction Specialties. Concrete surfacing with VCT porcelain tile, sheet vinyl floor.
- .3 Masterkure N-seal HS on slabs where hardeners specified interior and exterior application.

.2 Refer to Section 03345, Clause 2.1.2 for other product specifications.

.3 Truck/Concrete Pads (Unless Otherwise Noted on Drawings)
- .1 All concrete pads to be minimum 8" thick reinforced with 2 rows of 10M bars @ 12" o.c. each way, cast over 6 mil polyethylene and minimum 12' compacted granular fill. Slope 1% minimum away from building lines.

PART 3 EXECUTION

3.1 Inspection

.1 Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

.2 Verify that all items to be embedded in concrete are in place.

.3 Verify that concrete may be placed to the lines and elevations indicated on the drawings, with all required clearance from reinforcement.

3.2 Discrepancies

.1 In the event of a discrepancy, immediately notify the Consultant.

.2 Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.3 Preparation

.1 Remove all wood scraps and debris from the formed areas in which concrete will be placed.

.2 Thoroughly clean the forms to ensure proper placement and bonding of concrete.

.3 Thoroughly wet the forms, except in freezing weather, or oil them; remove all standing water.

.4 Thoroughly clean all transporting and handling equipment.

.5 Ensure that reinforcing steel and form work are complete and ready for concrete.

.6 Ensure that anchor bolts, embedded plates and assemblies, inserts and other embedded items are complete, properly located and secured.

.7 Provide construction joints where shown on submitted layout drawings or as approved by the Consultant. Key and dowel construction joints, or conform to special detail, as required.

.8 Form construction joints in walls and columns at underside of supported members. Allow two hours (minimum) to elapse before placing concrete in supported member. Place beams, caps, haunches, corbels and brackets monolithically with supported system. Form construction joints in beams, girders and slabs as per Clause 3.3.7. Submit layout drawings prior to construction.

.9 Where placing concrete against existing concrete, clean concrete face, remove laitance and loose material and wet down contact surfaces prior to placing concrete.

3.4 Tolerances

.1 Maintain the following tolerances for finished concrete:

.1 Concrete Form Work: See Section 03100.

.2 Anchor Bolts/Embedded Assemblies: + 3mm.

3.5 Installation

.1 Place concrete in accordance with requirements of CSA A23.1-04 (Latest Edition) and as indicated on drawings.

.2 Notify Consultant and Inspection and Testing Firm a minimum of 24 hours prior to commencement of concrete operations.

.3 Maintain accurate records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

.4 Ensure reinforcement, inserts, embedded parts, formed joints and fitments are not disturbed during concrete placement.

.5 Prepare previously placed concrete by cleaning with steel brush.

.6 Pour concrete continuously between predetermined construction and control joints. All construction joints subject to approval by Consultant.

.7 Approval to place concrete shall be contingent on the form work and reinforcing steel placement and evidence that the Contractor can place the planned casting without stopping.

.8 Convey concrete to the place of final deposit by methods which will prevent the segregation or loss of material.

.9 Equipment to be such that when concrete work has once started, the depositing of concrete is to proceed at a rate and sequence such that concrete is at all times, sufficiently plastic to ensure proper bonding of successive layers or panels.

.10 Conveying and placing equipment to be free of hardened concrete and foreign material. Clean at frequent intervals.

.11 Concrete to be deposited as close as practicable to final position. Avoid segregation due to re-handling or flowing. Place in horizontal lifts to maintain a level surface.

.12 Vertical height of free fall of concrete not to exceed maximum required for good practice. If segregation occurs, chutes and spouts to be used.

.13 Consolidate thoroughly and uniformly by tamping with hand tools, vibrators and finishing machines. Ensure dense, homogeneous structure, close bond with reinforcement and smooth formed surfaces. Use internal vibrators wherever practical. External type vibrators only where satisfactory surfaces cannot be obtained with internal type.

.14 Internal vibrators applied at the point of deposit in the areas of freshly placed concrete. Allow to sink in the concrete until penetrated into the previous layer of concrete. Withdraw immediately at the same speed at which they sank. Move about 300mm to a new location and then repeat process. Extreme care to be taken not to disturb the reinforcing steel of the forms.

.15 Excessive honeycomb or embedded debris in concrete is not acceptable. Remove and replace defective concrete. Excessive honeycomb is when eraser end of a pencil fits into cavity.

.16 Convey and place concrete in such a manner as to prevent segregation of concrete or displacement of reinforcing steel, forms or inserts.

.17 Finish integral concrete floors with steel trowel to produce smooth dense surface.

.18 After removal of form work, clean concrete surfaces to remove fins and laitance. Fill honeycombed areas after inspection and approvals by the Consultant. Fill break backs and conical holes below grade with plugs.

.19 Upon completion of erection of structural steel, grout bearing plates and other specified units in accordance with manufacturer's directions.

.20 Retarder for concrete with exposed aggregate surfaces, where such finish is required on drawings.

- .1 Treat forms with retardant where exposed aggregate is indicated so that after stripping forms, surface matrix can be removed to expose aggregate.
- .2 Mix concrete using gap graded concrete mix containing 65% to 75% by volume of coarse aggregate. Coarse aggregate: Size 15mm to 20mm. Once exposed aggregate design has been approved, mix materials to ensure consistent colour and texture for entire exposed aggregate areas.
- .3 After removal of forms, clean exposed aggregate surfaces as follows:
  - .1 Thoroughly clean surfaces with stiff brush and water.
  - .2 Wash surfaces with 10% solution of muriatic acid.
  - .3 Thoroughly wash surfaces with clean water completely removing all traces of acid.

.21 Sandblasting (for finishes as required on drawings):

- .1 After concrete has achieved 7-day strength and before achieving 28-day strength, expose aggregate to a medium exposure where shown on drawings. Achieve exposure by dry sandblasting to degree as per approved sample.

.22 Saw cut control joints in straight lines, within 24 hours after finishing. Cut in pattern shown on drawings. Use 3mm thick blade, cut 1/4 through full depth of slab.

3.6 Cold Weather Requirements

.1 When the air temperature is at or below 5 degrees C, or when there is a probability of it falling to that limit during the placing or curing period, cold weather requirements shall be applicable.

.2 Provide heating equipment or heating plant on the job ready for use when concrete is being placed during cold weather. Such equipment shall be adequate for the purpose of maintaining the required temperature during the placing and curing of the concrete. The methods used for heating shall be approved by the Consultant. Equipment inducing carbon monoxide gas in the building shall not be accepted. Heating equipment is to be vented through heat exchange designed heaters.

.3 Concrete shall not be placed on or against reinforcement, form work, ground or any surface that is at a temperature less than 5° C.

.4 The temperature of the concrete at all surfaces shall be maintained at not less than 25° C for 3 days, or at not less than 10° C for 5 days after placing. Means shall be provided to humidify the air within enclosures and to keep the concrete and form work continuously moist if dry heat is used. The concrete shall be kept above freezing temperatures for a period of 7 days, and shall be kept from alternate freezing and thawing for at least 14 days after placement.

.5 At the end of the specified protection period the temperature of the concrete shall be reduced gradually at a rate not exceeding that shown in CSA A23.1 (Latest Edition).

.6 Accelerator or so-called antifreeze compounds shall not be permitted unless otherwise approved in writing by the Consultant.

.7 All protective coverings shall be kept clear of the concrete and form surfaces to permit free circulation of air and shall be maintained intact for at least 24 hours after artificial heat is discontinued.

3.7 Hot Weather Requirements

.1 When the air temperature exceeds 27° C, hot weather requirements shall be applicable.

.2 Time of initial mixing to complete discharge shall not exceed one hour and fifteen minutes and concrete placed shall not exceed 30° C.

.3 Concrete forming surfaces and reinforcing steel shall be sprinkled with cold water just prior to placing concrete. Standing water or puddles shall be removed prior to concrete placement.

.4 Special wind protection will be required as directed by the Consultant.

.5 Columns, walls, beams and slabs shall be kept continuously damp for 24 hours by normal curing procedures as outlined by this specification. Slabs cured by the applications of sealing shall have curing compound applied immediately after finishing of the slab but before evaporation of surface moisture.

.6 The use of water reducing agents shall be subject to the approval of the Consultant when hot weather conditions prevail.

3.8 Construction Joints

.1 The location and detail of all construction joints not detailed on the structural drawings shall be approved by the Consultant.

.2 When fresh concrete is to be placed against concrete which has set or has partially set, the surface of the set or partially set concrete shall be roughened, cleaned of all laitance and thoroughly soaked with water prior to the placement of fresh concrete.

.3 In general, the construction joints in floor and roof systems shall be located at the one-third span of slabs, beams and girders. Proper key and dowels or extensions of reinforcing shall be provided at all construction joints.

.4 Concrete placed in wall and column forms shall be struck off flush with the underside of the floor.

.5 Vertical construction joints in foundation walls shall be properly keyed and doweled and constructed with an approved waterstop, properly anchored against displacement during the placement of the concrete and properly sealed at all of the intersections. Splices and intersections of waterstop shall be joined by heat fusion in accordance with approved manufacturer's instructions.

3.9 Defective Concrete

.1 Concrete not meeting the requirements of the specifications and/or the drawings shall be considered defective concrete.

.2 Concrete not conforming to the lines, details and grade specified herein or as shown on the drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Consultant. Finished lines, dimensions and surfaces shall be correct and true within tolerances specified in the Form Work Section of these specifications.

.3 Concrete not properly placed, resulting in excessive honeycombing and all honeycombing and other defects in critical areas of stress shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Consultant.

.4 Concrete of insufficient strength or improper consistency shall be, as required by the Consultant, subject to one or more of the following:

- .1 Changes in mix proportions for the remainder of the work.
- .2 Cores drilled and tested from the areas in question as directed by Consultant and in accordance with CSA A23.2-94 (Latest Edition). The test results shall be indicative of the in-place concrete.
- .3 Load testing of the structural elements in accordance with CSA A23.3-94 (Latest Edition).
- .4 The changes in the mix proportions and the testing shall be at the Contractor's expense.

.5 Concrete failing to meet the strength requirements of this specification shall be strengthened or replaced at the Contractor's expense and to the satisfaction of the Consultant.

3.10 Patching and Concrete

.1 After the removal of the forms, concrete surfaces may be subject to inspection by the Consultant.

.2 All exposed metal form ties, nails and wires shall be removed, fins broken off and all loose concrete removed.

.3 Form tile pockets shall be thoroughly wetted and patched with patching concrete followed by proper curing.

.4 Honeycombed and other defective surfaces shall be chipped away to a depth of not less than 25mm with the edges perpendicular to the surface, thoroughly wetted and patched with patching concrete, followed by proper curing.

.5 Patching concrete shall be thoroughly compacted into place and finished in such a manner as to match the adjoining concrete. The design mix of the patching concrete shall be approved by the Consultant.

3.11 Finishing of Formed Surfaces

.1 All formed surfaces shall be final finished to remove all protrusions, ridges and other irregularities. All voids and pinholes are to be filled. "Clean form" finish is acceptable.

.2 On all other exposed formed concrete surfaces, except at unfinished areas, remove blemishes and form work joint marks by rubbing with carborundum block and water. Leave finished surfaces smooth and unmarred. Complete rubbing within 24 hours of stripping form work.

3.12 Anchor Bolts and Weldments

.1 Set anchor bolts and weldments to the following tolerances:

.1 Alignment: + 3mm of location, plumb and true.

.2 Projection: + 6mm of elevations called for.

3.13 Base Plates Grouting

.1 Mix and place as per manufacturer's specifications. Pack grout tightly under plates and leave no voids. Neatly finish edges. Use grout as per Clause 3 of Section 03300.

3.14 Liquid Sealer

.1 Apply liquid sealer in strict accordance with the manufacturer's directions.

3.15 Sealing Saw Cut Control Joints

.1 Remove loose particles from joint and install joint sealant in strict accordance with the manufacturer's instructions.

3.16 Concrete Finishes

.1 Provide concrete hardener where required on drawings at the rate of 3.0 kg/m2, to unfinished concrete floor areas and where scheduled, in accordance with manufacturer's recommendations.

.2 Refer to general notes on structural drawings.

3.17 Protection and Curing

.1 Protect concrete and grout in accordance with CAN/CSA-A23,1 (Latest Edition).

.2 Cure in accordance with CAN/CSA-A23.1 (Latest Edition).

.3 Provide protection as required for floor slabs to ensure that design compressive strength of concrete is reached in 28 days. Refer to Section 03100 - Concrete Form Work.

3.18 Concrete Topping

.1 Concrete topping is to be bonded by either of the following methods, unless specifically directed:

- .1 Application of cement/sand grout to prepared base course in accordance with CSA Standard A23.1-94.
- .2 Application of approved bonding agent to prepared base coarse to be applied immediately before concrete placement.
- .3 There is to be a stringent wet cure for at least 7 days after the pour for bond to develop before drying shrinkage occurs.
- .4 Contractor to propose details as to the preparation of the substrate for Consultant's approval.

3.19 Equipment Pads

.1 Provide concrete pads for equipment where and as indicated on drawings.

.2 Insert bolts and sleeves and pack solidly with non-shrink grout in accordance with setting details and templates.

.3 Steel trowel top surfaces smooth. Tool edges.

3.20 Sidewalks

.1 Unless specifically detailed otherwise on drawings or in specifications, sidewalks shall be constructed to the following details.

.2 Use forms for edges of concrete walls to provide straight lines and smooth curves.

.3 Locate asphalt impregnated fibreboard joint filler at 4.5 m centres and where walks abut walls and other vertical surfaces. Joint filler to be full area of concrete section.

.4 Install tooled joints at 1.5 m on centre.

.5 Round all edges, including edges of control joints and tooled joints with 12mm radius edging tool.

.6 Provide exposed surfaces of all sidewalks with medium broomed finish.

.7 Slope walks and slabs as detailed on drawings.

.8 Unless detailed otherwise, all sidewalks to be 125mm thick reinforced with 10M bars at 300mm centres, each way, at mid-depth. Cast over 6 mil polyethylene and minimum 200mm compacted granular fill.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Cast-In-Place Concrete Section 033000.
.2 Structural Steel Section 051200.
.3 Metal Fabrications Section 055000.

1.2 Job Conditions

.1 Maintain surface and ambient air temperature of minimum 10° C for a minimum period of 24 hours prior to, during and 72 hours after application.
.2 If grouting outside, provide and maintain temporary weatherproof enclosures during inclement weather during preparation, grouting and curing.

PART 2 PRODUCTS

2.1 Grout

.1 Non-Ferrous Grout, pre-mixed, non-shrink.
Approved products:
.1 M-Bed Standard by Sternson.
.2 Sika Grout 212 by Sika.
.3 CI Grout by Steel Bros.
.4 CPD Non-shrink Grout by Wallace Construction Specialties.
.2 Epoxy Grout: high strength, self-leveling, 100% epoxy gout.
Approved products:
.1 Brutem MP multi-purpose epoxy grout by Master Builders.

2.2 Form Work Materials

.1 Plywood: Douglas Fir Plywood, GIS, undamaged sheets with true edge.
.2 Lumber: Sound; sizes as required.
.3 Nails, Spikes, Staples: Galvanized steel.

PART 3 EXECUTION

3.1 Examination

.1 Before starting work, examine work by others which may affect this work.
.2 Notify the Departmental Representative of any conditions which would prejudice proper completion of this work.
.3 Commencement of work implies acceptance of existing conditions.

3.2 Surface Preparation

.1 Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by bush-hammering, chipping or other similar means until a sound, clean concrete surface is achieved.
.2 Lightly roughen surface to ensure proper bond with grout.
.3 Remove paint primers, where possible, from ferrous metal surfaces in contact with grout.
.4 Follow manufacturer's directions respecting saturation of surfaces with water prior to grouting.

3.3 Form Work

.1 Construct form work accurately, ensuring ground conforms to lines, levels and dimensions indicated on drawings.

.2 Arrange and assemble form work to permit easy dismantling and stripping, ensuring grout is not damaged during form work removal.

.3 Provide sufficient clearance for proper placement between form work and area being grouted.

.4 Cover form surfaces with an acceptable release coating to prevent bonding with grout.

3.4 Inspection

.1 Notify Departmental Representative prior to placing grout, to permit inspection of form work and placing of grout.

3.5 Mixing

.1 Mix grout materials with clean, potable water in accordance with manufacturer's directions. Use minimum amount required for workable mixture.

.2 Mix grout as close to work areas as possible. Transport quickly, and in a manner that does not permit segregation of materials.

.3 Do not permit water to be added after grout has been mixed.

3.6 Installation

.1 If necessary, heat surfaces to minimum temperature recommended by manufacturer.

.2 Place grout quickly and continuously by most practical means permissible as recommended by manufacturer.

.3 Thoroughly compact grout and leave free of voids and air pockets.

.4 Trowel edges of grout to true lines.

3.7 Curing

.1 Cure grout to manufacturer's directions.

3.8 Form Removal, Repairs

.1 Remove forms after curing.

.2 Repair any visible defects in grouting, patch with matching grout.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Shop fabricated ferrous metal items, galvanized and prime painted.

1.2 Products Furnished But Not Installed Under This Section

.1 Section 033000 – Cast-In-Place Concrete: Placement of metal fabrications in concrete.

1.3 Related Sections

.1 Examine drawings thoroughly to determine items and quantities required, and for purposes of distinction, read this Section in conjunction with structural steel drawings and specifications under Section 051200.

.2 Concrete Form Work Section 031000.

.3 Cast-In-Place concrete Section 033000.

.4 Section 099120 - Painting: Paint finish.

1.4 References

.1 ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

.2 ASTM A325 - High Strength Bolts for Structural Steel Joints.

.3 ASTM B177 - Chromium Electroplating on Steel for Engineering Use.

.4 CAN/CGSB-7.1M - Cold Formed Steel Framing.

.5 CAN/CSA-G40.20M - General Requirements for Rolled or Welded Structural Quality Steel.

.6 CAN/CSA-G40.21M - Structural Quality Steels.

.7 CAN/CSA-S136M - Cold Formed Steel Structural Members.

.8 CGSB 85-GP-0M - Shop Painting Structural Steel.

.9 CGSB 85-GP-16M -Painting Galvanized Steel.

.10 CSA G164M - Hot Dip Galvanizing of Irregularly Shaped Articles.

.11 CSA W47.1 - Certification of Companies for Fusion Welding of Steel Structures.

.12 CSA W47.2 -Aluminum Welding Qualification Code.

.13 CSA W55.3 - Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.14 CSA W59 - Welded Steel Construction (Metal-Arc Welding).

.15 CSSBI - Canadian Sheet Steel Building Institute.

.16 SSPC - Steel Structures Painting Council.

1.5 Submittals

.1 Submit shop drawings to requirements of Section 01300.

.2 Indicate on shop drawings, profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Shop drawings to bear stamp and signature of professional engineer registered in the province of the work.

.3 Indicate welded connections using standard CSA W59 welding symbols. Indicate net weld lengths.

1.6 Quality Assurance

.1 Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance and with sufficient production capacity to produce required units without delaying the Work.

.2 Perform Work in accordance with CSA W47.1, CSA W47.2M, CSA W55.3, CSA W59.2 and CSA W59.

1.7 Field Measurements

.1 Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 PRODUCTS

2.1 Ferrous Materials

Note: See drawings for locations, i.e. grates/miscellaneous angles, etc.

.2 Metal Surfaces: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names or roughness.

.2 Steel Plates, Shapes and Bars: CAN/CSA G40.21-M.

.3 Rolled Steel Floor Plates: ASTM A786 (ASTM A786M).

.4 Steel Tubing: Product type (manufacturing method) as follows:

.1 Cold-Formed Steel Tubing: ASTM A500.

.2 Hot-Formed Steel Tubing: ASTM A501.

.5 Steel Pipe: ASTM A53, standard weight (schedule 40), unless otherwise indicated or another weight required by structural loads.

.1 Black finish unless otherwise indicated.

.2 Galvanized finish for exterior installations and where indicated.

.6 Gray Iron Castings: ASTM A48, Class 30.

.7 Malleable-Iron Castings: ASTM A47, Grade 32510 (ASTM A47M, Grade 22010).

.8 Cast-In-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing as per ASTM E488, conducted by a qualified independent testing agency.

.9 Formed Members: CAN/CGSB-7.1M, CAN/CSA-S136M.

.10 Bolts, Nuts, and Washers: ASTM, A325, A307, galvanized to CSA G164M for galvanized fabrications.

.11 Welding Materials: W59; type required for materials being welded.

.12 Shop and Touch-Up Primer: CGSB 85-GP-10M, Red oxide type.

.13 Touch-Up Primer for Galvanized Surfaces: CGSB 85-GP-16M, Zinc rich type.

.14 Stainless steel shall be gauges as indicated, Type 304, with #3 finish.

2.2 Paint (see also Section 099120)

.1 Shop Primer for Ferrous Metal: Fast-curing, lead and chromate-free, universal modified-alkyd primer complying with performance requirements of CGSB 1-GP-40M, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied top coats despite prolonged exposure.

.2 Zinc Chromate Primer: To CGSB 1-GP-132M.

.3 Zinc Rich Galvanized Primer: High zinc dust content paint for re-galvanizing welds in galvanized steel with dry film containing not less than 94% zinc dust by weight, to CGSB 1-GP-181M.

2.3 Fasteners

.1 General: Provide plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electro-deposited zinc coating for exterior use, or where built into exterior walls. Select fasteners for the type, grade and class required.

.2 Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ASTM F568, Property Class 4.6), with hex nuts.

.3 Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

.4 Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

.5 Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

.6 Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

.7 Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

.8 Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below, with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete, as determined by testing as per ASTM E488, conducted by a qualified independent testing agency.

.9 Toggle Bolts: FS FF-B-588, tumble-wing type; class and style as required.

2.4 Grout (See also Section 036000)

.1 Non-Shrink Metallic Grout: Factory-packaged, ferrous-aggregate grout, complying with ASTM C1107, specifically recommended by manufacturer for heavy duty loading applications.

.2 Non-Shrink Non-Metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107. Provide grout specifically recommended by the manufacturer for interior and exterior applications.

2.5 Concrete Fill

.1 Concrete Materials and Properties: Comply with requirements of Division 3, Section 03300 "Cast-In-Place Concrete" for normal weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 Psi (20 Mpa), unless higher strengths are indicated.

2.6 Fabrication

.1 Fabricate components in shop where possible, to details shown on drawings and in accordance with approved shop drawings. Accurately fit joints and intersecting members in true planes, with adequate fastening. Verify dimensions on site prior to proceeding with shop fabrication.

.2 Fit and shop assemble in largest practical sections for delivery to site.

.3 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Ensure shapes and sizes are true with clean lines and distortion-free surfaces.

.4 Ease exposed edges to a radius of approximately 1/32" (1 mm), unless otherwise indicated. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.5 Weld permanent connections wherever possible.

.6 Provide anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

.7 Fabricate items from steel unless otherwise noted.

.8 Use self-tapping, shake-proof, countersunk, flat headed screws on items requiring assembly by screws or as indicated. When used, countersink bolted connections in accordance with the Engineer's instructions. Nick threads to prevent loosening. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items.

.9 Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of jointed pieces. Clearly mark units for re-assembly and coordinated installation.

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

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

.12 Indicate bolted connections on shop drawings.

.13 Drill or punch holes for bolted connections.

2.6 Finishes

.1 Prepare surfaces to be primed in accordance with SSPC SP 2.

.2 Do not prime surfaces in direct contact with concrete or where field welding is required.

.3 Prime paint items with one coat.

.4 Galvanize structural steel members in accordance with CSA G164M to minimum 380g/sq m galvanized coating.

.5 Insulate contact surfaces to prevent electrolysis due to metal to metal contact or contact between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper or other accepted means.

.6 Thoroughly de-scale steel work for which galvanizing is not specified before delivery to project site. Remove roughness and irregularities, clean with a wire brush, remove oil and grease, and prime with one shop coat of primer to 0.04 to 0.05 mm (1.5 to 2 mil) thickness.

.7 Steel items located on the exterior or unheated side of air/vapour barrier of the building, or where items are likely to be in contact with moisture, shall be hot dipped galvanized.

.8 Do not prime the following surfaces:

- .1 Steel to be encased in concrete.
- .2 Non-ferrous metals.
- .3 Surfaces and edges to be field-welded. If painted, remove paint for field-welding for a distance of at least 50 mm (2") on sides of the joint.

.9 Steel and Iron Finishes

- .1 Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process complying with the following requirements:
  - .1 ASTM A153 for galvanizing iron and steel hardware.
  - .2 ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated, rolled, pressed, and forged shapes, plates, bars and strip 0.0299" (0.76mm) thick or thicker.
- .2 Preparation for shop Priming: Prepare un-coated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
  - .1 Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning".
  - .2 Interiors: (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning".

.3 Apply shop primer to un-coated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting. Stripe paint corners, crevices, bolts, welds and sharp edges.

PART 3 EXECUTION

3.1 Examination

.1 Verify that field conditions are acceptable and are ready to receive work.

.2 Beginning of installation means erector accepts existing conditions.

3.2 Workmanship

.1 Fabrication, erection and workmanship: Conform to the requirements of CSA Standard S16.1, Steel Structures for Buildings and S136 Cold Formed Steel Structural Members.

3.3 Preparation

.1 Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.

.2 Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

.3 Clean and strip primed steel items to bare metal where site welding is required.

.4 Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.4 Installation

.1 Install items plumb and level, accurately fitted, free from distortion or defects.

.2 Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors, as required.

.3 Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

.4 Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

.5 Field weld components indicated on shop drawings.

.6 Perform field welding in accordance with W59. Comply with the following requirements.

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove welding flux immediately.

.4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

.7 Cutting, Fitting and Placement: Obtain Departmental Representative approval prior to site cutting or making adjustments not scheduled. Perform cutting, drilling and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment and elevation, with edges and surfaces level, plumb, true and free of rack, and measured from established lines and levels.

3.5 Setting Loose Plates

.1 Clean concrete bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

.2 Set loose levelling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 Erection Tolerances

.1 Maximum variation from plumb: 6 mm per storey, non-cumulative.

.2 Maximum offset from true alignment: 6 mm.

3.7 Schedule

.1 The Schedule is a list of principal items only. Refer to drawing details for items not specifically scheduled.

.2 Bollards (if any – coordinate with drawings)

- .1 Steel pipe, concrete filled, crowned cap, as detailed; prime paint, enamelled finish.
- .2 Fabricate pipe bollards from Schedule 80 Steel Pipe.
- .3 Anchor bollards in concrete as detailed on plans.
- .4 Fill bollards solidly with concrete, mounding top surface.

.3 Ledge and shelf angles, channels and plates not attached to structural framing: For support of metal decking, masonry; prime paint finish. Provide loose bearing and levelling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

.4 Loose Steel Lintels:

- .1 As detailed; prime paint finish.
- .2 Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- .3 Size loose lintels for equal bearing of 12"/ft. (85 mm/m) of clear span but not less than 8" (200mm) bearing at each side of openings, unless otherwise indicated.
- .4 Galvanize loose steel lintels located in exterior walls.

.5 Rough Hardware

- .1 Furnish bent or otherwise custom-fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items as specified in Division 6.
- .2 Fabricate items to sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts that bear on wood structural connections and furnish steel washers elsewhere.

.6 Miscellaneous Framing and Supports

.1 General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the work.

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

.3 Galvanize miscellaneous framing and supports in exterior locations.

.7 Steel Ladders (if any – coordinate with drawings)

.1 Fabricate ladders for the location shown with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.

.2 Side Rails: Continuous, steel ½" x 2-1/2" (12mm x 64mm) flat bars with eased edges spaced 18" (460mm) apart.

.1 Bar Rungs: ¾" (19mm) diameter steel bars, spaced 12" (300mm) o.c. Fit rungs in centreline of side rails; plug weld and grid smooth on outer rail faces.

.2 Support each ladder at top an d bottom and at intermediate points spaced not more than 60" (1500mm) o.c. with welded or bolted steel brackets. Size brackets to support design dead and live loads indicated and to hold centreline of ladder rungs clear of the wall surface by not less than 5" (127mm).

.3 Steel Plate Stair: ¼" thick steel checkerplate treads, 1-1/4"x1-1/4"x3/1`6" angle support 10" channel stringers.

3.8 Identification of Parts for Erection

.1 Identify individual pieces in accordance with identification schedule used on shop and erection drawings to clearly indicate their positions in the work for erection purposes. Apply identification marks, clear and legible, by using paint, stamping or other suitable means which will not become obliterated during shipment and handling.

3.9 Adjusting and Cleaning

.1 After erection field prime welds, nuts, bolts, washers and touch up abrasions or damage to shop primed surfaces.

.2 Touch-up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA1 requirements for touching up shop-painted surfaces. Apply by brush or spray to provide a 2.0 mil (0.05mm) minimum dry film thickness.

.3 For galvanized surfaces, clean welds, bolted connections and abraded areas, and apply galvanizing repair paint to comply with ASTM A780.

3.10 Erection

.1 Erect metal work square, plumb, straight and true, accurately fitted, with tight joints and intersections.

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

.3 Make field connections with high tensile bolts of weld to CSA S16 (Latest Edition) and CSA S16S1 (Latest Edition).

.4 Hand items over for casting into concrete to appropriate trades together with setting templates.

.5 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection.

.6 Touch-up galvanized surfaces with zinc primer where burned by field welding.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Miscellaneous plywood sheathing.
.2 Miscellaneous wood furring and strapping.
.3 Miscellaneous blocking for roofing systems and roof-mounted where needed.
.4 Preservative treatment of wood members where needed.
.5 Wall framing (exterior and interior).
.6 Roof Framing.
.7 Connection links to greenhouses wall and roof framing

1.2 Related Sections

.1 Sheet Vapor Retarders and Air Barriers Section 072500
.2 Gypsum Board Section 092900.

1.3 References

.1 Canadian Standards Association, Latest Edition:
  .1 CAN3-086: Engineering Design in Wood (Working Stress Design).
  .2 CAN3-086.1: Engineering Design in Wood (Limit States Design).
  .3 0121: Douglas Fir Plywood.
  .4 0141: Softwood Lumber.
  .5 0151: Canadian Softwood Plywood.
.2 National Lumber Grades Authority Standards, latest edition.
.3 National Building Code of Canada, 2010.

1.4 Source Quality Control

.1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

PART 2 PRODUCTS

2.1 Lumber Material

.1 Except as indicated or specified otherwise, lumber shall be softwood, S4S, moisture content (MC) not greater than 19% at time of installation, in accordance with the following standards:
  .1 CSA 0141-1970.
  .2 NLCA Standard Grading Rules for Canadian Lumber, effective 1978-07-01, to CSA-086 grading to the latest edition of NLCA Standard.
  .3 Machine stress-rated lumber is acceptable for all purposes.
  .4 Framing and board lumber: In accordance with NBC 2005, except as indicated or specified.
  .5 Furring, blocking, nailing strips, grounds, rough bucks:
    .1 Use S2S or S4S material.
    .2 Grounds and blocking, nailing strips and cants: spruce/pine/fir "utility" light framing grade. Moisture content: maximum 19%.
    .3 Strapping: Spruce/pine/fir "Utility" light framing grade. Moisture content: maximum 19%.
  .6 Plywood: Douglas fir plywood marked "PMBC EXTERIOR" or grade as specified. Plywood to receive paint or varnish shall be fir plywood of suitable grade glued up with waterproof glue. Plywood exposed to view shall be "Clear Face"; plywood for portion not exposed to view may be factory grade plywood. Canadian softwood plywood to CSA 0151 for non-structural use.

.7 Lumber and moisture content shall conform to the official grading rules of the Canadian Lumberman's Association, Ottawa, Ontario, for the particular lumber and grade.

.8 Lumber shall be air dried, well seasoned and shall have moisture content of not more than 15%. Wood where required for interior finish work, shall not have moisture content of more than 6%.

.9 Fir plywood shall conform to CSA specification 0121, laminated, with waterproof adhesive. Canadian softwood plywood to CSA 0151 for non-structural use.

.10 Preservative shall be Pentox brown liquid toxic wood preservative manufactured by Osmose Wood Preserving Company of Canada, or approved equal. Propriety solution of organic zinc compounds in penetrating solvents, clear pentachlorphenol, "Pentox", or approved alternative.

2.2 Panel Material

.1 Panels shall be of type, grade and thickness as indicated, in accordance with the following standards:

.1 Douglas Fir Plywood (DFP): To CSA 0121-M1978.

.2 Canadian Softwood Plywood (CSP): To CSA 0151-M1978

.3 Poplar Plywood (PP): To CSA 0153-1978.

.4 Interior Mat-Formed Wood Particleboard (Particleboard or WPB): To CAN3-0188.1-M78.

.5 Wafer-board (WFB): To CAN3-0188.2-M78.

.6 Hardboard (HDB): To CGSB 11-GP-3M.

.2 Except as specified otherwise panels shall be 1220 x 2440 mm size, square-edge.

.3 Except as specified otherwise, wafer-board panels shall be un-sanded.

2.3 Air/Moisture Barrier

.1 Exterior wall sheathing paper: to CAN2-51.32M77 single ply type impregnated as indicated or TYVEK building paper or equal, all joints taped.

2.4 Damp-Proof Membrane (if any)

.1 Polyethylene Film: To CAN2-51.33-M77, type 1, 0.15 mm thickness.

.2 Roll Roofing: To CSA A123.3-M1979, No. 50 type.

2.5 Fastenings and Hardware

.1 In accordance with part 9 of NBC 2005 as supplemented by the following requirements, except where specific type is indicated.

.2 Nails, spikes and staples to NBC 2005 except:

.1 Use common spiral nails and spiral spikes except where indicated otherwise.

.2 Use hot galvanized finish steel for exterior work interior highly humid areas and for pressure-preservative and fire-retardant treated lumber except where indicated otherwise.

.3 Use stainless steel alloy.

.4 Bolt, nut, washer, screw and pin type fasteners with hot-dip galvanized finish to CSA G1641965 (R1972) for exterior work, interior highly humid areas and for pressure-preservative and fire-retardant treated lumber, elsewhere with primer paint finish where installed on sight-exposed surfaces.

.5 Use surface fastenings of the following types, except where specific type is indicated.

.1 To hollow masonry, plaster and panel surfaces use toggle bolt.

.2 To concrete, use expansion shield with lag screw, jute fibre of lead plug with wood screw.

.3 To structural steel, use bolts through drilled hole, or welded stud bolts or power driven self-frilling screws, or welded stud bolts, or explosive actuated stud bolts.

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

.7 Joist Hangers: Minimum 1 mm thick sheet steel, galvanized G90 coating designation, 6672 N bearing strength.

.8 Roof Sheathing H-Clips: Formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Consultant.

PART 3 EXECUTION

3.1 Examination

.1 Examine work of other trades on which work under this Section depends. Report promptly conditions, which may have detrimental effect on work under this Section.

3.2 Wood Frame Construction

.1 Comply with requirements of NBC 2005, Section 9.23, except where specified otherwise.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with "crown edge" up.

3.3 Erection of Framing Members

.1 Install members true to line, levels and elevations. Space uniformly.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with "crown edge" up.

3.4 Appearance Grade Materials

.1 Install lumber and panel materials designated "Appearance" (A) Grade so that grade marks and other defacing marks are not visible on surfaces specified to be left unfinished or to be finished with translucent or transparent type coating. Surface cutting or sanding to remove such marks is acceptable only in locations where defacement will not be evident after finishing.

.2 All materials shall be new, straight, dry and clean and shall be dressed 4 sides, properly sized and shaped to the correct dimensions from nominal sizes noted on the drawings.

3.5 Furring and Blocking

.1 To install furring and blocking as required to space out and support surface applied cabinets as indicated.

.2 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing:

.1 For vertical lumber siding: Install 19 mm furring horizontally at 600 mm o.c. maximum and behind edges of siding where siding terminates.

.2 For vertical panel siding: Install furring horizontally at 600 mm o.c. maximum and behind panel edges.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

.4 Framing lumber of wood blocking shall be #2 White or Red Pine, or #1 Construction Eastern Spruce of Jack Pine free from large loose knots, splits, wavy edges and other defects that would materially impair strength and durability.

.5 All lagging nailing pieces shall be bolted to all beams, columns, masonry walls, etc. for securing of carpentry or other items as shown. All lagging and nailing pieces shall be of random lengths, with joints staggered.

.6 All pipes, ducts, conduits, etc. in finished areas shall be enclosed by furring and strapping to the satisfaction of the Departmental Representative.

3.6 Rough Bucks, Nailers

.1 Install treated wood bucks and nailers as indicated, including:
  .1 Wood bucks and linings around frames for doors and windows.

.2 Except where indicated otherwise, use materials at least 38 mm thick secured with 9 mm bolts located within 300 mm from ends of members and uniformly spaced at 1200 mm between.

.3 Countersink bolts where necessary to provide clearance for other work.

3.7 Miscellaneous Cants, Nailers, Curbs (refer to drawings and details)

.1 Install treated wood cants, backing, nailers, curbs and other treated wood supports for roofing and sheet metal work as indicated.

.2 Secure with galvanized 9 mm bolts where indicated, galvanized nails elsewhere. Locate fastenings within 300 mm from ends and uniformly spaced between. Space bolts at 1200 mm and nails at 600 mm centers except where indicated otherwise.

.3 Staple vapour retardant sheet strip to underside of nailers before installation. Apply strip continuous with 200 mm overlap at joints, free of wrinkles and tears, with at least 200 mm exposed for overlap on roof deck.

.4 Install wood nailers for roof hopper, dressed, capered and recessed slightly below top surface of roof insulation.

.5 Around perimeter of all flat roofs and canopies and at juncture of roof with vertical surfaces provide beveled cant strips of sized and shapes indicated on the drawings or as directed. Cant strips shall be securely fastened.

3.8 Panel-Type Sub-Flooring

.1 Supplement NBC 9.23.14 sub-flooring and 9.23.3.4 fastenings as follows:
  .1 Install combined sub-floor and underlay with panel end joints located on solid bearing, staggered at least 800 mm.
  .2 Apply sub-flooring adhesive under panels installed on wood joists. Place continuous adhesive bead sized in accordance with manufacturer's instructions. single bead on each joist and double bead on joists where panel ends butt.
  .3 Fasten panels using common spiral or annular grooved nails.

3.9 Strapping and Bridging

.1 **Strapping**: 1" x 3" or as indicated in the drawings, where required and where shown on drawings. The underside of all strapping shall be leveled to within 1/8" in 12' and shall be to the satisfaction of the finishing trades and the Consultant. Strapping for acoustical tile by acoustical trade.

.2 **Bridging**: 2" x 2", in rows not over 6'0", twice nailed each end or solid wood blocking.

3.10 Grounds

.1 For wood trim, grilles and as shown, provide wood grounds and blocking of size and shape required for drywall work, for securing wood trim and where required to secure electrical fixtures or other work or equipment in place. Set grounds true to line, level or plumb and well secured in place. Wood blocking or nailers on steel framing shall be bolted thereto.

3.11 Handling and Storage

.1 Lumber shall be protected and under cover both in transit and at the job site and shall not be delivered to the job until facilities are available to the satisfaction of the Consultant.

3.12 Door Frame Installation

.1 Erect and substantially support frames in their proper location with assistance and co-operation with the pre-engineered metal building trade. Erect horizontal wood spreader to ensure maintenance of frame width during erection of steel frames.

3.13 Fixture Supports

.1 As required by plumbers

3.14 Hardware and Door Installation

.1 Install all hardware in accordance with hardware manufacturer's details, template and directions.

3.15 Boarding

.1 Butt joints made over bearing. Boarding well driven up and twice nailed over each bearing. One ply of 7/8" shiplap, laid diagonally to joints, where and if called up.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Scope

.1 This work includes the complete furnishings and installation of all Microllam laminated veneer lumber (LVL), as shown on the drawings herein specified and necessary to complete the work.

1.2 Related Sections

.1 Rough Carpentry 061000.

1.3 Reference

.1 Perform prefabricated wood truss work to CSA CAN3-086-M (Latest Edition), except where specified otherwise or to Part 9 of NBC 1995.

.2 The design and fabrication criteria of all laminated veneer lumber shall meet with "National Building Code of Canada" (Latest Edition) issued by the Associate Committee on the National Building Code, National Research Council, Ottawa, Canada; (Latest Edition).

.3 Code Reports: Materials shall comply with CCMC Report No. 08675-R.

1.4 Design

.1 These products shall be designed and manufactured to the standards set forth in the Canadian Construction Materials Centre (CCMC) Report No. 08675-R.

.2 Products: Microllam® LVL shall be designed to fit the dimensions and loads indicated on the plans.

.3 Design Calculations: A complete set of design calculations shall be prepared by Trus Joist. All design should be in accordance with allowable values and section properties assigned and approved by the Building Code

1.5 Submittals

.1 Drawings: Submit drawings showing layout and detail necessary for determining fit and placement in the building shall be provided by Trus Joist.

.2 Submit shop drawings, in accordance with GC 34 CCDC 12 (Latest Edition) and Section 01340, bearing stamp of qualified professional Consultant registered in a Province that the Project Work is resident in. Manufacturer is to accept responsibility for the design of all member components and connections of components to each other and structure. Engineering Seal on shop drawings demonstrates acceptance.

.3 Production: Fabrication and/or cutting shall not proceed until the Departmental Representative have approved the submittal package.

PART 2 PRODUCTS

2.1 Materials

.1 Microllam LVL by Trus Joist or approved equal.

.2 Adhesives: Adhesives shall be of the waterproof type conforming to the requirements of ASTM D-2559.

2.2 Fabrication

.1 Microllam LVL shall be manufactured in a plant listed in the reports referred to above and under the supervision of an approved third-party inspection agency. It shall be manufactured in a continuous process with all grain parallel with the length of the members. All members are to be free of finger joints, scarf joints, or mechanical connections in full-length members.

2.3 Tolerances

.1 Finished Length (as specified): ± 3mm.
.2 Depth: ± 1.5mm.
.3 Width: ± 1.5mm.

2.4 Identification

.1 Microllam LVL shall be identified by a stamp indicating the product type and grade, CCMC report number, manufacturer's name, plant number, date of fabrication, and the independent inspection agency's logo.

PART 3 EXECUTION

3.1 Installation

.1 Microllam® LVL, if stored prior to installation, shall be protected from the weather. It shall be installed in accordance with the plans, and any Shop drawings and installation suggestions. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep the Microllam® LVL straight and plumb as required and to ensure adequate lateral support for the individual Microllam® LVL members and the entire system until the sheathing material is applied.

3.2 Installation Review

.1 Prior to enclosing Microllam LVL, the contractor shall give notification to the Manufacturer representative to provide an opportunity for review of the installation.

3.3 Performance Standards

.1 Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D-5456.

3.4 Fire Rating

.1 Microllam LVL is permitted as a substitute for conventional wood framing in fire-resistive assemblies. Microllam® LVL shall be sized for the same load-carrying capacity as the sawn lumber specified in the assembly, and its dimensions shall be equal to or greater than those specified for the sawn lumber.

3.5 Warranty

.1 The products delivered shall be free from manufacturing errors or defects in workmanship and material. The products, when correctly installed and maintained, shall be warranted to perform as designed for the normal and expected life of the building.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Provide all labor, materials, methods, equipment, accessories to complete interior work bench counter and cabinetry.
- .1 Rough hardware required for millwork screws, nails, bolts, connectors.
- .2 Finish hardware for cabinets and casework.
- .3 Plastic laminate, special surface coverings on millwork.
- .4 Priming, sealing specified, required.
- .5 Temporary protection to millwork.

.2 Provide materials, items, Work for installation by others including but not limited to following:
- .1 Section 061000: Rough Carpentry - Protection after delivery, installation of millwork, finish carpentry.

.3 Install products provided by other Sections.
- .1 Division 26: Electrical fixtures, etc. built in millwork.

1.3 Related Sections

.1 Section 055000 – Metal Fabrication
.2 Section 061000: Rough Carpentry
.3 Section 099120 - Painting: Finishing cabinet interior.
.4 Division 26 - Electrical

1.4 References

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.1-09, Particleboard.
- .2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
- .3 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.

.2 ASTM International
- .1 ASTM E 1333-10, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
- .2 ASTM D 2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber D Determinations of Organic Emissions From Indoor Materials/Products.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 (2009).

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.5 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .3 CSA O121-08, Douglas Fir Plywood.
- .4 CSA O141-05(R2009), Softwood Lumber.
- .5 CSA O151-09, Canadian Softwood Plywood.
- .6 CSA O153-M1980(R2008), Poplar Plywood.

.7 CAN/CSA-Z809-08, Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.7 Green Seal Environmental Standards (GS)
- .1 GS-11-11, Paints and Coatings.
- .2 GS-36-11, Commercial Adhesives.

.8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.9 International Organization for Standardization (ISO)
- .1 ISO 14040-2006, Environmental Management-Life Cycle Assessment - Principles and Framework.
- .2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

.10 National Electrical Manufacturers Association (NEMA)
- .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

.11 National Hardwood Lumber Association (NHLA)
- .1 Rules for Measurement and Inspection of Hardwood and Cypress [2011].

.12 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2010.

.13 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards.
- .1 SCAQMD Rule 1113-A2011, Architectural Coatings.
- .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.14 Sustainable Forestry Initiative (SFI)
- .1 SFI-2010-2014 Standard.

1.5 Submittals

.1 Submit shop drawings and product data to requirements of Section 01330.

.2 Indicate items, material quantities in related, dimensioned positions to full size, large scale details, elevations minimum 1:50 metric scale.

.3 Indicate finish, fixing methods, construction details where applicable. Indicate mechanical, electrical items, where hardware unusual, miscellaneous items, etc.

.4 Indicate connection/disconnection points of dismantled "knock-down" items. Mark each item for reconnection.

1.6 Quality Assurance

.1 Ensure lumber bears agency grading stamp certified by Canadian Lumber Standards Accreditation Board (CLS).

.2 Ensure Plywood bears grading mark in accordance with applicable CSA Standards.

.3 Provide facilities to Owner to examine millwork undergoing fabrication, assembly.

1.7 Regulatory Requirements

.1 Construct millwork to Architectural Woodwork Manufacturers Association of Canada (AWMAC) "Quality Standards for Architectural Woodwork", 1991.

1.8 Delivery, Storage and Handling

.1 Protect millwork, keep under cover during fabrication, in transit.

.2 Do not deliver millwork long before required.

.3 Enclose items undergoing lengthy transportation in sturdy wood crates, fully protect contents, prevent moisture infiltration.

.4 Ensure crating in accordance with requirements of Carriers involved. Take adequate protection against damage in transit, on handling.

.5 Clearly mark each grate, carton, package in exterior with identification of items, intended location in building.

.6 Do not store millwork within structure during plastering, wet trades, etc. until Work reasonably dry, ready for millwork.

.7 Examine areas where millwork to be stored. Notify Consultant of conditions unsuitable for millwork.

.8 Verify humidity in building with moisture reading instruments if doubt exists building sufficiently dry, ready to receive millwork.

.9 Store millwork in dry warehouse conditions if millwork items manufactured before required on Site due to any cause.

.10 Do not store in damp, humid conditions.

.11 Bear costs for damage caused from such warehousing, storing.

.12 Confer with Departmental Representative to designate place in premises for reception of millwork.

.13 Peruse means of access into building ensure large items will enter intended location without hindrance.

.14 Sectionalize millwork for passage through doors, stairs, corridors, etc. Inform Construction Manager of difficult delivery, liaise for openings to be left in walls, etc.

.15 Pre-fit items together in millwork factory.

.16 Place millwork on wood skids provided by Section 06100, above floor in manner to prevent warping, undue stress.

.17 Examine materials delivered, ascertain no items damaged.

1.9 Warranty

.1 Guarantee surfaces free from blisters, de-laminations, warping, other failures, defects.

.2 Replace, re-install, refinish without cost, FOB job Site.

1.10 Field Measurements

.1 Verify that field measurements are as indicated on shop drawings.

1.11 Coordination

.1 Coordinate Work with plumbing and electrical rough-in.

PART 2 PRODUCTS

2.1 Wood Materials

.1 Softwood lumber: to CSA 0141-1970 National Lumber Grades Authority requirements, selected for natural, paint finishes scheduled, indicated, Douglas Fir, Ponderosa Pine, Spruce species, AWMAC Custom Quality grade.

.2 Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, species indicated, scheduled for natural finish schedules, AWMAC Custom Quality grade.

.3 Moisture content: kiln dried to average 6-8 percent interior Work, average 9-12 percent exterior Work.

2.2 Sheet Materials

1 Douglas Fir plywood: to CSA 0121-M1978, Good 2 Sides (G2S) grade, waterproof glues, thickness indicated.

.2 Western softwood plywood: to CSA 0151-M1978, Good 1 Side, sound 1 side (G1S, S1S), thickness indicated.

.3 Mat formed wood particle board: to CAN3-0188. 1-M78, Type 2, Industrial Grade R, minimum 45 pound core density, density required for finish applied, uniform light color, thickness indicated, required.

.4 Melamine faced plastic laminate panel: to CAN3-A172-M79, 0.18mm thick melamine resin impregnated decorative sheet fused to Industrial grade "R" mat formed particle board both sides (G2S),one side with backing sheet (G1S), 1/4", 1/2", 5/8", 3/4" panel thick, sizes and thickness indicated, required, 0.51mm thick factory applied edge banding where indicated, required, color, finish selected by Consultant, Arborite "Cladboard", Formica "MPC".

.5 Edging tape: pre-glued 3 mm PVC tape edge banding (site), shop applied with hot melt adhesive, color, pattern to match face.

.6 Plastic laminate: to CAN3-A172-M79, Post Forming (PF) Type 2 grade, 0.030" thick, solid, patterned, color pattern, finishes indicated, indicated on drawings.

.7 Plastic laminate backing sheets: Backing grade, Regular GP-MK-R, 0.045", 0.030" thick as required to match face thickness.

2.3 Accessories

.1 Nails, spikes and staples: to CSA B111-1974, spiral thread.
- .1 Galvanized: exterior Work, interior highly humid areas, treated lumber.
- .2 Plain finish: interior Work.

.2 Draw bolts, splines, etc.: fabricator standard.

.3 Rough hardware: bolts, nuts, washers, lags, pins, screws, draw bolts, hot dip galvanized.

.4 Glues, cements, adhesives: to CSA 0112 Series M77, first grade industrial quality, purpose made, water, heat proof for countertops.

2.4 Hardware

.1 Provide all finish hardware, accessories, etc. required, etc. to Owner approval.

.2 Shelf Standards and Rests: adjustable 2" increments, double-pinned.

.3 Drawer and Door Pulls: 4" Stainless Steel.

.4 Extra Heavy Duty Drawer Slides: 200 lbs capacity, self-closing feature.

.5 Hinges: exposed, 5 knuckle stainless steel (2) two per door leaf.

2.5 Countertop Metal Cladding

.1 Stainless Steel Type 304, with front edge and splash-guard, #4 brushed finish.

PART 3 EXECUTION

3.1 Preparation

.1 Take Site measurements for millwork, other fabrication, establish sizes where dimension not available.

3.2 Fabrication

.1 Fabricate millwork, finish carpentry Work to AWMAC Standards, Custom Quality Grade.
.2 Perform manufacture, fabrication using skilled, capable craftsmen, first class materials.
.3 Fabricate millwork, finish carpentry true, square, aligned as detailed, required.
.4 Construct members from pieces long as possible.
.5 Make ample allowance for site cutting, fitting required.
.6 Join assemblies to hairline joints secured with concealed nails, screws, draw bolts, splines fully set, mortise and tenon joints, dadoes, dovetails, glue blocks, other acceptable methods. Allow for shrinkage.
.7 Assemble at mill as practical, deliver ready for installation.
.8 Ensure expose millwork, finish carpentry Work without defect, rough construction in exposed parts unless grading, species allows.
.9 Apply compensating backing to rear face unsupported surfaces covered with glue-on facing materials, laminated plastic, etc.
.10 Co-operate, verify details, dimensions, locations of items, cut, prepare openings, etc. in millwork for other Sections:
  .1 Section 05500: Metal items attached, built-in.
  .2 Division 16: Electrical fixtures, outlets, etc.
.11 Build removable access panels required in millwork for servicing, installation, maintenance of electrical, mechanical items, valves, traps, etc.

3.3 Cabinet, Casework

.1 Fabricate cabinet, casework to detail in accordance with AWMAC conventional construction, Premium Grade, unless specified otherwise.
.2 Fabricate cabinet, casework bodies, gable ends, gables, bottoms, fixed, adjustable shelving from 5/8" thick melamine (G2S), 1/4" thick tempered masonite (i-side white). Apply PVC matching color edging tape on exposed edges.
.3 Fabricate concealed framing, gate frames, etc. from minimum 19 mm" CDX plywood (solid wood stops).
.4 Fabricate face frames minimum 19 mm thick, tight joints fully glued, nailed to case bodies. Provide for scribing where indicated, required.

.5 Assemble cases, machine, dovetail, mortise and tenon, dado, rout joints. House related edges, members minimum 1/4". Construct cabinet, casework cases as indicated.
.6 Construct counter tops, splash-backs, edgings, facing, etc. indicated, required.
.7 Apply plastic laminate to plywood core materials of counter tops, edges, splash-backs, window frame stools, other surfaces indicated, required to CAN3-A172-M79 Appendix A, Owner approval.
.8 Ensure adjacent parts continuous laminate match in color, pattern.
.9 Cover exposed flatwork core edges with straight self-edging plastic laminate strip chamfered approximately 200 at top surface junction.
.10 Apply straight self-edging plastic laminate strips to exposed end edges formed to top, splashback profile.
.11 Use draw bolts, connectors, splines, etc. in countertop, horizontal surface joints, spaced maximum 16" o.c., in from edges. Make flush, hairline joints.
.12 Fabricate cabinet, casework drawer fronts from 19 mm plywood with PVC edging tape on all edges.
.13 Construct drawer sides, backs from minimum 15mm thick plywood, bottoms from 1/4" thick plywood, tempered masonite.

.14 Fabricate drawers with lock shoulder front, dadoed back, plowed in bottom glued to shaper rounded top sides.

.15 Equip drawers on scheduled, specified metal drawer slides.

.16 Fabricate flush doors from 19mm thick plywood, edged with PVC tape all four edges.

.17 Install hardware indicated, scheduled, required to doors, shelves, drawers, etc. Recess shelf standards for adjustable shelving where indicated, required.

3.4 Adjusting

.1 Adjust Work under provisions of Section 01710.

.2 Adjust moving or operating parts to function smoothly and correctly.

3.5 Cleaning

.1 Clean Work under provisions of 01710.

.2 Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Board insulation at exterior wall construction and perimeter foundation wall.

1.2 Related Sections

.1 Section 033000 – Cast-In-Place Concrete: Foundation wall.
.2 Section 072130 – Batt and Blanket Insulation

1.3 References

.1 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Coverings
.2 CAN/ULC-S702-97, Thermal Insulation, Mineral Fibre, for Buildings

1.4 Submittals

.1 Comply with requirements of Division 1.
.2 Submit manufacturers' literature for insulation and fastening systems, indicating compliance with specifications.

1.5 Certification

.1 Polystyrene insulation to be tested, certified and labeled for conformance with CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering, in accordance with, ULC, or other certification program accredited by Standards Council of Canada.

1.6 Storage

.1 Store to protect materials from wind, moisture, sunlight and accidental ignition.

1.7 Environmental Requirements

.1 Install insulation during dry weather conditions.

1.7 Sequencing and Scheduling

.1 Schedule application of insulation to follow immediately after installation of sheet membrane air and vapor seal and to proceed concurrently with it.

PART 212 PRODUCTS

2.1 Insulation

.1 Polystyrene, Type 4: to CAN/ULC-S701.

2.2 Board Dimensions and Shape

.1 Minimum Width: 400 mm.
.2 Minimum Length: 1200 mm.
.3 Thickness: as indicated on drawings.
.4 Insulation applied to curved substrates to conform to profile without creation of cavities in, or alteration of density of, insulation boards.

2.3 Fasteners

.1 Fasteners to be specifically designed to anchor insulation by frictional resistance within structurally adequate substrates. They to be inserted into and compressed against surrounding substrates, either by being driven or screwed, and to be one of following types:

.1 Plastic: with integral shank and head of minimum 45 mm diameter to distribute stresses, of high density polyethylene to ASTM D1248 or high density polypropylene to ASTM D4101.

.2 Carbon Steel or Stainless Steel: of nail, screw or expansion type, with separate hot-dip galvanized sheet steel or high density polyethylene or polypropylene stress distribution plates of minimum 50 mm diameter or width.

.2 Performance requirements for installed insulation fasteners:

.1 Pullout Resistance: minimum 200 N, perpendicular to applicable substrates and within temperature range of -30°C to +40°C.

.2 Corrosion Resistance: carbon steel components to show not more than 15% of surface rusted, and coatings to not blister, peel or crack, when tested to Corrosion Test Procedure of Factory Mutual Research Approval Standard, Class I Roof Covers (4470).

PART 3 23EXECUTION

3.1 Installation of Insulation

.1 Install insulation boards horizontally. Offset vertical joints minimum 300 mm.

.2 Install tightly against dry substrate. Provide continuity of thermal protection to building elements and spaces.

.3 Cut and trim insulation neatly to fit around corners and penetrations. Take care to prevent cutting sheet membrane air and vapor seal.

.4 Butt joints tightly. Deform board edges as required to maintain tight butt joints at insulation fasteners and other penetrations located at board joints.

3.2 Installation of Fasteners

.1 Install fasteners following fastener manufacturer's recommendations for type of substrate, drill bits, edge distance, installation methods, and ambient and substrate temperature conditions.

.2 Space fasteners horizontally at:

.1 maximum 800 mm o.c., and

.2 maximum 200 mm from vertical board joints.

.3 Space fasteners vertically:

.1 at all horizontal board joints and on centre line of board widths, or

.2 at 1/4 of board width from all horizontal joints.

.4 Do not use plastic fasteners in horizontal, suspended installations.

3.3 Installation Schedule

Location	Type	Thickness(mm)
Walls and soffits above grade:	Polystyrene, Type 2	64 51 38
Vertical and Horizontal below grade:	Polystyrene, Type 4	25
Decks above heated spaces:]	High density polystyrene, Type 4	25 38

Note: Where more than one insulation type is specified for a single location, provide any one of types specified for that location.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes (Where Indicated on Drawings)

.1 Batt insulation in cavity space of exterior wall.

.2 Batt and/or blow-in insulation for roof or truss perimeter edge.

.3 Batt and blow-in insulation or spray foam insulation for filling perimeter window and door shim spaces crevices in exterior wall and roof.

.4 Acoustic batt insulation for interior demising walls.

1.2 Related Sections

1. Section 072500 - Vapour and Air Barrier: Continuing vapour and air barrier materials to adjacent construction.
2. Section 072120 - Board Insulation.

1.3 References

.1 CAN/CGSB-51.33M - Vapour Barrier, Sheet, for Use in Building Construction.

.2 CSA A101M - Thermal Insulation, Mineral Fibre, for Buildings.

1.4 Performance Requirements

.1 Materials of this Section shall provide continuity of thermal barrier at building enclosure elements.

1.5 Submittals

.1 Submit product data to requirements of Section 01300.

.2 Provide product data on product characteristics, performance criteria, limitations.

1.6 Coordination

.1 Coordinate the work of Section 07190 for installation of vapour and air barrier seals

PART 2 INSULATION MATERIALS

2.1 Acceptable Manufacturers - Insulation Materials

.1 Fibreglass Canada Inc. Model Fibreglass Friction Fit Batt Insulation.

2.2 Materials

.1 Batt Insulation: CSA A101M; pre-formed fibre batt; friction fit, Fibreglass Friction Fit manufactured by Fibreglass Canada Inc. Minimum R20 walls and R40 roof – batt or blow-in insulation. See drawings for insulation thickness.

.2 Mineral Fibre Insulation: To CSA A101-M1977, Type 1A, RSI indicated.

.3 Vapour Barrier Film:

.1 Fibreglass Batt Insulation, CSA A101-M1983.

.2 Insulation: Proper installation of the vapour barrier is critical. Installation is to be done according to the National Building Code, 2005 edition, Subsection 9.26.5, part of which is reproduced below for reference:

.1 Every vapour barrier shall be installed to protect the entire insulated wall surface, except that the vapour barrier need not extend across the framing members provided the interior finish consists of panel-type material attached to all framing members with a continuous bead of adhesive in addition to the nails.

.2 Insulation shall be protected by a vapour barrier so that all joints are sealed or are lapped at least 100 mm and occur at framing members, furring or blocking.

.3 Where an interior frame wall meets an exterior wall required to have vapour barrier protection, the vapour barrier protection shall extend between the exterior and interior walls to form continuous protections at the wall intersection.

.4 Where an interior frame wall meets a ceiling required to have vapour barrier protection, the vapour barrier protection shall extend over the top of the wall or beneath the top wall plate to form continuous vapour protection for the ceiling.

.5 Holes through vapour barrier, such as those cut for the installation of electrical wiring, electrical boxes, piping or ductwork, shall be sealed to maintain the integrity of the vapour barrier over the entire surface.

.4 Accessories

.1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

.2 Nails: Galvanized steel, length to suit insulation plus 25 mm to CSA B111-1974, Table 12.

.3 Staples: 12 mm minimum length.

.4 Sealant: To CGSB 19-GP-21M.

.5 For light gauge metal buildings, provide R-28, 3' wide blanket type glass fibre insulation having 1 lb density and 8" foil skrim Kraft insulation, minimum R-28 R-value.

PART 3 EXECUTION

3.1 Insulation Installation

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.2 Install insulation with vapour barrier facing warm side of building spaces and vapour permeable membrane facing cold side. Lap ends and side flanges of membrane over framing members. Retain in position with staples. Tape seal butt ends and lapped side flanges. Do not tear or cut vapour barrier.

.3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.4 Do not compress insulation to fit into spaces.

3.2 Vapour Barrier Installation

.1 Place polyethylene on warm side of insulation and tight to insulation.

.2 Staple vapour barrier to framing members. Lap joints 150 mm minimum. Ensure joints occur over framing members. Caulk all lap joints.

.3 Tape seal areas where nails or staples penetrate vapour barrier.

.4 Extend vapour barrier tight to perimeter of windows, door frames and other items interrupting continuity of membrane. Seal with sealant.

.5 Seal vapour barrier at points of penetration.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Sheet and sealant materials to provide a continuous vapour and air barrier throughout the building envelope and to seal wall vapour and air barrier to window, door and frame openings.

1.2 Related Sections

.1 Section 079200 - Joint Sealers: Sealants.
.2 Section 085313 – PVC Windows.
.3 Section 081112 – Steel Frames

1.3 References

.1 CAN/CGSB-19.13M -Sealing Compound, One Component, Elastomeric, Chemical Curing.
.2 CAN/CGSB-19.24M - Sealing Compound, Multi-Component, Chemical Curing.
.3 CGSB 19-GP-14M - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
.4 CGSB 19-GP-18M - Sealing Compound, One Component, Silicone Base, Solvent Curing.
.5 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.
.6 CAN/GSB 51.34 – M86 (Balcon Vapour Barrier).

1.4 Performance Requirements

.1 Materials of this Section shall provide continuity of building enclosure vapour and air barrier:
  .1 In conjunction with materials described in Section 07212, 07213, 07214, 07900.
  .2 To seal gaps between building enclosure components and wall and roof opening frame.

1.5 Quality Assurance

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.
.2 Maintain one copy of document on site.

1.6 Qualifications

.1 Applicator: Company specializing in performing the work of this Section with minimum 3 years documented experience approved by manufacture.

1.7 Environmental Requirements

.1 Do not install solvent curing sealants in enclosed building spaces without ventilation.
.2 Maintain temperature and humidity recommended by the materials manufacturers before, during, and after installation.

1.8 Sequencing

.1 Sequence Work to permit installation of materials in conjunction with other retardant materials and seals.

1.9 Coordination

.1 Coordinate the work of this Section with all Sections referencing this Section.

PART 2 PRODUCTS

2.1 Sheet Materials

.1 Sheet Air/Vapour Barrier: Type 1 used on masonry walls and masonry veneer walls, etc. Self adhering, cold applied composite sheet membrane comprised of rubberized asphalt integrally

bonded to a film of high density cross laminated polyethylene, maintaining a minimum thickness of 1 mm; Blueskin as manufactured by Bakor or CCW705 Carlisle BY Wallace Construction specialties; Type 2; see 3.4.1.

.2 Sheet Barrier Type 2: Self-adhering, cold-applied composite sheet membrane, comprised of 0.9 mm rubberized asphalt integrally bonded to a 0.1 mm film of high density, cross-laminated "embossed" polyethylene, for a minimum thickness of 1 mm. Ice and Water Shield manufactured by W.R. Grace; Betaguard AG manufactured by Bakor; Lastobond 195 by Soprema.

.3 Sheet Barrier Waterproofing Type 3: Self adhering 1.5 mm water proofing membrane composed of cross laminated polyethylene and rubberized asphalt, Bituthene 3000 manufactured by W. R. Grace, WP200 manufactured by Bakor and CCW 861 Carlisle by Wallace Construction Specialties.

.4 Sheet Air Barrier Type 4: Spunbonded olefin fibres interwoven in sheet form, forming an air retarder. Perm rating -1723 ng/Pa.s.sq.m. Tyvek, manufactured by E.I. du Pont de Nemours & Co.

.5 Sheet Vapour Barrier Type 5: CGSB 51.34M86, 6 mil polyethylene – walls.

2.2 Sealants

.1 Polyurethane Sealant: Single component, 100 percent solids in content; type recommended by manufacturer; Sunborne NPI by Wallace Construction.

.2 Primer: Type recommended by manufacturer.

.3 Acoustical sealant at overlap joints in poly ethylene vapour barrier.

.4 Cleaner: Non-corrosive type recommended by manufacturer.

2.3 Adhesives

.1 Adhesive: Type recommended by manufacturer.

2.4 Accessories

.1 Thinner and Cleaner for Sheet: As recommended by sheet material manufacturer.

.2 Tape: Minimum thickness of 0.8 mm; type recommended by manufacturer.

.3 Wall Flashing: Sheet Barrier Type 1; Self-adhering membrane; Perma-A-Barrier Wall Flashing Membrane manufactured by W.R.Grace or Sopraseal, Colphene 1000 GSA manufactured by Soprema or Blueskin SA manufactured by Bakor, Carlisle CCW705LT by Carlisle.

.4 Silicone: Anti mildew silicone Dow Corning tub and file sealant for countertop, plumbing, etc.

PART 3 EXECUTION

3.1 Examination

.1 Verify that surfaces and conditions are ready to accept the Work.

3.2 Preparation

.1 Remove loose or foreign matter which might impair adhesion.

.2 Clean and prime substrate surfaces in accordance with manufacturers' instructions.

3.3 Installation - Exterior Walls

.1 Install sheet materials in accordance with manufacturer's instructions

.2 Install sealant in accordance with manufacturer's instructions.

.3 Apply sheet barrier Type 1 to primed exterior GWB sheathing. Fit membrane tightly around all penetrations through it and seal.

.4 Lap Sheet Barrier Type 1 into all openings in the wall area, windows, doors, etc. and terminate at

a point that will ensure that it will not be visible from the interior.

.5 Tie membrane into and make continuous with all framed openings.

.6 Coordinate installation of membrane with roofing trade to ensure continuity of the air /vapour barrier.

.7 At the end of each working day, and assuming a wall area has been only partially covered, seal along the top edge of the membrane at its termination to prevent the vertical drainage of precipitation from running in behind the membrane.

.8 Before covering the membrane with the cavity insulation, inspect and repair any punctures, damaged areas or inadequately lapped seams.

.9 Install membrane within recommended application temperature ranges.

3.4 Installation - Roof

See drawings for roof type and locations.

.1 Install sheet barrier Type 2 onto primed roof surfaces. Lap seal in accordance with manufacturer's instructions, i.e. Carlisle CCW401 membrane, peel and stick self adhesive air vapour barrier by Wallace Construction Specialties Lastobond 195 by Soprema or in accordance to other approved roof membrane manufacturer/supplier.

3.5 Vapour Barrier Film Installation

.1 Staple vapour barrier to framing members. Lap joints 150 mm minimum and tape seal. Ensure joints occur over framing members.

.2 Tape seal areas where nails or staples penetrate vapour barrier.

.3 Extend vapour barrier tight to perimeter of windows, door frames and other items interrupting continuity of membrane. Tape seal.

.4 Seal vapour barrier at points of penetration.

3.6 Protection of Finished Work

.1 Protect finished Work under provisions of Section 01500.

.2 Do not permit adjacent Work to damage work of this Section.

3.7 Schedule

.1 Window and Door Frame Perimeter: Lap sheet barrier Type 1 from wall membrane with 102 mm of contact over firm bearing to window frame with 25 mm of contact. Use Carlisle CCW EZ Flash to detail 100% of all rough opening faces.

.2 Wall and Roof Junction: Lap sheet barrier Type 1 from wall vapour barrier with 150 mm of contact over firm bearing to roof vapour barrier with 100 mm of contact. Peel and stick air/vapour system of wall to lap minimum 2" with peel and stick air/vapour barrier system with roof.

.3 Sheet Metal Roofing: Lap sheet barrier Type 3 at eave protection, all valley, ridge and corner joints as indicated at eaves, Type 3 to extend minimum 2' within interior space.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Supply and installation of exterior metal siding and all related accessories.

1.2 Related Sections

.1 Vapour Retarder and Air Barriers – Section 07190

.2 Board Insulation – Section 07212

.3 Batt & Blanket Insulation – Section 07213.

.4 Metal Flashing and Trim - Section 07620.

1.3 Reference Standards

.1 Do performed metal siding work to CGSB 93-GP-2M, CGSB 93-GP-4M or CGSB 93-GP-5M.

1.4 Submittals

.1 Shop drawings: Submit shop drawings for review in accordance with Section 01340.

.1 Indicate dimensions, siding profiles, attachment methods, trim and closure pieces, soffits, fascia and related work

1.5 Samples

.1 Samples: Submit samples of the panel fabrication showing two panels joined approximately 24" high in accordance with Section 01340.

1.6 Design Criteria

.1 Design metal wall panel to suit climatic conditions for building geographic location.

.2 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movement, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.3 Design members to withstand dead load and wind loads calculated in accordance with NBC and applicable local regulations, to maximum allowable deflection of $1/180^{th}$ of span.

.4 Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".

.5 Design wall system to accommodate specified erection tolerances of structure.

.6 Maintain the following installation tolerances:

.1 Maximum variation from plan or location shown on approved shop drawings: 10 mm/10 m of length and up to 20 mm/100 m.

.2 Maximum offset from true alignment between two adjacent members abutting end to end, in line 0.75 mm.

PART 2 PRODUCTS

2.1 Materials

.1 Exterior Metal Wall Cladding at Columns & Canopy

.1 VicWest: 24 ga. CL6025-SR; HMP Series: QC 16071 Stone Gray color.

.2 Cap Flashing & Trim:

.1 VicWest: 24 ga. CL6025-SR; HMP Series: QC 16071 Stone Gray color.

PART 3 EXECUTION

3.1 Preparation

.1 Protect metal surfaces in contact with concrete, or other cementitious surface with isolation coating.

3.2 Installation

.1 Install Tyvek wall sheathing by stapling, lapping edges 150mm, one layer.

.2 Install starter strips, inside corners, continuous outside corners, edgings and drip cap flashings.

.3 General: Erect all panels and accessory shapes plumb and true to line. Panel ribs to be vertical. This Contractor shall be responsible for the supply and installation of all necessary sub-grid systems required for the installation of the exterior panels. All sheathing units shall be installed in accordance with the manufacturer's erection drawings.

.4 Handling: transport, unload, store, handle and erect all units with proper care and due regard for the characteristics of the material. Dented, spring, bent, chipped or otherwise damaged units will not be accepted and if erected, must be replaced with undamaged units.

.5 Subframe: Inspect and examine subframe before proceeding with erection of panels. Notify Engineer if subframe is not aligned to tolerances recommended by AISC. Do not erect panels until all necessary corrections are made. Supply and install angle iron reinforcing for installation as required for door and window openings.

.6 Exterior panels: clip-fasten exterior ribbed panels to sub-grid system. No fastenings for exterior panels to be visible. All interlocking ribs of exterior panels to be die-clinched in straight horizontal lines; spacing not to exceed 4'.

.7 Provide components including drip and cap flashings, screws and fasteners, as required to complete installation.

.8 Install siding and attachments sequentially to manufacturer's instructions.

.9 Install facing on fascia where indicated.

.10 Install sill flashings, starter strips, inside corners, edgings.

.11 Install exterior corners, fillers and closure strips with carefully formed and profiled work using concealed fasteners.

.12 Maintain joints in exterior sheets, true to line, tight fitting.

.13 Seal in accordance with CGSB 93-GP-5M and Section 07900.

.14 Provide components including drip and cap flashings, screws and fasteners, as required to complete installation.

.15 Touch-up: Touch-up by spray painting, as required, all metal siding which is abraded by the installation operations.

.16 Horizontal 7/8" metal furring bar @ 24" o.c.

3.3 Control/Expansion Joints

.1 Construct control joints as indicated or as directed.

.2 Use cover sheets, of brake formed profile, of same material and finish as adjacent material.

.3 Use mechanical fasteners to secure sheet materials.

.4 Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.4 Eave Flashing

.1 Supply pre-finished steel sheet material for forming of flashings under Section 07620.

3.5 Cleaning

.1 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean up.

.2 Remove excess sealant with recommended solvent.

END OF SECTION

PART 1 GENERAL

1.1 General

.1 Standing seam metal roofing section applies only to scope of work in PHASE 1 – Header House and greenhouse links only.

1.2 Samples

.1 Submit duplicate samples 12" long of metal panels, trim, corners and other components.

1.3 Shop Drawings

.1 Submit shop drawings for complete metal roofing installation.

.2 Indicate all profiles, thicknesses, finishes, connections, and dimensions.

.3 Require on shop drawings: Saskatchewan Engineering Seal to demonstrate responsibility for structural design of the system. In accordance with National Building Code insofar as wind pressure and uplift at all critical areas to the roof (i.e.: Eave, edge, ridge), indicate CpCg coefficients, specified external pressure, copies of and/or reference to recognized licensed laboratory and specific load test results to prove the structural capability of the system.

System description to include:

.1 Wood sheathing substrate type and thickness (plywood, OSB, sturdi-wood).

.2 Gauge and spacing of clips.

.3 Number, size and type of screws to anchor clip to substrate.

.4 Pan width or seam spacing.

.5 Edge crimping of seams (90° or 180°).

PART 2 PRODUCTS

2.1 Materials

.1 Metal roofing: "J.S.M. – equal to Flynn Roofing Canada Ltd.", VicWest Weatherloc/SSR, Bonkowski Enterprrises, Wapelle, SK. (Cell (306) 435-8008), or approved equal, continuous formed standing seam, snap-lock metal custom lock 1.5" standing seam, hidden fastener system.

.2 Fabricate all face components from 24 gauge prefinished steel.

.3 Mounting accessories to manufacturer's standard.

.4 Closures and accessories of 24 gauge minimum.

.5 Finish all exposed faces, HMP Colorlite series.

.6 Provide all required closures, J-molds, caps, flashings, closures, accessories required to complete the installation.

.7 Soffits, fascias, vertical cladding and rails.

.8 Snow guards (see Section 077250).

.9 Metal roof deck color and flashing color as specified on drawings.

2.2 Fasteners

.1 Fasteners shall be concealed wherever possible.

.2 Exposed fasteners shall be finished to blend with cladding color.

2.3 Sealants

.1 Concealed joint sealants shall be low temperature compression tape or polybutene sealant.

.2 All exposed sealant, Tremco Mono, colored to match cladding.

2.4 Colors

.1 Color to be selected by Architect from standard colors.

.2 This color is applicable to all standing seam roofing, accessories, flashings, etc.

2.5 Profiles

.1 Metal roof: 18" panel width (or 24"); 1-1/2" rib; see Drawings.

.2 Fabricate running trim, etc., in maximum practical lengths. Joints to telescope minimum 1", rivet to ensure tight even sight-lines.

2.6 Rainwater Goods

.1 Refer to drawings for detail.

.2 Fabricate gutters and drops of 24 gauge prefinished steel to match cladding (refer to Section 076310).

PART 3 EXECUTION

3.1 Fabrication & Erection

.1 Refer to details. Fabricate all components and accessories to profiles shown. Conform to Elite standard detailing at ridges, rakes, etc.

.2 All corner flashings, trims, shall be fabricated so that exposed face presents smooth continuous surface, free of crimps, cuts or other blemishes. All edges hemmed so no cut edges are exposed.

.3 Erection work shall be carried out by trained forces and in strict accordance with the manufacturer's recommendations.

.4 Ensure ends of panels at eaves and like conditions are securely screwed to the framing with neoprene washered screws spaced 8" o.c. Finish to match metal.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes (all work related to PHASE 1 - Header House and Links only)

.1 Roof and sill flashings.

.2 Counter flashings over base flashings.

.3 Roof expansion joint cover flashings.

.4 Counter flashings at roof.

.5 Parapet cap flashing.

.6 Fastening accessories.

.7 Sealing compound.

.8 Adhesives.

.9 Metal siding flashing and accessories.

1.2 Related Sections

.1 Section 06100 – Rough Carpentry.

.2 Section 07900 - Joint Sealers.

.2 Divisions 22 / 23 - Mechanical: Flashing sleeves and collars for mechanical items protruding through roofing (if applicable).

.5 Division 26 - Electrical: Flashing sleeves and collars for electrical items protruding through roofing membrane (if applicable).

1.3 References

.1 ASTM A653-M96 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot Dip Process

.2 CAN/CGSB-1.108-M89Bituminous Solvent Type Paint

.3 CAN/CGSB-19.13-M87Sealing Compound, One Component, Elastomeric, Chemical Curing

.4 CAN/CGSB 37.5-M89 Cutback Asphalt Plastic Cement

.5 ASTM A525 - Steel Sheet, Zinc Coated, Galvanized by Hot Dip Process.

.6 CAN2-51.33M - Vapour Barrier, Sheet, For Use in Building Construction.

.7 NAAMM - Metal Finish Handbook.

.8 SMACNA - Architectural Sheet Metal Manual.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Clearly indicate bending, folding, jointing, fastening installation details.

1.5 SAMPLES

.1 Comply with requirements of Division 1.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store materials off ground and under cover in a dry, well ventilated enclosure.

.2 Stack preformed material in manner to prevent twisting, bending and rubbing.

.3 Provide protection for galvanized and prepainted surfaces.

.4 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements.

PART 2 PRODUCTS

2.1 Materials

.1 Galvanized Steel Sheet: commercial quality sheet to ASTM A653-M96, with Z275 designation zinc coating.

.2 Prepainted Galvanized Steel: commercial quality to ASTM A653-M96 with Z275 zinc coating prepainted with baked on enamel with colours of proven durability for exterior exposure, to CSSBI Technical Bulletin No. 7, 5000 series.

.3 Solder: 50% pig lead and 50% block tin.

.4 Flux: commercial quality as recommended by sheet metal manufacturer.

.5 Flashing Nails: #12 hot dipped zinc coated, annular ringed.

.6 Sheet Metal Screws: Cadmium plated, self tapping, pan head.

.7 Bituminous Paint: solvent type, to CAN/CGSB-1.108-M89, type II.

.8 Plastic Cement: cutback asphalt type, to CAN/CGSB-37.5-M89.

.9 Sealing Compound: to Section 07510.

.10 Sealant: one component, elastomeric, chemical curing, CAN/CGSB-19.13-M87.

.11 Recessed Reglet: preformed 0.70 mm thick galvanized steel channel with face and ends covered with plastic tape.

.12 Flashing Anchor Clips: 0.80 mm thick galvanized steel.

2.2 General Fabrication

.1 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.2 Backpaint sheet metal with bituminous paint on surface in contact with concrete, masonry, cementitious materials or dissimilar metal.

2.3 Flashing Fabrication

.1 Maximum Joint Spacing:

.1 Parapet Face Flashings: 1200 mm.
.2 Cap Flashing 300 mm and Greater in Width: 1200 mm.
.3 All Other Flashings: 2400 mm.

.2 Construct flashing joints to allow for flashing movement, using flat "S" lock seams.

.3 Maintain minimum of 22 mm lap at all joints. Provide 25 mm anchor projection of "S" locks.

.4 At inside and outside corners, mitre joint, and use upstanding seams, 25 mm minimum height and 22 mm minimum lap.

.5 Maintain minimum 1:5 slope on horizontal surfaces of flashings, parapets and control joints.

.6 Hem exposed edges on underside of all flashings.

.7 Fabricate cap flashing to have a drip leg minimum 110 mm high.

.8 Fabricate cap and counter flashings to lap 100 mm over base flashings.

2.4 Roof Accessory Fabrication

.1 Form sheet steel roof drain sleeves, air-stops etc. from 0.70 mm galvanized steel.

.2 Form gum boxes from 0.70 mm galvanized steel, with 75 mm minimum upstand and 100 mm one piece flanges. Solder joints. Make pans wider than member passing through roof membrane by

50 mm minimum all sides.

.3 Fabricate roof scuppers from 0.70 mm, prepainted galvanized sheet steel with one piece deck flange, minimum 150 mm. Contour scuppers to cant strips.

.4 Fabricate splash pans from 0.70 mm galvanized steel.

.5 Fabricate air/firestop below control joint box from 0.70 mm galvanized steel.

.6 Fabricate roof drain sleeves as detailed on drawings, from 0.70 mm galvanized steel.

PART 3 EXECUTION

3.1 Examination of Surfaces

.1 Examine surfaces to receive flashings. Notify Minister of surfaces which are considered unacceptable to receive work of this Section.

.2 The commencement of flashing work will imply unconditional acceptance of surfaces and substrates to which flashing is to be fastened.

.3 Verify that following are located and installed as detailed on drawings:

.1 Plywood and lumber nailer plates to walls and parapets.
.2 Control joints.

3.2 Protection of Existing Work

.1 Protect work of other Sections from damage by work of this Section.

.2 Place protection to requirements and satisfaction of this Section before performing work of other Sections.

3.3 General Flashing Installation

.1 Install flashings not later than seven days after installation of membrane on any particular section of roof.

.2 Use 0.80 mm thick x 150 mm long anchor clips on fascia faces, and screws or annular ringed nails on opposite face.

.3 Use exposed fastenings in approved locations. Install anchors using annular ringed nails.

.4 Fasten flashings of 1.2 m length and shorter, through extended "S" locks. Fasten flashings over 1.2 m length, through extended "s" locks, and at mid-length with a 150 mm long, 0.80 mm thick galvanized steel clip.

.5 Fasten flashings at maximum 600 mm O.C.

.6 Where possible, do not set base flashing screws less than 200 mm from top of roof membrane.

3.4 Installation of Flashing joints

.1 Fit flashings together so that one end of each section is free to move in joint. Do not use sealant at joints.

.2 Wipe and wash clean, soldered joints to remove traces of flux, immediately after soldering.

3.5 Installation of Reglets

.1 Assist in locating and installing recessed reglets, as required.

.2 Confirm reglet installation and report defects to Consultant.

.3 Insert metal flashing into reglets to form tight fit.

.4 Seal flashing into reglet with sealant.

3.6 Gum Box Installation

.1 Fill gum boxes with plastic cement in two equal lifts. Separate lifts with one ply of organic felt, precision cut to fit box.

.2 Built-up Roofing Membranes: apply two plies of organic felt stripping over flange and extend up face of box curb. Reinforce stripping with 2 layers of woven glass cloth.

.3 Modified Bituminous Roofing: apply roofing and flashing to membrane manufacturer's printed instructions.

3.8 Vent Stack Installation

.1 Install vent stacks to same elevation as top of curb.

.2 Size lead flashings to extend minimum 150 mm down curb base flashing and screw to base flashing.

END OF SECTION

PART 1 GENERAL

1.1 **Scope of Work**

.1 Requirements of the Conditions of the Contract and of Division 1 of these Specifications apply to all work in this Section.

1.2 **Extent of Work**

.1 Provide roof curbs for all roof mounted equipment (If applicable – refer to roof plan).

1.3 **Submittals**

.1 Submit 5 copies of manufacturer's literature and complete shop drawings of fabrication and installation of items of this Section to the Engineer prior to installation.

PART 2 PRODUCTS

2.1 **Roof Curbs**

.1 General: Provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported.

.2 Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 14 ga. (.0747" thick), structural quality, hot dip galvanized or aluminum zinc alloy coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.

.3 Use curbs with height to extend 12" above the top of finished roofing surface. Consider and compensate for presence and thickness of roof insulation when ordering.

.4 Provide curbs with 1-1/2" insulation, #3 density on exterior curb face, extending full height from bottom to top of curb.

PART 3 EXECUTION

3.1 **Installation of Curbs**

.1 Install curbs per shop drawings and manufacturer's recommendations.

.2 Verify all locations with HVAC drawings and actual locations of roof joists.

.3 Install gaskets on the same day the roof mounted units are set on curbs.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Snow guards for installation on sloped metal roofing **(PHASE 1, only)**.

.2 Non-penetrating, seam mounted snow guards for standing seam metal roofs **(PHASE 1, only)**.

1.2 Related Sections

.1 Section 076100 - Standing Seam Metal Roof

.2 Section 076200 – Sheet Metal Flashing & Trim

.3 Section 076310 – Gutters and Downspouts

1.3 Submittals

.1 Submittals for Review

.1 Product Data: Manufacturers product data and installation instructions.

.2 Samples: One sample of each type of product to be installed including snow guard and snow guard cover (if applicable).

1.4 Quality Assurance

.1 Installer Qualifications

.1 Installer to be experienced in the installation of roofing material and snow guards for not less than 5 years.

1.5 Delivery, Storage and Handling

.1 Inspect products upon delivery and order replacements for any damaged or missing parts.

.2 Store products in manufacturer's unopened packaging until ready for installation. Keep products dry, covered, and off the ground until installation.

1.6 Project Conditions

.1 Maintain conditions within limits recommended by manufacturer with regards to temperature, humidity, etc. for best results. Do not install products under environmental conditions outside manufacturer's fixed limits.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Acceptable Manufacturers: Snojax (www.snojax.com) or approved equal.

.2 Other Manufacturers

.1 Must meet all aspects of this specification and approved in writing by Consultant (7) days prior to General Contractor bid date. Equality must be shown in every aspect of this specification, including, but not limited to tested load-to-failure values verified by independent laboratory, and color match. If tested load-to-failure values are lower than called out in this specification, then additional rows of assembly may be furnished to achieve compliance.

2.2 Materials

.1 Icejax II, mechanically fastened guards, (2) per roof panel (between standing seam ribs), alternating at 3'-0", respectively 3'-6" from the roof edge. See roof plan for locations.

.1 Injection molded prime virgin grade polycarbonate polymer material constriction containing an UV stabilizer.

.2 Dimensions: 3" high x 5" wide.

.3 Color: Clear.

.2 Fasteners and Other Hardware: Each guard is to be secured directly to the roof deck with two #14 non-corrosive screws, and all-weather sealant.

PART 3 EXECUTION

3.1 Examination

.1 Prior to installation, confirm that:

.1 Roof system has been completely installed.

.2 Roof system is installed to withstand loads incurred by snow guard system.

.3 Snow guards will not obstruct roof drainage system.

.4 Architect and/or General Contractor has been notified of any deficiencies.

3.2 Preparation

.1 Prior to installation, inspect conditions to verify that surfaces are suitable for installation of snow guards and clean all surfaces to achieve best result.

3.3 Installation

.1 Install system in accordance with approved manufacturer's installation instructions and approved architectural drawings.

.2 Mechanical Mounted Units: Attach snow guard to roof using self-tapping screws or appropriate fasteners to screw through pre-drilled holes in the base. Apply sealant to fastener heads and base of unit.

END OF SECTION

PART 1 GENERAL

1.1 Work Included

.1 Preparing sealant substrate surfaces.

.2 Sealant and backing at all locations where different materials come in contact, and where called out in the drawings.

1.2 Related Work

.1 Section 072500 - Vapor and Air Barriers: Sealants used in conjunction with vapor and air barrier continuity

.2 Section 088000 - Glazing: Sealants used in conjunction with glazing methods.

1.3 References

.1 ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers Open Cell Foam, CAN2-19.13M - Sealing Compound, One Component, Elastomeric, Chemical Curing.

.2 CAN2-19.24M - Sealing Compound, Multi-Component, Chemical Curing.

.3 CGSB 19-GP-2M - Glazing Compound, Non-hardening, Modified Oil Type.

.4 CGSB 19-GP-5M - Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.5 CGSB 19-GP-14M - Sealing Compound, (1) Component, Butyl Polyisobutylene Polymer Base, Solvent Curing, CGSB 19-GP-17M- Sealing Compound, (1) Component, Acrylic Emulsion Base.

.6 CGSB 19-GP-18M - Sealing Compound, One Component, Silicone Base, Solvent Curing.

.7 CGSB 19-GP-21M - Sealing and Bedding Compound for Acoustical Purposes.

.8 CGSB 19-GP-22M - Sealing Compound, Mildew Resistant, for Tubs and Tile.

.9 CGSB 19-GP-23 - Guide to the Selection of Sealants on a Use Basis.

.10 Sealant and Waterproofers Institute - Sealant and Caulking Guide Specification.

1.4 Quality Assurance

.1 Manufacturer: Company specializing in manufacturing the products specified in this Section with three years documented experience.

.2 Applicator: Company specializing in applying the work of this Section with three years documented experience.

.3 Conform to Sealant and Waterproofers Institute requirements for installation & CGSB 19-GP-24.

1.5 Installation Instructions

.1 Submit manufacturer's installation requirements of Section 01600.

.2 Submit surface preparation instructions.

1.6 Environmental Requirements

.1 Perform work to requirements of Section 01500.

.2 Do not install solvent curing sealants in enclosed building spaces.

.3 Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

.4 Sealant and Substrate materials to be minimum 5°C

1.7 Coordination

.1 Coordinate work with other trades.

.2 Coordinate the work of this Section with all Sections referencing this Section.

1.8 Warranty

.1 Provide a warranty under provisions of PWGSC.
.2 Warranty includes: Coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 Sealants

.1 Acrylic Sealant Type A: CGSB 19-GP-5M, Single component, solvent curing, non-staining, non-bleeding, non-sagging, color as selected. Tremco 830

Elongation Capability	7.5 to 12%
Service Temperature Range	-25 to 82° C
Shore A Hardness Range1	25 to 50

.2 Butyl Sealant Type B: CGSB 19-GP-14M, Single component, solvent release, non-skinning, non-sagging, butyl-polybutylene compound, black color, Tremco Butyl Sealant.
.3 Acoustical Sealant Type C: CGSB 19-GP-21M, single component, non-skinning, high solids content, synthetic rubber, non-corrosive to metals or concrete, non-sagging, color as selected to match adjacent materials. Tremco Acoustical Sealant.
.4 Polyurethane Sealant Type D: CGSB CAN 19. 13-M 87, Single component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, self leveling type, color as selected. Dymonic manufactured by Tremco, Perma Pol RC-1 manufactured by P.R.C. Canada, NP1 manufactured by Sonneborn.

Elongation Capability	25%
Service Temperature Range	-40 to 80° C
Shore A Hardness Range	20 to 35

.5 Polyurethane Sealant Type E: CGSB CAN 2-19.24-M 80 Multi-component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, self-leveling Type, color as selected. Dymeric manufactured by Tremco, Perma Pol RC-2 manufactured by P.R. C. Canada, NP2 manufactured by Sonneborn.

Elongation Capability	25%
Service Temperature Range	-40 to 82° C
Shore A Hardness Range	20 to 35

.6 High Density Polyurethane Foam combined with Latex Modified Asphalt Type F: Emseal Manufactured by Emseal Corporation.
.7 Silicone Sealant Type G: CGSB 19-GP-18M, Single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding, color as selected. 786 manufactured by Dow Corning; Proglaze manufactured by Tremco.

Elongation Capability	25%
Service Temperature Range	-54 to 82° C
Shore A Hardness Range	15 to 35

.8 Silicone Sealant Type H: CGSB 19-GP-22M, Single component, fungus resistant, chemical curing, non-sagging, non-staining, non-bleeding, color as selected. 796 manufactured by Dow Corning.

Elongation Capability	25%
Service Temperature Range	-54 to 82° C
Shore A Hardness Range	15 to 35

2.2 Accessories

.1 Primer: Non-staining type, recommended by sealant manufacturer to suit application.
.2 Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer;

compatible with joint forming materials.

.3 Joint Backing: ASTM D1056 D1565; round, open cell polyethylene foam rod; oversized 30 to 50% larger than joint width; Shore A hardness 10, tensile strength 140 to 100 KPa; Sof-Rod manufactured by Tremco.

.4 Bond Breaker: Pressure sensitive type recommended by sealant manufacturer.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that surfaces, joint openings are ready to receive work and field measurements are as shown on drawings and recommended by manufacturer.

.2 Beginning of installation means acceptance of substrate

3.2 Preparation

.1 Clean and prime joints in accordance with manufacturer's instructions.

.2 Remove loose materials and foreign matter, which might impair adhesion of sealant.

.3 Verify that joint backing and release tapes are compatible with sealant.

.4 Prepare in accordance with ASTM C804 for solvent release and C790 for latex base sealants.

.5 Protect elements surrounding the work of this Section from damage or disfiguration.

3.3 Installation

.1 Install sealant in accordance with manufacturer's instructions.

.2 Measure joint dimensions and size materials to achieve required width/depth ratios.

.3 Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

.4 Install bond breaker where joint backing is not used.

.5 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

.6 Install sealant free of air pockets, other embedded matter, ridges, & sags, & tool joints concave.

.

3.4 Cleaning and Repairing

.1 Clean Work under provisions of 01700.

.2 Clean adjacent soiled surfaces.

.3 Repair or replace defaced or disfigured finishes caused by work of this Section.

3.5 Protection of Completed Work

.1 Protect finished installation and adjacent work to requirements of Section 01600.

.2 Protect sealants until cured.

3.6 Schedule

	Location	Type	Colour
.1	PVC Window Perimeter and Openings	A	to be determined
.2	Interior Demising Walls	A	to be determined
.3	Foundation	D	to be determined
.4	Poly Vapor Retarder	A	to be determined

END OF SECTION

PART 1 GENERAL

1.1 Section Includes
.1 Non-rated and fire rated rolled steel frames.

1.2 Related Sections
.1 Section 079200 – Joint Sealers.
.2 Section 081113 - Standard Steel Doors.
.3 Section 087100 - Hardware.
.4 Section 088000 - Glazing.
.5 Section 099120 - Painting: Field painting of frames

1.3 References
.1 Canadian Steel Door and Frame Manufacturers Association - Manufacturing Standard for Steel Doors and Frames.
.2 Canadian Steel Door and Frame Manufacturers Association - Manufacturing Specifications for Steel Doors and Frames.
.3 Canadian Steel Door and Frame Manufacturers Association - Canadian Fire Labelling Guide for Steel Doors and Frames.
.4 Canadian Steel Door and Frame Manufacturers Association - Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
.5 NFPA No. 80 - Fire Doors and Windows.
.6 NFPA 252 - Fire Tests for Door Assemblies.
.7 ULC - List of Equipment and Materials, Volume 2.

1.4 Quality Assurance
.1 Conform to requirements of Canadian Steel Door and Frame Manufacturers Association standards.
.2 Fire rated frame construction to conform to ULC, NFPA 252.
.3 Installed frame assembly to conform to NFPA No. 80 for fire rated class indicated in schedule.

1.5 Regulatory Requirements
.1 Conform to applicable codes for fire rated frames.

1.6 Shop Drawings and Product Data
.1 Submit shop drawings and product data to requirements of Section 013400.
.2 Indicate on shop drawings, frame configuration, anchor types, and spacing, location of cut-outs for hardware, reinforcement, and finish.

1.7 Installation Instructions
.1 Submit manufacturer's installation instructions to requirements of Section 016000.

1.8 Delivery, Storage and Handling
.1 Deliver products to site to requirements of Section 016000.
.2 Store and protect products to requirements of Section 016000.

PART 212 PRODUCTS

2.1 Acceptable Manufacturers

.3 Shanahan's Manufacturing Ltd.
.2 Steldor Ltd.
.3 S.W. Fleming Ltd.
.4 Baron Metal Industries Ltd.

2.2 Frames/Material

.1 Exterior Frames: 1.5 mm thick material, core thickness appropriate to grade and model of door.
.2 Interior Frames: 1.5 mm thick material, core thickness appropriate to grade and model of door.
.3 Provide fire-rated metal frames (1-hr rating) to metal doors at mechanical room, compressor room, electrical room, janitor's room and store room, where rooms are located on plan.
.4 Sheet steel: commercial grade steel to ASTM A366-72, Class 1, finished to ASTM A526 W25, wiped zinc finish.

.1 Frames: 16 gauge base thickness.
.2 Floor anchors, channel spreaders and wall anchors: min. 1.6 mm base thickness steel.

.3 Guard Boxes: minimum 0.8 mm base thickness steel
.4 Glazing stops: minimum 1/16" base thickness steel, screw fixed.

.5 Reinforcing channel: to CSA G40.21-M1978, Type 300W.
.6 Door bumpers: black neoprene single stud.
.7 Primer: to CGSB 1-GP-181M + Amdt-latest edition.

2.3 Accessories

.1 Glazing Stops: Rolled steel channel shape, mitred corners; prepared for countersink style screws.
.2 Bumpers: Resilient rubber.

2.4 Protective Coatings

.1 Primer: Zinc chromate type.

2.5 Fabrication

.1 Fabricate frames as welded unit.
.2 Provide metal Z shaped astragals for double doors.
.3 Fabricate frames with hardware reinforcement plates welded in place.
.4 Reinforce frames wider than 1200 mm with roll formed steel channels fitted tightly into frame head, flush with top.
.5 Prepare frame for silencers. Provide three single silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.
.6 Attach fire rated label to each frame unit.
.7 Fabricate frames to CSDFMA standards and as specified herein. Fabricate frames as detailed, to Canadian Steel Door and Frame Manufacturer's Association, "Canadian Manufacturing Specifications for Steel Doors and Frames"; except where specified otherwise.
.8 Interior and exterior frames of 1.5 mm thick steel mitered and continuously welded on inside of profile. Grind welded joints to smooth uniform finish.
.9 Provide drywall return on frames installed in drywall partitions.

.10 Glazed openings: glazing bead, formed channel, minimum 16 mm high, accurately fitted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws at 450 mm maximum centers, 50 mm from each end.
.11 Butt joints of mullions and transoms: accurately cope, securely weld and grind smooth.
.12 Blank, reinforce, drill and tap for mortised butts and strike. Protect cut-outs with guard boxes. Reinforce for surface mounted hardware. Prepare each door for rubber bumpers, three for single door openings and two for double door openings set in head of frame.
.13 Top hinge reinforcement: Weld top hinge reinforcement to face of frame.
.14 Insulation: provide insulation where scheduled to frame cavities excluding open perimeter. Insulation to be equal to 2 kg density rigid fiberglass board; standard of acceptance AF545.
.15 Weld in two channel spreaders per frame to ensure proper frame alignment.
.16 Drill and tap for surface applied hardware.
.17 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.
.18 Touch up frames with primer where galvanized finish damaged during fabrication.
.19 Provide adjustable jamb anchors for fixing at floor.
.20 Construct thermally broken frames using steel core, separating exterior portion of frame from interior portion with polyvinyl chloride thermal breaks.
.21 Install 1.6 mm base thickness steel frames to interior openings and openings 1200 mm or less in unsupported width.
.22 Install 2.0 mm base thickness steel frames to exterior openings and openings over 1200 mm unsupported width.

2.6 Finish

.1 Wipe coated galvanize.
.2 Coat inside of frame profile with bituminous coating at masonry walls.

PART 324 EXECUTION

3.1 Installation

.1 Install frames in accordance with Canadian Steel Door and Frame Manufacturers Association standards.
.2 Co ordinate with wall construction for anchor placement.
.3 Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.2 Tolerances

.1 Maximum Diagonal Distortion: 1.5 mm measured with straight edge, corner to corner.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Non-rated and fire rated rolled steel doors.

.2 Hardware Schedule see Drawings and section 087100.

1.2 Related Sections

.1 Section 079200 – Joint Sealers.

.2 Section 081112 - Standard Steel Frames.

.3 Section 087100 - Hardware.

.4 Section 088000 – Glazing.

.5 Section 099120 - Painting: Field painting of doors.

1.3 References

.1 Except as otherwise specified, comply with requirements of Canadian Manufacturing Standards for Steel Doors and Frames published by Canadian Steel Door and Frame Manufacturers' Association.

.2 ASTM A653M-96 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot Dip Process

.3 Canadian Steel Door and Frame Manufacturers Association - Manufacturing Specifications for Steel Doors and Frames.

.4 Canadian Steel Door and Frame Manufacturers Association - Canadian Fire Labelling Guide for Steel Doors and Frames.

.5 Canadian Steel Door and Frame Manufacturers Association - Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.6 CGSB 82-GP-5M - Doors, Insulated, Steel.

.7 NFPA No. 80 - Fire Doors and Windows.

.8 NFPA No. 252 - Fire Tests for Door Assemblies.

.9 ULC - List of Equipment and Materials, Volume 2.

1.2 Product Options and Substitutions

.1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.3 Fire Rated Doors

.1 Provide doors produced under label service program of a testing agency acceptable to authorities having jurisdiction.

.2 Doors to bear testing agency label indicating following:

- .1 At standard size openings: fire endurance rating.
- .2 At oversized openings: unclassified as to fire rating.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Division 1.

.2 Clearly indicate each type of door, material, metal thicknesses, mortises, reinforcements, location of exposed fasteners and special features.

.3 Reference door types to door schedule. Indicate door numbers where applicable.

PART 2 PRODUCTS

2.1 Acceptable Manufacturers

.1 Shanahan's Manufacturing Ltd.
.2 Steeldor Ltd.
.3 S.W. Fleming Ltd.
.4 Baron Metal Industries Ltd.

2.2 Materials

.1 Doors to be 18 ga., fully welded, reinforced steel.
.2 Sheet steel: 18 ga. Base thickness, commercial grade steel to ASTM A366-72, Class 1, finished to ASTM A526 (1975) W25, wiped zinc finish.
.3 Glazing stops: Minimum 1/16" base thickness sheet steel with W25 (wiped) zinc finish to ASTM A525-80a, screw fixed.
.4 Door core: To ULC Standards.
  .1 Hollow steel: Vertically stiffened with steel ribs and all voids filled with semi-rigid fibrous insulation, minimum density 24 kg/cu. m.
.5 Primer: For touch-up to CGSB 1-GP-181M + Amdt – Latest Edition.

2.3 Fabrication

.1 Fabricate steel doors as detailed, in accordance with Canadian Steel Door and Frame Manufacturer's Association "Canadian Manufacturing specifications for Steel Doors and Frames", Latest Edition, for hollow steel construction, except where otherwise specified.
.2 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier.
.3 Make provisions for louvers and glazing if requested by Owner and provide necessary glazing stops.
.4 Construct rail and stile doors in same manner as flush door.
.5 Construct matching panels in same manner as doors.
.6 Touch-up doors with primer where galvanized finish damaged during fabrication.

2.4 Finish

.1 Primer: Wipe coat galvanize.

2.5 Component Parts

.1 Thickness of component parts as follows unless otherwise specified.
  .1 Door lock reinforcements: 1.6 mm.
  .2 Hinge reinforcement: 2.7 mm with top hinge provided with additional reinforcement between hinge template and face of door or frame.
  .3 Flush bolt reinforcements: 1.6 mm.
  .4 Reinforcements for surface applied hardware: 1.2 mm
  .5 Glass mouldings, non-fire rated doors: either snap-on type aluminum or formed steel, screw-fixed or snap-on type, 0.9 mm.
  .6 Glass mouldings, fire rated doors: formed steel 0.9 mm.
  .7 Mortar guard boxes: 0.8 mm.
  .8 Glazed opening reinforcing: 0.9 mm.
  .9 Jamb spreaders: 1.2 mm.

.10 Door end channels: 1.2 mm.
.11 Astragals: 1.9 mm.

.2 Glazing stops: minimum 1 mm base thickness sheet steel with W25 (wiped) zinc finish to ASTM A525-80a screw fixed.

.3 Primer: for touch up to CGSB 1-GP-181M=-Amdt-Mar-78.
.4 All exterior glazed doors to have sealed tempered insulated glass units as per specification Section 08800.

2.6 Door Construction

.1 Doors:
- .1 Door to be as manufactured by S.W. Fleming Ltd., or approved equal.
- .2 Doors to be fabricated as follows:
  - .1 Exterior Doors: To be 1-3/4" thick of not lighter than 18 US ga. wipe coat galvanized steel reinforced doors with continuous 20 ga. min. vertical stiffeners, placed 6" o.c. and welded 6" o.c. max. Insulate doors with fiberglass AF rigid insulation or approved equal. Core material of rigid polyurethane to provide minimum RSI-1.9. Securely bond core material to inside face of both surface sheets. In other respects, these doors to be as specified in this Section.
  - .2 Interior Doors: To be 1-3/4" thick and not lighter than 18 US ga. wipe coat galvanized steel. Doors to be stiffened, insulated and sound deadened with expanded small cell honeycomb core, completely filling inside of door and laminated to inside of door and inside faces of panels with U.S. approved adhesive.
- .3 Doors to be flush with no face seams.
- .4 Doors to have vertical, mechanically interlocking seams on hinge and lock edges.
  - .1 All doors to have exterior sheets spot welded at following points:
    - .1 Top and bottom of door on lock edge.
    - .2 Above and below lock preparation.
    - .3 Above and below each hinge on doors' hinge edge.
- .5 Doors to have 18 ga. steel and channels projection welded to top and bottom of door.
- .6 Doors to be reinforced for surface-mounted closers or holders.
- .7 Doors to be mortised, reinforced, drilled and tapped for three template hinges, standard cylinder lock or blank reinforced for push/pull or rim panic.
- .8 Exterior doors to be provided with steel top caps.
- .9 Doors to have high frequency angle top hinge reinforcement.
- .10 Finishing: all doors to be cleaned and sanded, flood coated with air drying paste filler and again sanded to eliminate all unevenness or irregularities.
- .11 Painting: Prime finish: provide one coat of baked on rust inhibitive primer as recommended by manufacturer. Finish paint by others.
- .12 Finish Painting: door finish to be wipe coat galvanized steel as per ASTM D2247.
- .13 Fabricate steel doors as detailed, in accordance with Canadian Steel Door and Frame Manufacturers' Association, "Canadian Manufacturing Specifications for Steel Doors and Frames", 1978 for hollow steel honeycomb-core construction except where specified otherwise.
- .14 Glazed doors: reinforce openings with 0.9 mm thick channel before applying stops and trim.
- .15 Construct rail and stile doors in same manner as flush doors.

2.7 Labeled Fire Doors

.1 Provide labeled doors and frames constructed in manner tested and approved by U.L.C or W.H.I.

for openings requiring fire protection ratings. For metal doors to mechanical, compressor, electrical, janitorial and storage rooms, where rooms are located on plan, provide 1-hr. rating.

PART 3 EXECUTION

3.1 Installation

.1 Install doors and hardware in accordance with templates and manufacturer's instructions. Maximum permissible warp of 3 mm measured diagonally across door.

.2 Adjust operable parts for correct function.

.3 Apply hardware to Class 'A' fire rated doors prior to delivery.

3.3 Adjusting and Cleaning

.1 Adjust hardware for smooth and balanced door movement.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes
.1 Electric overhead sectional door.
.2 Pre-finished galvanized steel panels.
.3 Operating hardware and supports.

1.2 Related Sections
.1 Section 055000 - Metal Fabrications: Steel channel frame for door opening.
.2 Section 087100 - Hardware: Lock cylinders.

1.3 References
.1 ASTM A446 - Steel Sheet, Zinc-Coated Galvanized by the Hot Dip Process, Structural Physical Quality.
.2 ASTM A526 - Steel Sheet, Zinc-Coated Galvanized by the Hot Dip Process, Commercial Quality.
.3 ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
.4 ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
.5 CSA HA Series M - CSA Standards for Aluminum and Aluminum Alloys.
.6 NEMA - National Electrical Manufacturer's Association.
.7 ANGI A216.1-1977 NAGDM 102-1976; NAGDM 101-1975.

1.4 System Description
.1 Panels: Flush steel insulated panels 50 mm thick.
.2 Heavy duty lift track and hardware. High vertical lift system where possible.
.3 Electric operation: 3/4 H.P. motor.

1.5 Quality Assurance
.1 Manufacturer: Company specializing in overhead door construction with three years minimum documented experience.
.2 Applicator: Company specializing in installing overhead doors with three years documented experience approved by manufacturer.

1.6 Shop Drawings and Product Data
.1 Submit shop drawings and product data to requirements of Section 013300.
.2 Indicate on shop drawings, opening dimensions and tolerances, component construction, connections and details, anchorage methods and spacing, hardware and locations and installation details.
.3 Provide product data on operating components; describing characteristics.

1.7 Installation Instructions
.1 Submit manufacturer's installation instructions to requirements of Section 016000.

1.8 Operation and Maintenance Data
.1 Submit operation and maintenance data under provisions of Section 017900.
.2 Include data for motor and transmission, shaft and gearing, lubrication frequency, control adjustments, spare part sources.

PART 2 PRODUCTS

2.1 Materials / Performance

.1 Size – as per drawings. Thickness 51 mm (2")
.2 Exterior Skin: 24 gauge galvanized steel, ribbed exterior surface, white baked on polyester.
.3 Interior Skin: 26 gauge galvanized steel, white baked on polyester.
.4 High-impact polystyrene insulation (R min. = 1.29 W/sqM or 7.35).
.5 End stiles and center stiles: 16 gauge steel.
.6 75K cycle springs.
.7 Heavy duty 75 mm (3") track. Some O.H. doors require low-headroom track – verify.
.8 Electric Operator with bottom sensory edge.
.9 Jamb weather seals and top seals.
.10 Individual lights 3mm DSB (as indicated in the drawings).
.11 Tumbler key lock.

2.2 Components

.1 Electric Operator: NEMA Type 1 CSA listed motor; side mounted on cross head shaft; adjustable safety friction clutch, brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter, mounting brackets and hardware.
.4 Control Station: Standard three button open-close-stop momentary type, control for each electric operator, 24-volt circuit, surface mounted. Include key operated switch located at inside doorjamb.
.5 Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to stop, reverse door upon striking object; hollow rubber covered to provide weatherstrip seal.

PART 3 EXECUTION

3.1 Inspection

.6 Verify that substrate openings are ready to receive work and opening dimensions are as indicated on shop drawings.
.7 Verify that power supply is available.
.8 Beginning of installation means acceptance of existing surfaces, site conditions.

3.2 Preparation

.1 Prepare opening to permit correct installation of door unit and air and vapour barrier seal.
.2 Apply sealer.

3.3 Installation

.1 Install door unit assembly in accordance with manufacturer's instructions.
.2 Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
.3 Securely brace door tracks suspended from structure. Secure tracks to structural members only.

.9 Fit and align door assembly including hardware, level and plumb, to provide smooth operation.

.10 Coordinate installation of electrical service. Complete wiring from disconnect to unit components.

.11 Coordinate installation of sealants and backing at frame perimeter as specified in Section 079200.

.12 Install perimeter trim and closures.

3.4 Tolerances

.1 Maintain dimensional tolerances and alignment with adjacent work.
.2 Variation from plumb: 1.5 mm maximum.
.3 Variation from level: 1.5 mm maximum.
.4 Longitudinal or Diagonal Warp: Plus or minus 3 mm from 3 m straight edge.

3.5 Adjusting and Cleaning

.1 Adjust door assembly.
.2 Clean doors, frames and glazing.
.3 Remove labels and visible markings.

END OF SECTION

PART 1 GENERAL

1.1 Work Included
.1 Exterior and interior glazing units.

1.2 Related Work
.1 Final Cleaning Section 017413.
.2 Rough Buck and Wood Blocking Section 061000.
.3 Caulking of Joints Between Frames and Other Building Components Section 079200.
.4 Glazing Section 088000.
.5 Painting Exposed Wood Surfaces Section 099120.

1.3 Quality Assurance
.1 Fabricate windows in accordance with CAN3-A440-M84 except where specified elsewhere.

1.4 Shop Drawings
.1 Submit shop drawings.
.2 Indicate materials and large scale details for head, jamb and sill, profiles of components, elevations of unit, anchorage details, description of related components.

1.5 Warranty
.1 Contractor hereby warrants the PVC windows against leakage, defects and malfunction under normal usage for minimum 5 years.

PART 2 PRODUCTS

2.1 Materials

.1 PVC Windows:
- .1 Frame: White 3-1/4" main frame (optional sandstone exterior of frame) is constructed from extruded multi-chambered high impact resistant, rigid polyvinylchloride (PVC) with fusion welded corners; base configuration with integral nailing fin (pre-punched for installation) providing 8-1/2" jamb; Configuration and opening sizes as per drawings: bottom operating awning.
- .2 Sash: Step/lap type sash constructed from extruded, multi-chambered high impact resistant, rigid polyvinylchloride (PVC) with fusion welded mitred corners.
- .3 Insulating Glass: Dualpane insulating glass with 1/2" (12 mm) airspace(s) featuring Warm Edge spacers, Low E and argon filled .
- .4 Glazing: Factory glazed with a dual adhesive tape on the exterior with a vinyl snap-on stop mounted on the interior. Reglazable on site.
- .5 Sash Weatherproofing: Exclusive weatherproofing system with 4 contact points ensures a tight seal against air and water infiltration; includes step/lap protection of hardware from elements. This unique design utilizes co-extruded PVC weatherstripping and Santoprene - well known for its resiliency.
- .6 Hardware: To ensure smooth operation. Positive locking weathersealed camlock(s) draws sash tight against weatherstripping and provides excellent security; all hardware in white finish.
- .7 Screen: Aluminum frame with baked enamel white finish; black fibreglass screen cloth 18 x 16 mesh; units removable from interior.

.9 CCMC Evaluation Listing:
- .1 CSA Standard CAN3-A440-M90 Test Results:
- .2 A3 - Air Infiltration
- .3 B3 - Water Infiltration
- .4 C4 - Wind Load Resistance
- .5 Forced Entry - Passed

PART 3 EXECUTION

3.1 Installation

.1 Set window units in prepared openings plumb, square and level, free from warp, twist or superimposed loads.

.2 Secure work adequately and accurately to structure in required position, in manner not restricting normal movement of wood windows.

3.2 Caulking

.1 Seal joints between frame members, fixed window units and other non-operating components of window assembly with sealant to provide weathertight seal at outside and air, vapour seal at inside.

.2 Apply sealant in accordance with Section 079200. Conceal sealant within window components except where exposed use is permitted by Engineer.

END OF SECTION

PART 1 GENERAL

1.1 **General**

.1 Comply with the requirements listed in Division 1

1.2 Section Includes

.1 Hardware for hollow metal doors.

1.3 **Related Sections**

.1 Electrical back boxes, conduit, wire runs and 115 vac hook up for electrical hardware and security. Division 26.

.2 Standard Steel Frames: pressed steel frames. Section 081112

1.4 **Quality Assurance**

.1 Meet all of the requirements of the local building code and all other applicable regulations.

.2 Products listed in Part 2 of this section establishes the minimum requirement for this project. Approved manufactures are listed. Deviation from these specified products will require the supply and installation of the specified products at no cost to the owner. Any equal's request for products other than those specified must be done so, in writing (type written form) listing the specified items then the proposed items. To be performed no later than five (5) working days prior to tender closing.

.3 Qualified suppliers must have in their employ a certified A.H.C (Architectural Hardware Consultant) as licensed by the Door and Hardware Institute. The supplier must have a minimum of 3 years experience furnishing hardware for similar projects. Only firms that can extend the manufactures warranty for the project are to be considered for suppliers.

1.5 **Submittals**

.1 Prepare and submit six (6) copies of a detailed hardware schedule listing product numbers, size, and finish. Include two (2) sets of catalogue cuts of all hardware being supplied.

.2 Furnish other sections with two (2) complete sets of hardware templates for related fabricating and installation.

.3 Where electrical hardware is being supplied, provide five (5) sets wiring diagrams showing all wire termination points. Where electrical hardware is being supplied and installed provide the contractor with three (3) sets riser diagrams listing the correct wire runs and back box size as well as 120 vac requirements.

.4 Where required in Division 1, provide two (2) operating manuals for the owners use. Include copies of the final Hardware Schedule, templates, installation instructions and all maintenance data required.

1.6 **Regulatory Requirements**

.1 Conform to National Building Code requirements applicable to fire rated doors, frames, and hardware.

.2 Conform to ULC and or Warnock Hersey requirements applicable fire rated doors, frames, and hardware.

1.7 **Deliver, Handling, and Storage**

.1 Deliver each hardware item in its original package complete with all fasteners, keys, and templates and installation instructions required for proper installation.

.2 Clearly mark each container with the door opening number and the hardware schedule item number or heading number.

.3 The contractor must store hardware delivered in a secure area. The storage must contain adequate shelf space to hold all of the hardware off the floor. Ensure the area is kept dry and clean.

.4 When requested, package items of hardware separately for delivery to other fabricators for their installation.

.5 Deliver hardware in a timely fashion as not to delay construction schedule. Contractor to keep hardware supplier updated with construction schedule indicating delivery date required.

1.8 **Warranty**

.1 Provide a written warranty in the name of the owner, stating that the following products are guaranteed against defects and workmanship for a period of * two (2) years after date of substantial completion, and that the products shall be repaired or replaced if they fail to perform as warranted. *Door closers to have a minimum of ten (10) years warranty, lifetime warranty on the hinges.

PART 2 PRODUCTS

2.1 Butt Hinges

.1 All butt hinges shall be three knuckle type. Use concealed bearing hinges for all doors with door closers.

.2 Where the door width exceeds 914mm supply 127mm high hinges. Doors over 2200mm high shall have (2) pair of butts.

.3 Approved Manufactures: Hager, McKinney, Stanley

2.2 Continuous Hinges & Pivots

.1 All continuous hinges shall be full height of doors and be a knuckle type with nylon bearings between each knuckle.

.2 All pivots and or pivot sets shall be of one manufacture. Sets as noted in the hardware groups shall be matching in design for both labelled doors and regular doors. All pivot sets are required to meet ANSI grade one standard as listed in ANSI 156.4. Caps shall be hex type to increase security.

.3 Approved Manufactures: Pemko, McKinney, Rixson,

2.3 **Locks and Latchsets**

.1 Locks and latchsets are to be a cylindrical style lockset. ULC labels for all fire doors. Lever style as specified with through bolt mounting. Interior finish as specified. Locks and latchsets shall be of one manufacture.

.2 Key all locksets as per owner's instructions, (see door schedule notes). Master keys are to be delivered directly to the owner. Coordinate with General Contractor.

.3 Approved Manufactures: Yale, Schlage, Sargent

2.4 **Door Closers**

.1 Door closers to have full adjustment features including separate valves for backcheck, general speed, and latch speed control.

.2 All interior closers will have a reduced opening force spring power to meet the barrier free codes of 22N (5 lbs).
.3 Surface mounted closers are to be mounted on the room side of the door wherever possible or as directed by the architect.
.4 Door closers will be attached with through bolt mounting on aluminum and wood doors.
.5 Provide all brackets and extension arms as required to suit applications.
.6 Approved Manufactures: Norton, LCN, Sargent

2.5 **Pulls and Plates**

.1 Supply door trim as listed in the hardware schedule. Pulls are supplied with back to back mounting (BTB) or through bolt mounting as required. When push plates are listed with door pulls, install the push plate to conceal the through bolt mounting of the door pull.

.2 All kickplates, pushplates, and bumper plates must have all sides bevelled and the corners rounded to ensure there are no sharp edges. Supply plates with countersunk holes. The plates will be .050 thick unless otherwise specified. Size to suit door width (less 45mm for single doors, 35mm for double doors). Finishes as specified within the hardware schedule.
3. Approved Manufactures: Gallery, Rockwood, Standard Metal

2.6 **Door Stops and Holders**

.1 Wall stops are only to be used on proper wall conditions such as block or masonry. Provide proper backing on drywall walls. Supply floor stops with sufficient height to suit the floor condition and undercut of doors.
.2 Overhead stops and holders shall be installed for a 90-degree stop unless otherwise specified.
.3 Electro-magnetic door holders will be supplied in the correct voltage as the fire alarm system requires. Contractor to verify the correct voltage required to tie into the fire alarm system, the door must release when signalled by the fire alarm system.
.4 Approved Manufactures: Rixson, Rockwood, Sargent,

2.7 **Door Seals**

.1 Perimeter seals must be supplied to fully cover all gaps between the door, frame, and floor condition to seal against weather, sound, or smoke.
.2 Frame gasketing must be closed cell neoprene. The extruded housing must have a rib to prevent distortion during installation. Aluminum doors and frames will be equipped with felt inserts by the door supplier.
.3 Door bottoms will be heavy duty and have an adjustment screw to ensure proper contact with the floor. Supply the correct drop insert for carpet where required.
.4 Thresholds must be installed to ensure door bottom makes full contact. Exterior door thresholds to be sealed by two (2) continuous beads of silicone.
.5 Approved Manufactures: Pemko, National Guard, Hager

2.8 Card Access System

.1 The card access system is used primarily to control access to (4) four exterior man-doors within the scope of work of the HEADER HOUSE (PHASE 1 only). The Owner shall be responsible for the designation, supply, installation and integration of *all components.* (except electric strikes, electric trim, smart pacs, actuators, and the power required to operate these devices. These are to be supplied by **Division 8.**) Owner will provide all housings, accessories, finishing plates, connectors, cable and wiring as well as the computer equipment, proximity cards/key fobs,

proximity readers, door control units, communication boards, and operating software, for a complete and functional card access system. Coordinate with Owner for the card access system requirements, and door control panel.

PART 3 EXECUTION

3.1 **Examination**

.1 Verify that door and frame components are ready to receive hardware and that the dimensions are as indicated on the drawings.

.2 Verify that power is available to power operated devices.

.3 Beginning of installation is acceptance of existing conditions.

3.2 **Installation**

.1 Install hardware in accordance with manufacturer's instructions and templates.

.2 Make all necessary adjustments to door hardware including door closers, handing of locksets if required, and degree of door swing.

.3 Mount hardware to suit elevations. Unless otherwise directed by consultant, install the hardware at the following heights from the floor:

Locks/latchsets:	1024mm to centre of strike
Exit Device:	1015mm to centre of strike
Push/Pulls:	1015mm to centre
Deadlock;	1200mm to centre
H/C Switch's:	1200mm to centre

3.3 Abbreviation List

Abbreviation	**Actual Name**
SCWD	Solid Core Wood Door
PSF	Pressed Steel Frame
HMD	Hollow Metal Door
IHMD	Insulated Hollow Metal Door
45min UL	¾ Hour Fire Rating Required

3.4 **Hardware Schedule**

.1 Refer to Drawings (Door Schedule) for hardware groupings.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Glass and glazing for exterior windows and door lites.

1.2 Related Sections

.1 Section 079200 - Joint Sealers: Sealant and back-up material.
.2 Section 085313 - PVC Windows: Glazing.

1.3 References

.1 ASTM E84 - Surface Burning Characteristics of Building Materials.
.2 CAN/CGSB-12.1M -Glass, Safety, Tempered or Laminated.
.3 CAN/CGSB-12.3M - Glass, Polished Plate or Float, Flat, Clear.
.4 CAN/CGSB-12.4M - Glass, Heat Absorbing.
.5 CAN/CGSB-12.5M - Mirrors, Silvered.
.6 CAN/CGSB-12.8M - Insulating Glass Units.
.7 CAN/CGSB-12.12M - Glazing Sheets, Plastic, Safety.
.81 CAN/CGSB-19.13M -Sealing Compound, One Component, Elastomeric, Chemical Curing.
. 9 CGSB 19-GP-2M -Glazing Compound, Non-hardening, Modified Oil Type.
.10 CGSB 19-GP-5M - Sealing Compound, One Component, Acrylic Base, Solvent Curing.
.21 CGSB 19-GP-14M - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
.12 CGSB 19-GP-18M - Sealing Compound, One Component, Silicone Base, Solvent Curing.
.33 CGSB 19-GP-22M - Sealing Compound, Mildew Resistant, for Tubs and Tile.
.14 CGSB 19-GP-23 - Guide to the Selection of Sealants on a Use Basis.
.15 IGMAC Insulated Glass Manufacturers Association of Canada - Quality Standard Specification.
.16 IGMAC - Glazing Recommendations for Sealed Insulating Glass Units.
.17 FGMA -Glazing Manual Glazing Sealing Systems Manual.

1.4 Quality Assurance

.1 Conform to FGMA - Glazing Manual, IGMAC - Quality Standard Specification and Glazing Recommendations for Sealed Insulated Glass Units for glazing installation methods.
.4 Select glazing compounds and sealants in accordance with CGSB 19-GP-23, glass manufacturer's instructions.

PART 5 PRODUCTS

2.1 Manufacturers - Flat Glass Materials

.1 AFG Glass OR PPG Canada Inc (basis of design).

2.6 Flat Glass Materials (Note: not all materials listed may be in the Scope of Work).

.1 Float Glass Type FG-A: CAN2-12.3M, glazing quality, 6 mm thick, clear on clear and Heat Treated.
.7 Tempered Float Glass: to CAN/CGSB 12.1 – M90 'A' quality, 6 mm thick minimum.
.3 All exterior glazing units to be double pane insulated tempered glass units, complete with low emissivity treatment including glazing in exterior doors.

2.3 Manufacturers - Sealed Insulating Glass Materials

.1 AFG. OR PPG CANADA INC (basis of design).

2.4 Sealed Insulating Glass Materials

.1 Insulated glass units – Commercial Type SG-A: CAN2-12.8M 1GMAC; double pane tempered, with glass elastomer edge seal, outer pane of 6mm clear float glass with Comfort USE Coating E-PS on surface #2 by AFG or approved equal; inner pane of 6mm clear float glass; total unit thickness of 25mm minimum.

.1 Exterior Window Glazing: tempered double pane with outer pane of 6mm clear float glass with Comfort USE Coating E-PS coating on surface #2 by AFG or approved equal; inner pane of 6mm clear float glass.

2.5 Glazing Compounds

.1 Glazing compound: Type recommended by manufacturer.

2.6 Glazing Accessories

.1 Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section. Beginning of installation means acceptance of existing substrate.

3.2 Preparation

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.8 Prime surfaces scheduled to receive sealant.

3. 9 Cleaning

.1 After installation, mark pane with an 'X' by using plastic tape or removable paste.

.210 Remove glazing materials from finish surfaces.

.3 Remove labels after Work is complete.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Metal channel wall and ceiling (if any) framing.
.2 Acoustic insulation.
.3 Gypsum board (Refer to drawings).
.4 Taped and sanded joint treatment.
.5 Accessories

1.2 Related Sections

.1 Section 081112 - Standard Steel Frames.
.2 Section 099120 -Painting: Surface finish.
.3 Divisions 22-23 - Mechanical

1.3 References

.1 ASTM C36 - Gypsum Wallboard.
.2 ASTM C630 - Water Resistant Gypsum Backing Board.
.3 ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
.4 ASTM E119 - Fire Tests of Building Construction and Materials.
.5 CGSB 71-GP-25M - Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
.6 CSA A82.27M - Gypsum Board Products.
.7 CSA A82.30M - Interior Furring, Lathing and Gypsum Plastering.
.8 CSA A82.31M - Gypsum Board Application.

1.4 System Description

.1 Acoustic Attenuation for Identified Interior Partitions: 48 STC in accordance with ASTM E90.

1.5 Quality Assurance

.1 Applicator: Company specializing in gypsum board systems work with three (3) years documented experience.

1.6 Regulatory Requirements

.1 Conform to National Building code for fire rated assemblies as follows:
  .1 Fire Rated Partitions: 2 hour Listed assembly by ULC No. W414.

  .2 Fire Rated Ceiling: 2 hour Listed assembly by ULC No. M503.
  .3 Wall assembly: ULC Design W407 for 1-hr. rating.
  .4 Duct Shaft Wall: ULC Design W507 for 2-hr rating.
  .5 Alternate designs proposed will be considered, providing design, including materials, meets approval of the Provincial Fire Commissioner and other regulatory bodies having jurisdiction.

PART 2 PRODUCTS

2.1 Acceptable Manufacturers

.1 CGC

.2 Westroc Industries Ltd.
.3 Georgia Pacific.

2.2 Gypsum Board Materials

.1 Standard Gypsum Board: CSA A82.27M, 12.7 mm thick and 16 mm thick maximum permissible length; ends square cut, square edges.
.2 Fire Rated Gypsum Board: CSA A82.27M, fire resistive type, ULC rated; 12.7 mm and 16 mm thick, maximum permissible length; ends square cut, square edges.
.3 Abuse Resistant Gypsum Board: ASTM 0.1037 and ASTM E 695, 12.7 mm and 16 mm thick.. See drawings for locations.
.4 Moisture Resistant Gypsum Board: "Denshield", 12.7 mm thick manufactured by Georgia Pacific. "Denshield" board to be used behind ceramic tile.

2.3 Accessories

.1 Acoustical Insulation: Pre-formed fibrous glass, friction fit type without integral vapour barrier membrane, 90 mm thick.
.2 Acoustical Sealant: Non hardening, non-skinning, for use in conjunction with gypsum board.
.3 Corner Beads: Metal.
.4 Edge Trim: Galvanized steel.
.5 Joint Materials: CSA A82.31M, reinforcing tape, joint compound, adhesive, water, fasteners.
.6 Joint Taping, Interior: 50 mm wide perforated type recommended for gypsum board finishing.
.7 Joint Compounds, Interior: Bedding and finishing types recommended for gypsum board finishing; case in, vinyl or latex base.
.8 Corner Beads and Casing Beads: Minimum 28 gauge 0.4 mm thick galvanized steel type with perforated flanges; of type recommended for gypsum board application. Casing beads: of type to provide filler finish.
.9 Adhesive: As recommended by gypsum board manufacturer.
.10 Fasteners: Standard drywall screws; rust resistant; of size to suit application and to rigidly secure gypsum board and related accessories in place.

2.4 Wall Framing & Furring Materials

.1 Interior Studs: Minimum 0.5 mm thick sheet steel galvanized to Z275; minimum 32mm wide flanges with edges bent back 90 degrees and doubled over minimum 5 mm return; of widths indicated on drawings, lengths as required, with openings or knockouts to accommodate services and lateral bracing.
.2 Interior Studs 3660 and longer: Minimum 1.56 mm thick sheet steel galvanized to Z275; minimum 32 mm wide flanges with edges bent back 90 degrees and doubled over minimum 5 mm return; of widths indicated on drawings, lengths as required; with openings or knockouts to accommodate services and lateral bracing.
.3 Floor and Ceiling Tracks: Of same material and finish as studs; minimum 50 mm high legs, slightly bent in to hold studs, of widths to suit.
.4 Lateral Stud Bracing: Minimum 1.4 mm thick cold rolled steel channels with galvanized coating; 19 mm x 10 mm size, maximum practical lengths.
.5 Furring Channels: Minimum 1.4 mm thick cold rolled steel galvanized to Z275; 19 mm deep; standards width; lengths as required.
.6 Fastening Devices: Screws or other approved devices, of type and size to suit application and to rigidly secure furring and framing members in place.

2.5 Ceiling Framing and Furring Materials (if any)

.1 Main Carrying Channels: Minimum 1.4mm thick galvanized sheet steel; 38 mm x 19 mm size, lengths as required.

.2 Furring Channels: Minimum 0.5 mm thick galvanized sheet steel; 19 mm deep x 32 mm wide; lengths as required.

.3 Hangers: Of galvanized steel, size and type to suit application and to rigidly secure gypsum board ceiling system in place with maximum deflection of 1/360.

.4 Resilient Hangers: W30 spring hangers by Mason Industries Inc., distributed by Western Noise Control Ltd., Edmonton, Alberta.

.5 Lateral Bracing: Minimum 1.4 mm thick, cold rolled steel channels with galvanized coating; 19 mm x 10 mm size; maximum practical lengths.

.6 Fastening Devices: Screws or other approved devices, of type and size to suit application and to rigidly secure furring and framing members in place.

2.6 Accessory Materials

.1 Acoustical insulation: Pre-formed mineral wood; friction fit type without an integral vapour barrier membrane; of thicknesses indicated on drawings.

.2 Acoustic Sealant: Sealing and bedding compound for acoustic purposes shall conform to CGSB Standard 19-GP-21M.

Approved Products:

.1 PR 181 60660F manufactured by PRC Chemical Corporation of Canada.

.2 60416F manufactured by Canadian Adhesives Limited or approved alternative having CGSB certification.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

.2 Beginning of installation means acceptance of substrate.

3.2 Furring for Fire Ratings

.1 Install furring as required for fire resistance ratings indicated.

3.3 Ceiling Framing Installation (if any)

.1 Install in accordance with CSA A82.31M, manufacturer's instructions.

.2 Coordinate location of hangers with other work.

.3 Install ceiling framing independent of walls, columns, and above ceiling work.

.4 Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 600 mm past each end of openings.

.5 Laterally brace entire suspension system.

3.4 Gypsum Board Installation

.1 Install gypsum board in accordance with CSA A82.31M, manufacturer's instructions.

.2 Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.

.3 Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

.4 Use screws when fastening gypsum board to metal furring or framing.

.5 Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.

.6 Place control joints consistent with lines of building spaces as indicated.

.7 Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

.8 Do not start application until bucks, anchors, blocking, mechanical and electrical and other work scheduled to be installed in or behind gypsum board work has been installed, tested and approved.

.9 Unless shown otherwise, extend gypsum board up to full height of steel studs.

.10 Secure gypsum board to studs and furring channels by fastening within the field of board first. Install screw nails at maximum 300 mm on center for ceilings and wall surfaces. Use power screw driver and set screw nails with countersunk head slightly below surface of board.

.11 For laminated installation, apply first layer as specified above. Apply second layer using adhesive and screw nails in accordance with gypsum board manufacturer's instruction.

.12 Install corner bead and edge beads at corners, edges, and at junctions as detailed on drawings.

.13 Install fire rated board Type "X" at locations as shown on drawings.

.14 Install moisture resistant gypsum board where ceramic wall tile is scheduled as room finish.

.15 Install gypsum sheathing board in spandrel panels as shown on drawings.

3.5 Joint Treatment

.1 Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

.2 Feather coats onto adjoining surfaces so, that camber is maximum 1.6 mm.

.3 In general, tape and fill gypsum board joints and junctions in accordance with gypsum board manufacturer's instructions. Provide three coat applications, sanding between coats. Leave sanded surface ready for painting and covering. When sanding, avoid damage to paper surface.

.4 Fill corner joints, edge joints and elsewhere as shown. Ensure that fill type beads are provided as detailed.

.5 Leave finished work smooth, seamless, plumb, true, flush and with square neat corners.

.6 Avoid or prevent conditions and circumstances which produce "ridging" of gypsum board joints. "Ridging" is considered a defect and will not be acceptable.

3.6 Tolerances

.1 Maximum Variation from True Flatness: 3 mm in 3 m in any direction.

3.7 Environment

.1 Surface and ambient temperatures: minimum 10°C. Avoid temperature variations in excess of 10°C in a 24 hour period.

.2 In cold weather, apply temporary heat at least seven days prior to commencing work and maintain uniform temperature during erection and joining for at least four days thereafter.

.3 Use deflectors or protective screen to prevent concentrated or irregular heat. When discontinuing temporary heat, reduce temperatures gradually.

3.8 Finishing: Exterior Sheath

.1 Tape and seal joints and junctions with self-adhering fiberglass tape and rubber-asphalt sealant.

.2 Seal perimeter of wall area and around items penetrating exterior sheathing with rubber asphalt sealant.

3.9 Insulation: Acoustic

.1 Install insulation where shown on drawings. Fill areas between studs with continuous blanket. Spot adhere insulation to sheathing to prevent sagging.

.2 Ensure that insulation is carried around and behind electrical boxes, light switches and other projection into the wall.

.3 Install fire blanket insulation in shaft walls as detailed.

3.10 Acoustic Sealant

.1 Apply acoustic sealant to surfaces to receive gypsum board partitions. Apply sealant at junction of wall board and adjacent surface.

.2 Apply acoustic sealant around perimeter of shaft wall installations.

3.11 Wall Furring

.1 Install wall furring for gypsum board wall finishes to CSA A82.31-1977, except where specified otherwise.

.2 Frame openings and around built-in equipment, cabinet access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.3 Furr duct shafts, beams, columns, pipes and exposed services where visible.

3.12 Accessories

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Miter and fit corners accurately, free from rough edges. Secure at 150 mm o.c. using contact adhesive for full length.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board or casing beads abutting metal window or exterior door frames, to provide thermal break.

3.13 Control Joints

.1 Locate control joints at changes in substrate construction on long corridor runs at approximate 15m spacing on ceilings.

.2 Install control joints straight and true as per accessories, paragraph 2.7.

3.14 Taping and Filling

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

3.15 Clean Up

.1 Remove surplus material from area. Scrape floor surfaces clean of cement and other surplus material. Leave area broom clean.

END OF SECTION

PART 1 GENERAL

1.1 Work Included (Washroom 101 only)

.1 Suspended metal grid ceiling system

.2 Acoustical tile

.3 Perimeter trim and accessories.

1.2 Related Work

.1 Drawing and general provisions of contract, including General and Supplementary Conditions and Division 1 Specifications apply to this section.

.2 Section 06100 – Rough Carpentry

.3 Section 09111 – Metal Stud Framing System

.4 Division 22/23- Mechanical: Air diffusion devices in ceiling system.

.5 Division 26- Electrical: Light fixtures in ceiling system.

1.3 References

1 ASTM E 1264-98 (2005) Standard Classification for Acoustical Ceiling Products

.2 CSA B111-1974 (R1998) Wire Nails, Spikes and Staples

.3 ASTM D 1779-98 (2004) Specification for Adhesion for Acoustical Materials

.4 ASTM C 636 / C636M-06 Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

1.4 Product Options and Substitutions

.1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.5 Samples

.1 Submit duplicate samples of each component of acoustical systems for approval. Include accessories and mitered interior and exterior corners of wall mouldings.

.2 Install sample panel and components including suspension system at a location designated by Owner.

1.6 Quality Assurance

.1 Manufacturer: Company specializing in manufacture of ceiling suspension system, ceiling panels, with three years minimum documented experience.

.2 Installer: Company with three years minimum documented experience, approved by manufacturer.

1.7 Delivery, Storage & Handling

.1 Deliver acoustic panels and suspension system components to Work site in original, unopened packages and store in fully enclosed space protected against damage from moisture direct sunlight, surface contamination and other sources.

.2 Ensure room air temperature within installation area and a stabilized moisture content.

.3 Handle acoustic panels carefully to avoid chipping edges or damaging units in any way.

1.8 Environmental Requirements

.1 Perform Work to requirements of Section 01545.

.2 Maintain uniform temperature of minimum 16°C and humidity of 20% to 40% prior to, during, and after installation.

1.9 Sequencing/Scheduling

.1 Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead Work is completed, tested, and approved.

.2 Schedule installation of acoustic units after interior wet Work is dry.

1.10 Extra Stock/Spare Parts

.1 Provide 2% of extra panels, to Owner for each pattern and type required for project.

PART 2 PRODUCTS

2.1 Acceptable Manufacturers – Acoustic Panel System

.1 Armstrong Commercial Ceilings

.2 CGC

2.2 Acceptable Manufacturers – Suspension System

.1 Armstrong Commercial Ceilings

.2 CGC

2.3 Other Manufacturer

.1 Subject to approval by Consultant.

2.4 Acoustic Panels, General

.1 Standard: Provide manufacturer's standard panels of configuration indicated in compliance with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings and light reflectance unless otherwise indicated:

.1 Mounting Method for Measuring Noise Reduction Coefficient: Type E-400, plenum mounting in which face of test specimen is 15¾" (400 mm) away from test surface per ASTM E 795.

.2 Acoustic Panel Colors and Patterns: Match appearance characteristics indicated for each product type:

.1 Appearance characteristics of acoustical panels are indicated by referencing ASTM E 1264. Pattern designations and not manufacturer's proprietary product method. Products to be selected by Consultant.

.3 Antimicrobial Treatment: Provide acoustic panels treated with manufacturer's standard antimicrobial solution consisting of blend of salts of alkylated phosphoric acids mixed with free alkylated phosphoric acid to inhibit fungus, mold, mildew and harmful bacteria.

2.5 Metal Suspensions System Standard

.1 Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

.2 Finished and Colors: General

.1 Comply with NAAMM "Metal Finish Manual for Architectural and Metal Products" for recommendations for application and designation of finishes.

.2 Provide manufacturer's standard factory-applied finish for type of system indicated.

.3 Attachment Devices

.1 Size for 5x design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

.4 Wire Hanger, Braces and Ties

.1 Zinc-Coated Carbon Steel Wire: ASTM A 641/A64.1M, Class 1, soft temper. Size: Wire diameter 3x hanger design load. Minimum diameter 0.106" (2.69mm).

.5 Hanger Rods

.1 Mild steel, zinc-coated or protected with rust inhibiting paint.

.6 Sheet Metal Edge Moldings and Trim

.1 Type and profile indicated on drawings or manufacturer's standard moldings for edges and penetrations that fit acoustical panel edges details and suspension systems.

.2 Formed from steel, metal of some material and finish as used for exposed flanges of suspension system runners.

.7 Impact Clips

.1 Where indicated, provide manufacturer's standard impact clip system designed to absorb impact forces against acoustical panels.

2.6 Acoustical Sealant

.1 Acoustical Sealant for Exposed and Concealed Joints

.1 Manufacturer's standard non-sag, paintable, non-staining latex sealant in compliance with ASTM C 834.

.2 Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing assemblies in accordance to ASTM E 90.

.2 Acoustical Sealant for Concealed Joints

.1 Manufacturer's standard non-drying, non-hardening, non-skimming, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

.3 Products

.1 For Acoustical Sealant for Exposed Concealed Joints

.1 PL Acoustical Sealant, Chemrix Inc.
.2 AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
.3 Sheetrock Acoustical Sealant, United States Gypsum Co.

.2 For Acoustical Sealant for Concrete Joints

.1 BA-98, Pecora Corp.
.2 Tremco Acoustical Sealant, Tremco Inc.

PART 3 EXECUTION

3.1 Job Environment

.1 Commence installation after building enclosed and dust generating activities completed.

.2 Permit wet Work to dry prior to commencement of installation.

.3 Maintain uniform minimum temperature of 15°C and humidity of 20-40% prior to, during and after installation.

3.2 Installation

.1 Ensure substrate surface is level to within ±3 mm in 3 m.

.2 Install adhesive bonded acoustic units to clean, dry, firm and level surface.

.3 Ensure suspended system is coordinated with location of related components.

.4 Install acoustic units parallel to building lines with edge unit not less than 50% of unit width. Refer to reflected ceiling plan.

.5 Scribe acoustic units to fit adjacent Work. Butt joints tight.

.6 Support suspension system main runners at 1.2 m on center maximum with hanger wire from building structural system. Completed assembly to support all superimposed loads. Maximum permissible deflection is 1/360 of span.

.7 Attach cross member to main runner to provide rigid assembly.

.8 Install suspension assembly to manufacturers written instructions.

.9 Install fibrous acoustical media over entire area above suspended metal pans and linear metal ceilings.

.10 Install flush edge moulding at junction of acoustic unit ceiling and other materials around entire length of joint. Secure to construction. Butt joints neatly, square and true in alignment.

.11 Install framed access panels supplied under Divisions 15 and 16.

.12 Seal vertical air plenum closure and acoustical ceiling where ventilating ceiling occurs. Use vinyl tape and 100 micrometre polyethylene to make positive, continuous seal.

.13 Electrical fixtures to be supported by main runners and cross runners, but in addition to this acoustical Subcontractor to supply and install to each and every fixture a 2.6 mm galvanized soft annealed mild steel wire hangers within 150 mm of each corner. Fixtures exceeding 610 mm x 1220 mm to be supported by other Subcontractors responsible to General Contractor.

.14 Runners supporting ceiling fixtures to remain horizontal across their width within 2 degrees after

fixture loads are imposed.

.15 Do not install acoustic units until Work above suspension system is complete and has been inspected by Owner.

3.3 Expansion Joints

.1 Erect two main runners parallel, 25 mm apart, on building expansion joint line. Lay in strip of acoustic tile/board, painted black, 25% narrower than tight fit.

3.4 Cleaning

.1 Keep acoustic installation and all components clean. Remove blemishes immediately.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes (See drawings for specification on VCT)

.1 Vinyl Composition Tile

.1 Washroom 101= 8'-0" x 6'-6"

.2 Rubber base.

.3 Base

.1 Provide all rubber base as scheduled .

.2 Provide base to cabinets, fitments, etc., as shown, in both toe space and backsplash positions.

1.2 Related Sections

.1 Section 03300 - Cast-in-Place Concrete: substrate surface.

1.1 References

.2 ASTM F1066-99, Standard Specification for Vinyl Composition Floor Tile.

.2 ASTM F1303-99, Standard Specification for Sheet Vinyl Floor Covering with Backing.

.3 ASTM F1344-00, Standard Specification for Rubber Floor Tile.

.4 ASTM F1700-99, Standard Specification for Solid Vinyl Floor Tile.

.5 ASTM F1861-00, Standard Specification for Resilient Wall Base.

.6 ASTM F1913-98, Standard Specification for Vinyl Sheet Floor Covering Without Backing.

1.4 Quality Assurance

.1 Specifications and details are based upon products named or manufactured by manufacturers named. Products of other manufacturers may be considered subject to approval to the Consultant.

1.5 Submittals

.1 Submit samples in accordance with Section 01300.

.2 Include duplicate 300 mm x 300 mm sized samples of each flooring materials, color and pattern selected.

1.6 Materials

.1 Provide for maintenance use, 2 cartons of each color and pattern of floor material required for project.

1.7 Samples

.1 Submit duplicate samples of all materials specified in this Section.

.2 Samples shall be 300 mm squares of flooring, 300 mm lengths of base, grippers, binders, etc.

1.8 Maintenance

.1 Provide maintenance data for resilient flooring for incorporation into Maintenance Manual.

.2 Submit results of moisture content testing of concrete subfloor prior to installation of flooring. Results to include evidence of flooring manufacturers representative's attendance and agreement.

1.9 Environmental Requirements

.1 Maintain minimum 20°C air temperature in installation area for 3 days prior to, during and 2 days after installation.

PART 2 PRODUCTS

2.1 Floor Covering

.1 Vinyl Composition Floor Tile as manuf.by Armstron, Excelon, Imperial Texture, 12" x 12"

.1 Class: Class 2

.2 Pattern: No pattern

.3 Wearing Surface: Smooth

.4 Thickness: 2.38 mm

.5 Size: As indicated in Part 1.1

.6 Color: To be selected by Architect from standard colors.

.2 Resilient Base 4" by Johnsonite, VPI or approved equal, as Follows

.1 Type: TP rubber thermoplastic

.2 Group: 1 solid

.3 Style: Cove

.4 Thickness: 3.17 mm

.5 Height: 100 mm

.6 Length: As indicated on schedule

.7 End Stops and External Corners: Pre-Moulded

.8 Color: To be selected by Architect from standard colors.

2.2 Edge Strips (at all transition points)

.1 Extruded aluminum: Smooth, anodized with lip to extend under cored floor finish and profile to cover top of coved VCT flooring.

2.3 Accessory Materials

.1 Sub Floor Filler: White premix latex requiring water only to produce cementitious paste.

.2 Primers: As recommended by flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.3 Adhesives: VOC free as recommended by flooring manufacturer for each flooring material on applicable substrate, above, on or below grade.

.4 Welding Rod: Designed to weld seams of sheet flooring as recommended by flooring manufacturer. Color as indicated by schedule.

.5 Sealers and Wax: As recommended by flooring manufacturer for flooring type and location.

PART 3 EXECUTION

3.1 Examination

.1 Ensure floor and tread surfaces are smooth and flat with maximum variation of 6 mm in 3 meters.

.2 Ensure concrete floor and treads are dry- maximum 7% moisture content - and exhibit negative alkalinity, carbonization or dusting.

3.2 Preparation

.1 Maintain minimum 21°C air temperature at flooring installation area for 3 days prior to, during and for 24 hours after installation.

.2 Store flooring materials in area of application for minimum 3 days to allow material to reach temperatures as area.

.3 Remove edges and bumps. Fill low spots, cracks, joints, holes and other defects.

.4 Clean floor and apply, trowel and float filler to leave smooth, flat hard surface. Prohibit traffic until filler cured.

.5 Prime and seal concrete slab to resilient flooring manufacturer's recommendations.

3.3 Leveling

.1 Remove ridges and bumps from sub-floor treads.

.2 Fill low spots, cracks, joints, holes and other defects with sub-floor filler in strict accordance with manufacturer's instructions.

.3 Clean floor and treads. Apply trowel and float filler to leave smooth, flat hard surface.

.4 Prohibit use of floor until filler is cured.

3.4 Installation

.1 Vinyl Composition Tile:

.1 Open floor tile cartons enough to cover each area, and mix tile to ensure shade variations do not occur within any one area.

.2 Vacuum clean substrate.

.3 Spread cement evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation.

.4 Spread only enough adhesion to permit installation of flooring before initial set.

.5 Set flooring in place, press with heavy roller to ensure full adhesion.

.6 Install with a minimum tile width 1/2 full size at room or areas perimeter, to square grid pattern with joints aligned with patter grain parallel for units and parallel to length of room.

.7 Terminate resilient flooring at centerline of door openings where adjacent floor finish is dissimilar.

.8 Install edge strips at unprotected or exposed edges where flooring terminates.

.9 Scribe flooring to walls, column, cabinets, floor outlets and other appurtenances to produce tight joints.

.10 Install flooring in pan type floor access covers, maintaining floor pattern.

.2 Base:

.1 Fit joints tight and vertical, maintaining minimum measurement of 450 mm between joints.

.2 Miter internal corners.

.3 Use pre-moulded sections for external corners and exposed ends.

.4 Install base on solid backing.

.5 Adhere tightly to wall and floor surfaces.

.6 Scribe and fit to door frames and other obstructions.

.7 Install straight and level to variation of plus or minimum 6 mm over 3 m.

3.5 Protection

.1 Protect floor finish from traffic for 48 hours after installation.

.2 Protect new floors with 6 mil polyethylene cover after initial waxing and cleaning until just before final inspection. Tape joints to prevent shifting.

3.6 Clean and Waxing

.1 Remove excess adhesive from floor, base and wall surface with damage.

.2 Clean, seal and wax resilient floors surface to flooring manufacturer's instructions. All tile floors shall be thoroughly waxed down; with three coats of approved hard wax, thoroughly rubbed the final coat to be very well rubbed, brush polish and pad polished until a hard non-slip gloss is obtained.

3.7 Clean Up

.1 Remove excess adhesive from floor, base and wall surfaces without damaging the surfaces.

.2 Clean, seal and wax floor and base surfaces in accordance with manufacturer's recommendations.

.3 Do not seal or wax conductive flooring.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Surface preparation.

.2 Surface finish (see drawings). Exposed primed and non-primed metal in framing, railings and miscellaneaous supports, drywall surfaces (inside Office 201), along with mezzanine and stairway plywood floor (resin epoxy with "Shark-Grip" - type anti-slip provision).

1.2 Related Sections

.1 Section 051200 – Structural Steel: Shop primed items.

.1 Section 081112 - Standard Steel Frames.

.3 Section 092900 – Gypsum Board Systems.

1.3 References

.1 ASTM D2016 - Moisture Content of Wood.

.2 CPCA (Canadian Painting Contractors Association) - Painting Manual.

1.4 Quality Assurance

.1 Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five (5) years experience.

.2 Applicator: Company specializing in commercial painting and finishing with three (3) years documented experience, approved by product manufacturer.

.3 Perform Work in accordance with Master Painters Institute's Architectural Painting and Specification Manual and the MPI Maintenance Repainting Manual.

1.5 Regulatory Requirements

.1 Conform to applicable codes for flame/fuel/smoke rating requirements for finishes.

1.6 Certifications

.1 Submit manufacturer's certificate to requirements of Section 016000 that products meet or exceed specified requirements.

1.7 Product Data

.1 Submit product data to requirements of Section 013300.

.2 Provide product data on all finish products.

1.8 Installation Instructions

.1 Submit manufacturer's installation instructions to requirements of Section 016000.

1.9 Operation and Maintenance Data

.1 Submit operation and maintenance data to requirements of Section 013300.

.2 Include special cleaning instructions, and stain removal guidelines.

1.10 Delivery, Storage, and Handling

.1 Deliver products to site to requirements of Section 016000.

.2 Store and protect products to requirements of Section 016000.

.3 Accept products on site in sealed and labelled containers and verify no damage.

.4 Container labelling to include manufacturer's name, type of paint, brand name, colour designation and instructions for mixing and reducing.

.5 Store paint materials at minimum ambient temperature of 7 degrees C, in well ventilated area.

.6 Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.11 Protection of Surrounding Elements

.1 Provide protection in accordance with Section 016000.

.2 Protect elements surrounding the work of this section from damage.

1.12 Environmental Requirements

.1 Perform work to requirements of Section 015000.

.2 Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 7 degrees C for 24 hours before, during and 48 hours after application of finishes.

.3 Provide minimum 270 lx of lighting surfaces to be finished.

1.13 Maintenance Materials

.1 Provide maintenance materials to requirements of Section 017413.

.2 Provide one container of each colour to Owner.

.3 Label each container with colour, texture, and room locations.

PART 2 PRODUCTS

2.1 Acceptable Manufacturers - Paint

.1 Benjamin-Moore.

.2 General Paint.

.3 Glidden Co. Ltd.

.4 Sherwin Williams Company of Canada.

2.2 Acceptable Manufacturers - Varnish and Urethane

.1 Benjamin-Moore.

.2 General Paint.

.3 Glidden Co. Ltd.

.4 Sherwin Williams Company of Canada.

2.3 Acceptable Manufacturers - Stain

.1 Benjamin-Moore.

.2 General Paint.

.3 Glidden Co. Ltd.

.4 Sherwin Williams Company of Canada.

2.4 Acceptable Manufacturers -- Primers and Sealers

.1 Benjamin-Moore.

.2 General Paint.

.3 Glidden Co. Ltd.

.4 Sherwin Williams Company of Canada.

2.5 Materials (Note: not all materials listed may be used on this project).

.1 Paints: Ready mixed except field catalysed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

.2 Paints: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

.3 Paint Accessory Materials: Linseed oil, shellac, turpentine, and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.6 Finishes

.1 Refer to schedule for application and colour schedule.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.

.2 Examine surfaces scheduled to be finished, prior to commencement of work. Report any condition that may potentially affect proper application.

.2 Verify substrate surface temperature and ambient air temperature is above 5° C before applying finishes.

.3 Minimum Application Temperatures for Latex Paints: Interiors 7° C. Exterior 50° F 10° C.

.4 Minimum Application Temperature for Varnish and Finishes: 18° C.

.5 Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below the following maximums:

- .1 Plaster and Gypsum Wallboard: 12 percent.
- .2 Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
- .3 Exterior Located Wood: 12 percent, measured in accordance with ASTM D2016.
- .4 Concrete Floors: 12 percent.
- .5 Beginning of installation means acceptance of existing surfaces.

3.2 Preparation

.1 Correct minor defects and deficiencies in surfaces, which affect work of this section.

.2 Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow surface to dry.

.3 Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high-pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

.4 Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

.5 Concrete Floors: Remove contamination and acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

.6 Gypsum Board Surfaces: Remove contamination and prime paint to identify minor defects. Prime paint after defects have been remedied.

.7 Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

.8 Steel and Iron Surfaces: Remove grease, rust, scale, dirt, and rust. Where heavy coatings of scale are evident, removed by wire brushing, sandblasting.

.9 Un-Primed Steel Surfaces: Clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime surfaces to identify defects. Prime paint after defects have been remedied.

.10 Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

.11 Wood Items and Millwork: Wipe off dust and grit prior to priming. Coat knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime interior and exterior woodwork.

.12 Exterior Wood Scheduled to Receive Paint Finish: Remove dust grit and foreign matter. Seal

knots, pitch streaks and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

Mezzanine plywood floor, Office 201 plywood floor and Stairway wood treads and risers: Sand the wood and plywood surfaces, clean thoroughly, apply primer and install flexible epoxy over all joints. Install 100% solid product epoxy as per manufacturer instructions for this type of application, with anti-slip provisions such as "Shark-grip" or other similar product mixed into the formula.

3.3 Application

.1 Apply products in accordance with manufacturer's instructions. Workmanship to be in accordance with CPCA Architectural Planning Specification Manual. Colors as selected by the Owner, and materials to be new, in unopened containers. Apply one coat of primer and two finish coats.

.2 Apply each coat to smooth consistency.

.3 Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

.4 Sand lightly between coats to achieve required finish.

.5 Do not apply finishes to surfaces that are not dry.

.6 Allow applied coat to dry before next coat is applied.

.7 Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

.8 Back prime exterior wood work with exterior primer paint.

.9 Back prime interior wood work with enamel primer sealer paint.

.10 Back prime interior and exterior woodwork scheduled receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

.11 Wood and Metal Doors Scheduled for Painting: Prime top and bottom edges with enamel undercoat.

.12 Wood Doors Scheduled to Receive Stain or Clear Finish: Prime top and bottom edges of wood doors with gloss varnish.

3.4 Mechanical and Electrical Equipment

.1 Refer to Divisions 22-23 - Mechanical and Division 26 - Electrical for schedule of painting and finishing requirements, colour coding, identification banding of equipment, ducting, piping, and conduit.

.2 Remove finished louvers, grilles, covers, and access panels on mechanical and electrical components from location and paint separately. Finish paint primed equipment to colour as selected.

.3 Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are pre-finished.

.4 Replace identification markings on mechanical or electrical equipment when painted accidentally.

.5 Paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, convector and baseboard cabinets to match face panels.

.6 Paint exposed conduit and electrical equipment occurring in finished areas. Colour and texture to match adjacent surfaces.

.7 Paint both sides and edges of plywood backboards for electrical equipment before installing equipment.

.8 Colour code equipment, piping, conduit, and exposed ductwork in accordance with requirements indicated.

.9 Replace electrical plates, hardware and fittings removed prior to painting.

.10 Where exposed, painted structure is specified for interior floor and ceiling finishes, all piping, ducting, wiring, HVA diffusers, conduit, and speakers to be installed neatly and painted with ceiling color specified.

3.5 Protection

.1 Protect other surfaces from paint or damage. Repair damage.

.2 Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

.3 Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.6 Cleaning

.1 As work proceeds, promptly remove paint where spilled, splashed, or spattered.

.2 During progress of work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.

3.7 Schedule Exterior Surfaces

.1 Wood –Painted (if any)
- .1 One coat alkyd primer sealer.
  - .1 Two coats alkyd enamel, semi-gloss.
- .2 Wood - Transparent
  - .1 Two coats semi transparent stain.
- .3 Wood - Solid Colour Stain
  - .1 Two coats solid colour stain.

.2 Steel - unprimed
- .1 One coat zinc chromate primer.
- .2 Two coats alkyd enamel, semi-gloss.

.3 Steel - shop primed
- .1 Touch up with zinc chromate primer.
- .2 Two coats alkyd enamel, semi-gloss.

.4 Steel galvanized
- .1 One coat zinc chromate primer.
- .2 Two coats alkyd enamel, semi-gloss.

3.8 Schedule - Interior Surfaces

.1 Wood (if any) - painted
- .1 One coat alkyd primer sealer.
- .2 One coat interior undercoat
- .3 One coat alkyd, eggshell.

.2 Wood Transparent (if any)
- .1 Filler coat for open grained wood only.
- .2 One coat sealer.
- .3 Two coats varnish, satin.

.3 Steel unprimed
- .1 One coat zinc chromate primer.
- .2 Two coats alkyd enamel, semi-gloss.

.4 Steel primed
- .1 Touch up with zinc chromate primer.

.2 Two coats alkyd enamel, semi-gloss.

.5 Steel galvanized
- .1 One coat zinc chromate primer.
- .2 Two coats alkyd enamel, semi-gloss.

.6 Concrete floors (only if called out specifically in the drawings finish schedule)
- .1 One coat floor enamel thinned 15 percent.
- .2 Two coats alkyd floor enamel catalyzed epoxy enamel, gloss.

.7 Plaster, Gypsum Board
- .1 One coat latex primer sealer.
- .2 Two coats latex eggshell.

.8 Plaster, Gypsum Board
- .1 One Coat Primer (by Contractor)
- .2 Two Coats Alkyd Eggshell enamel. Benjamin Moore 264 Vol-Pro. (By Others)

.9 Concrete Block (if any), Concrete
- .1 One coat block filler.
- .2 One coat latex sealer.
- .3 Two coats latex eggshell.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Supply and installation of screens louvres and vents to roofs, walls and doors (as per drawings).

1.2 Related Sections

.1 Sealants Section 079200.
.2 Mechanical Divisions 22-23.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 013300.
.2 Clearly indicate fabrication and erection details, including anchorage, accessories, electrical connections and finishes.

PART 2 PRODUCTS

2.1 Materials

.1 Aluminum extrusions: Aluminum Associations ally AA6006-T5.
  .1 Provide mechanical, chemical and anodic finished in accordance with Aluminum Association Designation System for Aluminum Finishes to match cladding.
  .2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative category, shall meet requirements of CGSB 63-GP-2M paragraphs 5.13 and 15.13.1, classes 1, 2, and 3 respectively.
.2 Solder: to ASTM B32-76, 50% tin and 50% lead.
.3 Flux: rosin, cut muriatic acid, or commercial preparation suitable for materials to be soldered.
.4 Nails and fasteners: same material as fabricated items.
.5 Primer: to CGSB 1-GP-121M for aluminum CGSB 1-GP-178M for galvanized steel sheet metal.

2.2 Prefinished Steel Sheet

.1 Finish galvanized steel sheet with factory applied coating to CGSB 93-GP-3M amended as follows:
  .1 Class F1S.
  .2 Color selected by Architect from manufacturer's standard range.

2.3 Screens

.1 Insect screens: 0.3 mm diameter aluminum wire 18 x 14 mesh with 60 % free area, secured to aluminum frame.
.2 Birdscreens: Crimped aluminum wire cloth secured to 2 mm thick extruded aluminum frame mitered at corners and secured with corner locks 50 x 50 size mech, dia. wire with 60% free area.

2.4 Extruded Aluminum Louvers

.1 Construct louvers from aluminum extrusions of minimum 3 mm thickness.
.2 Arrange blades, mullions and frame extensions as indicated.
.3 Assemble louvers by heliarc welding to CSA S244-1969 bolting riveting.
.4 Complete louver assembly to have 50% free area.
.5 Attach insect screen to inside face of louver.

2.5 Adjustable Louvers

.1 Construct adjustable louvers from aluminum extrusions of minimum 3 mm thickness.
.2 Arrange blades, mullions and frame extrusions as indicated.
.3 Center pivot stormproof type blades with two reinforcing bosses with pinions operating in self

lubricating nylon bearings.

.4 Arrange blades to be operated by concealed drive arms at each jamb. Connect drive arms by torsion bars operating in nylon bearings.
.5 Equip louver blades and sills with vinyl gasket weatherseals. Rivet vinyl gaskets to ends to louver blades to provide jamb weatherseal.
.6 Assemble louver fixed parts by riveting.
.7 Compete louver assembly to have 55% free area when in open position.
.8 Attach insect screen to inside face of louver.

PART 3 EXECUTION

3.1 Installation

.1 Install louvers and vents where indicated.
.2 Follow procedures in manufacturer's recommended installation instructions.
.3 Adjust louvers so moving parts operate smoothly.
.4 Repair damage to louvers and vents to match original finish.

END OF SECTION

PART 1 GENERAL

1.1 **Scope**

.1 Requirements of the Conditions of the Contract and of Division 1 of these Specification Sections apply to all work of this Section.

1.2 **Extent of Work**

.1 Provide all miscellaneous specialties as specified herein and as indicated on the drawings.

1.3 **Related Work (In Other Sections)**

.1 Gypsum Board Assemblies - Section 092900.

PART 2 PRODUCTS

2.1 **Miscellaneous Specialty Products**

.1 Fire Extinguishers

.1 Provide (2) fire extinguishers including wall-mounting brackets. Verify location with Owner

.2 Bollard Sleeves

.1 Provide full height bollard sleeves at interior and exterior pipe bollards. See Division 5, Section "Metal Fabrication".

.2 Colors: Exterior - Safety Yellow; unless otherwise noted.

.3 Manufacturer (basis of design): Ideal Shield, 2525 Clark Street, P. O. Box 09210, Detroit, Mi. 48209-1355; Ph 1-313-842-7290; fax: 1-313-849-1646; Email: info@idealshield.com; www.idealshield.com;

PART 3 EXECUTION

3.1 General

.1 Install all miscellaneous specialties per manufacturer's recommendations and as indicated on the drawings.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Include in electrical section, provision of labour, new materials, tools, transportation, services and facilities for a complete electrical installation. The installation shall be left complete in all respects and ready for operation to the complete satisfaction of the responsible Professional Engineer.

.2 The electrical scope of work includes, but is not necessarily limited to the following provisions:

.1 Provisions of new normal building distribution system including metering, panelboards, disconnect switches, and wiring devices.

.2 Provision of a complete coordinated telephone system extension including a complete conduit raceway system. Provide BIX field and wiring from BIX field to voice patch panel. Include outlet covers, jacking testing and all associated utility contribution charges.

.3 Provision of lighting, associated control and branch circuitry. (See Luminaire Schedule for details).

.4 Provision of code conforming exit signage and emergency lighting fed from emergency battery banks. Interlock with normal lighting in the area to activate upon loss of normal lighting.

.5 Provision of receptacles and branch circuitry as indicated on the drawings and as per code.

.6 Provision of power supply to all mechanical equipment. Mechanical equipment to be supplied by others. Provide all line voltage control wiring. (See Motor Schedule and Mechanical drawings for details).

.7 Provision of power connections to owners equipment including shop equipment, auto lift, air compressor, washers, dryers, and all other appliances and equipment.

.8 Co-ordinate all utility work. Provide mounting accessories, cabinets and meter sockets. Owner to pay all utility contribution charges.

END OF SECTION

PART 1 GENERAL

1.1 CODES AND STANDARDS

.1 Do complete installation in accordance with the latest edition of CSA C22.1 as amended by the Saskatchewan Building Code and all local Electrical by-laws, except where specified otherwise.

.2 Comply with CSA Electrical Bulletins in force at time of tender submission, while not identified and specified by number in this Division, are to be considered as forming part of related CSA Part II standard.

.3 Do overhead and underground systems in accordance with C22.3No.1-M1979 except where specified otherwise.

.4 Do complete installation in accordance with latest Electrical Bulletins of the supply authority and local inspection authority. Comply with all additional requirements of local inspection authority.

.5 Abbreviations for electrical terms: to CSA Z85-1963

1.2 PERMITS, FEES

.1 Submit to Electrical Inspection Department, and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Architect will provide drawings at no cost.

1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples as requested by Engineer.

.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 and Divisions.

.5 Include shop drawings for all electrical items and equipment including wiring devices, motor starters, distribution equipment, luminaires, etc.

1.4 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into maintenance manual.

.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.

1.5 MAINTENANCE MANUALS

.1 Provide 3 maintenance manuals which include fire alarm verification inspection report and local inspection authority Certificate of Inspection.

1.6 CARE, OPERATION AND START-UP

.1 Installer to be certified in performing work of this section, and have at least 5 years successful experience in this size and type of project, qualified to standards of TIAC.

1.7 VOLTAGE RATINGS

.1 Operating voltages: to CSA C235-1969(R1979).

.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.

.3 Where appliances such as stoves are supplied by other sections, advise the General Contractor in writing of the voltage at the outlet.

1.8 INSPECTION

.1 Furnish a Certificate of Inspection from Inspection Department on completion of work.

1.9 MATERIAL AND EQUIPMENT

.1 Shall be new and CSA approved.

.2 Shall be manufactured in accordance with current CEMA, NEMA, or CSA standards.

.3 Submit a quotation only on the material and equipment specified and as shown on the drawings. Refer to bid instructions in Division 1 of Specification.

.4 Distributers submitting prices to Electrical Contractors shall not group products and materials. Refer to bid instructions in Division 1 of Specification.

.5 Requests for approval of material and equipment, other than those specified on the drawings, refer to bid instructions in Division 1 of Specification. Requests for approval shall be submitted with complete details of the construction and performance of the materials and equipment. Requests submitted without sufficient supporting information shall be rejected.

.6 Materials and equipment of the same classification, type of function, shall be provided by the same manufacturer.

1.10 ELECTRICAL MOTORS, EQUIPMENT AND CONTROLS

.1 Power wiring to all equipment, motors or control panels to be performed by Electrical Contractor. Refer to mechanical section.

.2 Mechanical and electrical contractors are responsible for the mutual co-ordination of all electrical requirements of mechanical equipment. Co-ordination is to include the communication of all final electrical nameplate information from the mechanical contractor to the electrical contractor, the communication of the detailed control information as well as any ancillary information required for the final systems to operate as intended by the responsible professional engineer. The co-ordination is to occur prior to the ordering of equipment by either trade. No extra compensation will be allowed due to failure to carry out this coordination. Report at once to the consultant any defect, discrepancies omission or interference affecting the satisfactory completion of work.

1.11 FINISHES

.1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean, prime and paint exposed hangers, racks, fastenings to prevent rusting, unless equipment is constructed of galvanized steel.

1.12 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with lamacoid nameplates with black face and white lettering sized to the approval of the Engineer.

.2 Wording on nameplates to be approved prior to manufacture.

.3 Allow for average of twenty-five (25) letters per nameplate.

.4 Identification to be English.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify all electrical equipment such as motor starters, panelboards, distributions, distribution circuit breakers with nameplates.

.7 Identify panel and circuit number on all outlets with lamacoid nameplates.

1.13 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to the latest edition of CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

.5 For each conductor identify at each termination and junction box, the panel and circuit number for power circuits and zone for fire alarm.

1.14 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.15 MANUFACTURERS AND CSA LABELS

.1 Manufacturers nameplates and CSA labels to be visible and legible after equipment is installed.

1.16 WARNING SIGNS

.1 Provide warning signs, as specified or to meet requirements of Inspection Department and Engineer.

1.17 LOCATION OF OUTELTS

.1 Make all necessary adjustments after interior finishes are completed.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 4m and information is given before installation.

.4 Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door. Confirm direction of door swing on Architectural drawings prior to installation.

1.18 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not indicated verify before proceeding with installation.

.3 Confirm luminaire locations with Architect prior to rough-in.

.4 Install electrical equipment at the following heights unless indicated otherwise.

.1 Local switches: 1200 mm.

.2 Wall receptacles:

.1 General: 400 mm.

.2 Above top of counters or splash back: 200 mm.

.3 In mechanical rooms: 1400 mm.

.3 Panelboards: 1200 mm or as required by Code.

.4 Telephone outlets: 400 mm.

.5 Fire alarm stations: 1200 mm.

.6 Fire alarm audible devices: 2000 mm.

.7 Fire alarm silencable audible devices: 1200mm.

.8 Television outlets: 400 mm (unless wall mounted - refer to architectural)

.9 Clocks: 2000 mm.

.10 In accordance with accessibility guidelines.

1.19 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage in English.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.20 LAOD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

1.21 CONDUIT AND CABLE INSTALLATION

.1 All penetrations through exterior walls are to be made water and weatherproof.

1.22 FIRE PROOFING

.1 Where cables or conduits pass through floors and fire rated walls, complete integrity of wall type to the satisfaction of the Engineer and local inspection authority.

.2 All emergency feeders and control wires to be 2 hour rated via use of mineral insulated cables or equivalent fireguard application by electrical section.

1.23 TEST/STUDIES

.1 Conduct and pay for tests and studies of the following where applicable:

.1 Power distribution system.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.2 Furnish manufacturer's, certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturers instructions.

.3 Carry out tests in presence of Engineer. Notify Engineer two days prior to testing.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Submit test results.

1.24 INSULATION RESISTANCE TESTING

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

1.25 CO-ORDINATE OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays, fuses, are installed to values and settings as indicated. Co-ordinate overcurrent protection short circuit interrupting capacity with utility. Ratings to the satisfaction of the Engineer.

1.26 CLEANING

.1 Clean all outlets, cabinets, enclosures, tubs and similar electrical equipment of all construction dust and dirt.

.2 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.

.3 Clean all coverplates and insure all paint is removed from wiring devices, panels, luminaires and other electrical equipment.

1.27 EXCAVATING AND BACKFILLING

.1 Not used.

1.28 GUARANTEE

.1 The Electrical Contractor shall guarantee the satisfactory operation of all work and apparatus included and installed under this section of the specification.

.2 Replace forthwith at no additional material, or labour cost any part which may fail or prove defective within a period of twelve (12) calendar months after the final acceptance of the complete building, provided that such failure is not due to improper usage, or ordinary wear and tear.

.3 No certificate given payment made, partial or entire use of the equipment by the Owner, shall be construed as acceptance of defective work.

.4 This general guarantee shall not act as a waiver of any specified guarantee for any greater length of time

1.29 CUTTING AND PATCHING

.1 Pay all costs for cutting and patching required for the installation of electrical work, unless otherwise noted.

.2 Assume full responsibility for laying out electrical work and for any damage caused by incorrectly located equipment or improper performance of this work.

.3 Study the architectural plans and co-operate with other trades so that the elevation of all outlets shall not necessitate any unnecessary cutting of dados, mirrors, tiles or other construction material. If this is not done, the Electrical Contractor may be required by the Engineer to move these outlets at no additional cost to Owner (including repair).

1.30 CO-OPERATION

.1 Schedule execution of work with associated work specified in other Divisions. Check shop drawings of other sections prior to electrical rough-in to co-ordinate physical and electrical requirements. Adjust as required.

1.31 DRAWINGS

.1 Carefully examine all drawings and specifications relating to the work to be certain that the work under this contract can be satisfactorily carried out, examine the work of the other trades and report at once to the Engineer, any defect, discrepancy, omission or interference affecting the work of section or the warranty of same. Refer to bid instruction in Div 1 of Specification.

.2 The drawings accompanying these specifications are intended to show the general arrangement and extent of the work to be done, but the exact location and arrangement of all parts shall be determined as the work progresses. The location of the outlets, equipment, etc. as given on the drawings are approximately correct but it shall be

understood that they are subject to such modifications as may be found necessary or desirable at the time of installation to meet any structural, mechanical or architectural conditions. Such changes shall be made by the Electrical Contractor, as directed by the Engineer without additional charge.

.3 .At completion of project, provide a complete print of revisions, changes and conduit location as-built drawings to the satisfaction of the responsible Professional Engineer. Provide AutoCAD .dwg files of all changes, revisions, and conduit layouts suitable for printing drawing size reproductions of electrical drawings. Engineer will provide .dwg copies of original electrical drawings.

1.32 SPARE PARTS

.1 Provide the following spare parts:

.1 .Lighting: 10% of all lamps, 5% of all ballasts.

.2 Fire alarm: (1) manual pull station c/w cover, (1) audible/visual device, (1) smoke detector (1) heat detector.

1.33 EXISTING CONDITIONS

.1 the Electrical Contractor shall visit the site and ascertain that all work indicated can be carried out without additional cost to the Owner.

.2 The Electrical Contractor shall take into account items which he is responsible for due to the changes and alterations to the existing building and allow for such items that may occur in his tendered price. The Electrical Contractor is to notify the supply utility of all load increases to existing service.

.3 Rewire, alter, modify, divert and extend existing wiring as herein specified and as may be required to provide a complete, approved, and fully operative installation to the satisfaction of the Engineer.

.4 In all areas where existing walls, ceilings, etc. are required to be cut into or removed, or other similar construction or alterations are required, existing wiring in the areas required to remain in use for any reason, this contractor shall reroute, alter, and/or divert all such wiring in these areas in an approved manner, concealed in the building structure where required in such a manner that the original electrical capacity or characteristics of the existing wiring is maintained to the complete satisfaction of the engineer.

.5 Conduits and boxes shall be installed exposed (surface mounted) only in areas specified.

.6 Cutting and patching necessary for conduit work, etc., shall be as specified in another section of this contract. Routes of conduits, etc. shall be coordinated with the owner and engineer in order to keep such cutting and patching to a minimum. All existing wiring that is required to remain in use and required to be diverted and extended to appropriate existing panelboards, etc., shall be installed in conformance with this specification.

.7 Existing branch circuit wiring within the areas of the renovations which are substandard or do not meet normal requirements, shall be noted and owner advised. All existing

circuits which are required to be reconnected shall be free from interconnection (cross connected circuits, i.e. accidentally connected to the conductors of another circuit) and shall conform to the installation tests described elsewhere in this section of the specification. The responsibility for existing wiring which is not required to be altered in any way is beyond the area of this contract and is not included in this scope of work unless such wi is specifically affected due to work carried out in this contract.

.8 Existing branch circuit wiring and outlets, etc. for any electrical systems no longer required to remain in use shall be removed, or if this is not possible, rendered permanently inaccessible and completely disconnected from the electrical distribution system. Existing branch circuit wiring which unnecessarily extends into the construction area shall be terminated (deadened) in an approved manner.

.9 Disconnect and remove all existing lighting fixtures as specified and noted on drawings. All fixtures shall be neatly stored on the premises at the location as directed by the owners. Once the new ceiling is complete, the electrical subcontractor shall clean and reinstall fixtures to the location specified. Provide all mounting hardware as required.

.10 Disconnect and remove existing ceiling mounted electrical devices for the construction of new ceiling. Once new ceiling is complete, reinstall and reconnect to original locations and circuits.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 Wire and Cable: Section 26 05 21.

.2 Outlet Boxes: Section 26 05 32.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Connectors complete with locking bushings for armoured cable.

.2 Aluminum "wet" type or "dry" type for aluminum sheathed cable depending on application.

.3 Wet type connectors for sealtite flexible conduit

PART 3 EXECUTION

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

.1 Install connector in box.

.2 Install conductor in connector and tighten. Complete joints inside box using Marrette type connectors.

END OF SECTION

PART 1 GENERAL

PART 2 PRODUCTS

2.1 MATERIALS

.1 Grounding equipment to: CSA C22.2No.41 1950(R1967).

.2 Copper grounding conductors to: ASA G7.1- 1964.

2.2 EQUIPMENT

.1 Clamps for grounding of conductor, size as required to electrically conductive underground water pipe or ground rods as required by inspection authority.

.2 System and circuit, equipment, grounding conductors, bare stranded copper, soft annealed, size as required.

.3 Insulated grounding conductors to Section 26 05 21 - Wires and Cables (0-1000V).

.4 Non-corroding accessories necessary for grounding systems, type, size, material as required, including but not necessarily limited to:

.1 Grounding and bonding bushings.
.2 Thermit welded type conductor connectors.
.3 Bolted type conductor connectors.
.4 Bonding jumpers, straps.

2.3 MANUFACTURERS

.1 Acceptable manufacturers: Burndy, Cadweld.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Engineer and local authority having jurisdiction over installation. Where EMT is used, run ground wire in conduit.

.2 Install connectors to manufacturers instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.8 Install separate ground conductor, to outdoor lighting standards.

3.2 ELECTRODES

.1 Make ground connections to ground grid.

.2 Install rods as required by local inspection authority. Provide all grounding as per local inspection authority requirements.

3.3 TESTS

.1 Perform tests in accordance with Section 260501.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Engineer and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 Electrical General Requirements: Section 26 05 01.

PART 2 PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 38mm x 38mm, 25mm thick, surface mounted, suspended, set in poured concrete walls and ceilings as required.

2.2 MANUFACTURERS

.1 Acceptable manufacturers: Burndy, Electrovert, Unistrut.

2.3 FASTENING

.1 Lead anchors or nylon shields to secure equipment and conduit straps.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Secure fastenings and supports as required for each type of equipment, cables and conduits and to manufacturers installation recommendations.

END OF SECTION

PART 1 GENERAL

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Section 26 05 01.

PART 2 PRODUCTS

2.1 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

2.2 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 Provide cast junction boxes for all exterior/weatherproof and surface installations.

PART 3 EXECUTION

3.1 SPLITTER INSTALLATION

.1 Install splitters as indicated and mount plumb, true and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor.

.3 Provide pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.3 IDENTIFICATION

.1 Install size 2 identification labels indicating system name voltage and phase in accordance with Section 26 05 01.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 Box connectors: Section 26 05 20.

PART 2PRODUCT

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with the latest edition of CSA C22.1, Section 12-3042.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as required. 102 mm square outlet boxes when more than one conduit enters one, side with extension and plaster rings as required.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 CONDUIT BOXES

.1 Cast FS boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle in exterior or wet or Class 1 areas.

2.6 FITTINGS – GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of foreign materials.

.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

PART 3EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction material.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers not allowed.

.5 Provide continuous vapour barrier for outlet boxes located on exterior walls or ceilings.

END OF SECTION

PART 1 GENERAL

1.1 LOCATION OF CONDUIT

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

PART 2PRODUCTS

2.1 CONDUITS

.1 Rigid galvanized steel threaded conduit: size as indicated or required; to CSA C22.2 No.45

.2 Electrical metallic tubing (EMT), with couplings to CSA22.2 No.83

.3 Rigid pvc conduit: size as indicated; to CSAC22.2 No.136

.4 Flexible metal conduit and liquid-tight flexible metal conduit: size as indicated; to CSAC22.2 No. 56.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller (except where otherwise noted). Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for multiple conduits.

.4 6 mm dia threaded rods to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings manufactured for use with conduit specified.

.2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms, and in unfinished areas or as otherwise noted.

.3 Use electrical metallic tubing (EMT) unless otherwise noted.

.4 Use rigid pvc conduit underground, unless otherwise prohibited or noted.

.5 Use flexible metal conduit or AC75 for connection to motors in dry areas, connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures, work in movable metal partitions.

.6 Use liquidtight flexible metal conduit for connection to motors in damp or wet locations.

.7 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 19 mm dia.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install polypropylene fish cord in empty conduits.

.11 Run 2-25mm spare conduits up to ceiling space and 2-25mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in 150mm x 150mm x 100mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in a flush concrete surface type box.

.12 Where conduits become blocked, remove and replace blocked section.

.13 Dry conduits out before installing wire.

.14 Minimum conduit size to be 19mm.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible on suspended surface channels.

.4 Do not pass conduits through structural members except as indicated.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls.

.2 Do not install conduits in terrazo or concrete toppings.

3.4 CONDUITS IN POURED CONCRETE

.1 Locate to suit reinforcing steel. Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Where conduits pass through waterproof membrane provide oversized sleeve before membrane is installed. Use cold mastic between sleeve and conduit.

.5 Encase conduits completely in concrete.

.6 Co-ordinate electrical work and requirements in poured construction with General Contractor and insure installation is complete prior to pour.

3.5 CONDUITS IN POURED SLABS ON GRADE

.1 Run conduits 25mm and larger below slab and encased in 75mm concrete envelope. Provide 50mm of sand over concrete envelope below floor slab.

3.6 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with a heavy coat of bituminous paint.

END OF SECTION

PART 1 GENERAL

1.1 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 26 05 01.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

1.2 PLANT ASSEMBLY

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

PART 2PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2No.29-1955.

.2 Panelboards to be product of one manufacturer.

.3 250 and 600 V panelboards: bus and breakers rated for available (symmetrical) interrupting capacity or as indicated.

.4 Sequence phase bussing with breakers numbered as shown on drawings, with each breaker identified by permanent number identification as to circuit number.

.5 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.6 Two keys for each panelboard and key panelboards alike.

.7 Copper bus with full size neutral.

.8 Mains suitable for bolt-on breakers.

.9 Finish trim and door baked grey enamel.

.10 Sprinkler proof.

2.2 CUSTOM BUILT PANELBOARDS

.1 Upstream circuit breaker on mains as indicated.

.2 Double stack panels as indicated

2.3 BREAKERS

.1 Breakers to Section 26 28 21.

.2 Breakers with thermal magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry.

.4 Lock-on devices for receptacles, fire alarm, emergency, door supervisory, intercom, stairway, exit and night light circuits.

2.4 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 01.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.

.4 Complete circuit directory with typewritten legend showing location and load of each circuit.

2.5 MANUFACTURERS

.1 Acceptable manufacturers: Cutler-Hammer, Siemens, GE, or to match existing.

PART 3EXECUTION

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on fireguard backboards. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height given in Section 26 05 01 or as indicated.

.4 Connect loads to circuits as indicated.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

.6 For flush mounted panelboards, the general contractor is to provide adequate wall depth at no additional cost.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 Contactors: Section 26 29 01.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 01.

PART 2 PRODUCTS

2.1 SWITCHES

.1 15 A, 120 V, single pole, double pole, three-way, four-way switches as indicated or required.

.2 Manually-operated general purpose ac switches as indicated and with following features:

- .1 Terminal holes approved for No. 10 AWG 5 mm² wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine molding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 Brick - grey with stainless steel coverplate. Drywall - white with white coverplate.
- .6 Decora Rocker.
- .7 2 year warranty.

.3 Rocker operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

.5 Devices to be specification grade.

.6 Acceptable manufacturers: Leviton

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:

- .1 Urea molded housing.
- .2 Suitable for No. 10 AWG 5 mm² for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Double wipe contacts and rivetted grounding contacts.

.6 Tamper-resistant (in areas with children).

.7 10 year warranty.

.8 Decora style.

.9 Brick - grey with stainless steel coverplate. Drywall - white with white coverplate. .

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

.4 Devices to be commercial grade.

.5 Acceptable manufacturers: Leviton .

2.3 SPECIALTY EQUIPMENT

.1 Complete installation shall be to the satisfaction of the Departmental Representative.

.2 Electrical section shall wire and connect all specialty equipment as shown and/or required so as to leave all equipment in an operating condition to the satisfaction of the Engineer, the local inspection authority. Any equipment that is supplied with a cord and cap and is not deemed portable by the Engineer, shall be direct wired at no additional subsequent cost. Electrical section shall supply and install all disconnects, magnetic starters and matching receptacles for equipment not supplied with same. Ampacity, number of conductors of cord and receptacle configuration to match nameplate rating of equipment.

2.4 COVER PLATES

.1 Provide cover plates for all wiring devices.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel Decora, for wiring devices mounted in a flush-mounted outlet box.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height specified in Section 260501 or as indicated.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height specified in Section 260501 or as indicated.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Mount receptacles located in laboratory millwork and above laboratory countertops horizontally.

.3 Cover plates:

.1 Protect cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

PART 1General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 01.

PART 2PRODUCTS

2.1 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker, quick- make, quick-break type, for manual and automatic operation.

.2 Common-trip breakers with single handle for multipole applications.

.3 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

.4 Integrated instantaneous interrupting capacity to be as required by Engineer and coordinated with utility, but not less that 22KA.

.5 Moulded case circuit breakers: to CSA C22. No. 5 -1963.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping under overload conditions and instantaneous magnetic tripping for short circuit protection.

2.3 MANUFACTURERS

.1 Acceptable manufacturers; Cutlet Hammer, Siemens, GE, or to match existing.

PART 3EXECUTION

.1 Install circuit breakers as indicated.

END OF SECTION

PART 1General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 01.

PART 2PRODUCTS

2.1 EQUIPMENT

.1 Enclosed manual air break switches in non- hazardous locations: to CSA C22.2No.4-1974.

.2 Fuseholder assemblies to CSA C22.2No.39-1972.

.3 Fusible and non-fusible disconnect switch in CSA Enclosure 1 .

.4 Fusible and non-fusible disconnect switch in CSA Enclosure 3 if located on exterior of building.

.5 Provision for padlocking.

.6 Mechanically interlocked door to prevent opening when handle in ON position.

.7 Fuses as required where indicated.

.8 Fuseholders in each switch suitable without adaptors, for type of fuse as indicated.

.9 Quick-make, quick-break action.

.10 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Indicate name of load controlled on nameplate to Section 26 05 01.

2.3 MANUFACTURERS

.1 Acceptable manufacturers: to match Section 26 24 17.

PART 3EXECUTION

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses as indicated.

END OF SECTION

PART 1General

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Breakers: Section 26 28 21.

1.2 PRODUCT DATA

.1 Submit shop drawing in accordance with Section 26 05 01.

PART 2PRODUCTS

2.1 CONTACTORS

.1 Contactors: to CSA C22.2No.14-1973 and EEMAC No.1CS-1970.

.2 Electrically held controlled by pilot devices as indicated and rated for 1.5x load controlled. Half size contactors not accepted.

.3 Mount in CSA Enclosure 1 unless otherwise indicated.

.4 Include following options in cover:

- .1 Red indicating lamp.
- .2 On-Off selector key switch.

.5 Control transformer in contactor enclosure.

2.2 EQUIPMENT IDENTIFICATION

.1 Nameplate in accordance with Section 26 05 01 indicating name of load controlled as indicated.

2.3 MANUFACTURERS

.1 Acceptable manufacturers: Allen-Bradley, Group Schneider, Westinghouse.

PART 3EXECUTION

3.1 INSTALLATION

.1 Install contactors and connect auxiliary control devices as indicated.

.2 Control voltage to be 120VAC.

END OF SECTION

PART 1 GENERAL

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 01

.2 Indicate:

.1 Mounting method and dimensions.
.2 Starter size and type.
.3 Layout of identified internal and front panel components.
.4 Enclosure types.
.5 Wiring diagram for each type of starter.
.6 Interconnection diagrams.

1.2 OPERATION AND MAINTENANCE DATA

.1 Provide data for incorporation into maintenance manuals.

.2 Include operation and maintenance data for each type and style of starter.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Starters: to the latest edition of CSA C22.2No.14, EEMAC E14-1.

.1 Half size starters not acceptable.

2.2 MANUAL MOTOR STARTERS

.1 Manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:

.1 Switching mechanism, quick make and break.
.2 Overload heaters, manual reset, trip indicating handle.

.2 Accessories: Toggle switch: standard labeled as indicated.

.1 Indicating light: standard and color as indicated.
.2 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

.1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:

.1 Contactor solenoid operated, rapid action type.

.2 Motor overload protective device in each phase, manually reset from outside enclosure.

.3 Power and control terminals.

.4 Wiring and schematic diagram inside starter enclosure in visible location.

.5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.6 Two spare auxiliary contacts.

.7 Hand-off-automatic control.

.8 Control transformer and fusing.

2.4 IDENTIFICATION

.1 In accordance with Section 26 05 01.

2.5 MANUFACTURERS

.1 Acceptable manufacturers are: Allen Bradley, Group Schneider, Siemens, Westinghouse.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install starters, connect power and control as indicated.

.2 Ensure correct fuses and overload devices elements installed.

3.2 TESTS

.1 Perform tests in accordance with Section 26 05 01 and manufacturer's instructions.

.2 Operate switches, contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

PART 1General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00.

1.2 ACCESSORIES

.1 Provide supporting devices, plaster frames, rings, integral surface mounted junction boxes and outlet boxes where required.

PART 2PRODUCTS

2.1 LUMINAIRES

.1 Provide luminaires as indicated on luminaire schedule on drawings.

2.2 LAMPS

.1 Provide lamps as indicated.

2.3 BALLASTS AND ACCESSORIES

.1 All fluorescent ballasts to be premium electronic Utility approved. All other ballasts to be high power factor. All ballasts to be suitable for mounting in location indicated.

2.4 MANITOBA POWER SMART

.1 All applicable electrical MB Power Smart credit to be passed on to MBLL.

PART 3EXECUTION

3.1 INSTALLATION

.1 Locate luminaires as indicated.

.2 Clean all construction dirt and dust from luminaires prior to building turnover.

.3 Install lamps.

3.2 WIRING

.1 Connect luminaires to lighting circuits as indicated.

.2 Connect luminaires to dimmers as indicated.

3.3 TESTS

.1 Perform tests in accordance with Section 26 05 01.

.2 Check luminaires and replace defective lamps, ballasts and accessories.

.3 Operate fluorescent lamps for 100 hours.

END OF SECTION

PART 1General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 01.

.2 Data to indicate system components, mounting method, source of power and special attachments.

1.2 WARRANTY

.1 For batteries, 120 months warranty period with a no-charge replacement during the first 5 years and a pro-rate charge on the second 5 years.

PART 2PRODUCTS

2.1 EQUIPMENT

.1 Supply voltage: to match general lighting in the area.

.2 Output voltage: 12V dc.

.3 Operating time: 30 min.

.4 720W or as required.

.5 Battery: sealed, maintenance free.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.7 Solid state transfer circuit.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, for 'AC Power ON'.

.10 Lamp heads: 345° horizontal and 180° vertical adjustment. Lamp type: 4W LED. All integral and remote luminaires are to be double-head.

.11 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.12 Finish: white.

.13 Auxiliary equipment:

.1 Test switch.

.2 Shelf.

.3 Cord and plug connection for ac.

.4 Self-test.

.5 Zone sensing relays as required.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: to Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: to Section 26 05 21 - Building Wires, sized in accordance with manufacturer's recommendations.

2.3 MANUFACTURERS

.1 Acceptable manufacturers: Lumacell, Ready-Lite, Aim-Lite.

PART 3EXECUTION

3.1 INSTALLATION

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Interlock with normal lighting in the area to activate upon loss of normal lighting.

END OF SECTION

PART 1GENERAL

1.1 RELATED WORK

.1 General Provisions: Section 26 05 01.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 01.

PART 2PRODUCTS

2.1 MATERIALS

.1 Housing: Extruded one-piece aluminum. - Running man type.

.2 Universal mounting: Wall, pendant, end, or ceiling mount.

.3 Directions supplied with all combinations for both faces.

.4 Lamps: White LED with 25 year life expectancy.

.5 Universal 120-347V AC input and 6V-24V DC input.

.6 Standards: Meets of exceeds CSA 22.2 No. 141-10.

2.2 MANUFACTURERS

.1 Acceptable manufacturer: Lumacell, Aim-Lite, Readi-lite.

PART 3EXECUTION

3.1 INSTALLATION

.1 Install exit lights as indicated, to requirements of the latest edition of Saskatchewan Building Code.

.2 Connect fixtures to emergency power exit light circuits.

.3 Mount at suitable height. Provide rigid pendant if required. Provide single or double faceplate as required. Provide mounting as required.

.4 Fasten properly and level.

.5 Ensure that exit light circuit breaker is locked in on position.

END OF SECTION

PART 1GENERAL

1.1 SYSTEM DESCRIPTION

.1 Complete raceway system consists of outlet boxes, cover plates, terminal distribution cabinets, conduits, cabletroughs, pull boxes, sleeves and caps, fish wires (in empty conduits), service fittings.

.2 Provide complete raceway systems for the following:

.1 Voice/data communication system.

PART 2PRODUCTS

2.1 MATERIALS

.1 Conduits: EMT Type, to Section 26 05 34.

.2 Junction boxes, to Section 26 05 31.

.3 Outlet boxes , conduit boxes, and fittings: to Section 26 05 32.

PART 3EXECUTION

.1 Install to associated Utility and cable system manufacturer satisfaction.

END OF SECTION

1.1 Geotechnical Investigation Report

.1 A copy of the detailed Geotechnical Investigation Report dated June 15, 2015, prepared by Ground Engineering Consultants Ltd is attached.

.2 The Report, by its nature, may not reveal all conditions that exist or can occur on the proposed site. Should sub-surface conditions be found to vary substantially from those indicated in the Geotechnical Investigation Report, further geotechnical investigation will be required if soil condition not reflected in Geotechnical Report, changes in the design and construction of foundations will be made accordingly, with resulting credits or expenditures accruing to the Owner.

.3 Contractor to engage Ground Engineering Consultants Ltd to be on site to inspect piling installation and to confirm if soil conditions consistent with Geotechnical Report. If conditions vary inform the Departmental Representative.

END OF SECTION

TITLE: GEOTECHNICAL INVESTIGATION
PROPOSED AG CANADA BUILDINGS
SW 19-18-12-W2M EXT. 0
INDIAN HEAD, SASKATCHEWAN

CLIENT: AGRICULTURE & AGRI-FOOD CANADA

FILE NO: GE-1518-2 DATE: JUNE 10, 2015

TABLE OF CONTENTS

DRAWINGS

APPENDICES

GROUND ENGINEERING CONSULTANTS LTD.

CIVIL & GEOENVIRONMENTAL ENGINEERS

415 - 7th AVENUE • REGINA • SASKATCHEWAN • CANADA • S4N 4P1
TELEPHONE: (306) 569-9075 FAX: (306) 565-3677 EMAIL: groundeng@myaccess.ca

FILE: GE-1518-2 June 10, 2015

Agriculture & Agri-Food Canada
P.O. Box 940
#2 Government Road
INDIAN HEAD, Saskatchewan
S0G 2K0

ATTENTION: MR. DON McCARRON

Dear Sir:

SUBJECT: GEOTECHNICAL INVESTIGATION
PROPOSED AG CANADA BUILDINGS
SW 19-18-12-W2M EXT. 0
INDIAN HEAD, SASKATCHEWAN

1.0 INTRODUCTION

This report presents the results of a site specific subsurface soils investigation and geotechnical analysis carried out at the above captioned site located in the Town of Indian Head, Saskatchewan. It is understood that the proposed buildings (2) are steel frame, lightly loaded buildings.

The objectives of this investigation were to provide the following information:

.1 To define the subsurface soil stratigraphy and engineering properties of the foundation soils including the groundwater regime at the site;

.2 To provide design recommendations for the most suitable and economical foundation system to support the proposed buildings;

.3 To provide recommendations with respect to the type of cement to use for concrete in contact with native soils;

.4 To comment on possible excavation and construction problems related to foundation construction with particular reference to groundwater conditions;

.5 To provide recommendations for floor slab design and construction;

.6 To provide recommendations on pertinent geotechnical issues identified during the subsurface investigation.

Authorization to proceed with this work was received in your e-mail dated April 16, 2015.

2.0 DESCRIPTION OF THE SITE

The study area is located at the Shelter Belt Centre at the east side of the Town of Indian Head, Saskatchewan. The legal description of the property is SW19-18-12-W2M, Ext. 0. The proposed building sites are located at the south (Site No. 1) and east (Site No. 2) sides of the property as shown in Figure 1.

Building Site No. 1 was previously developed with a building which was recently demolished. The topography of the site is now relatively flat. Ground surface elevations vary 0.86 metres between the test hole locations.

Building Site No. 2 is a landscaped grassland area. The topography of the site is relatively flat. Ground surface elevations vary 0.54 metres between the test hole locations.

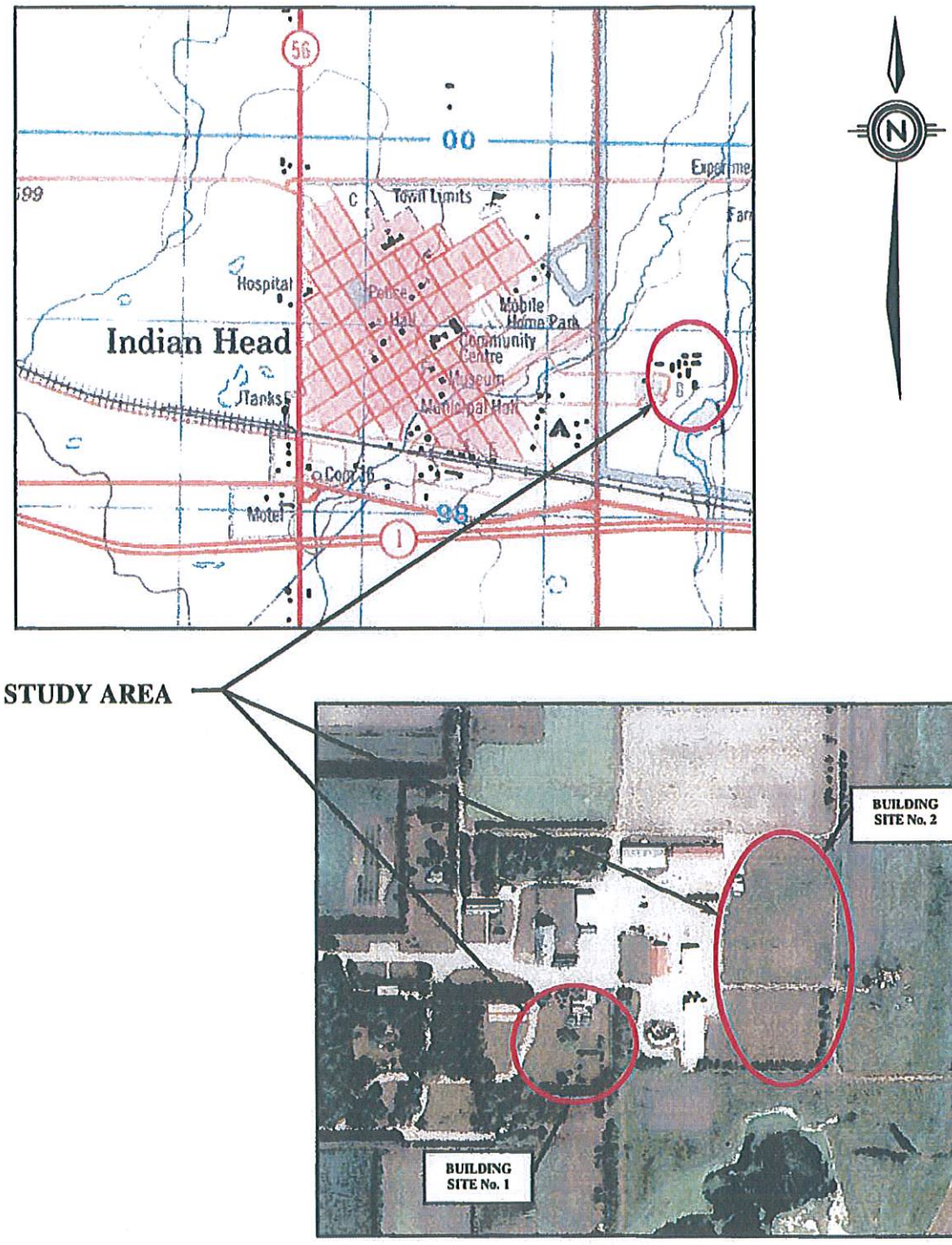

FIGURE 1

LOCATION OF STUDY AREA

3.0 FIELD AND LABORATORY INVESTIGATION

The subsurface conditions were investigated by drilling 10 test borings at the locations shown on Drawing No. GE-1518-2-1. The test holes were drilled on April 27, 2015 using a truck-mounted, Brat 22 digger equipped with a 150 mm diameter continuous flight auger to a depth of 6.1 metres below existing grade.

Representative disturbed auger soil samples, split spoon soil samples and undisturbed Shelby tube soil samples were recovered from the test borings and taken to our laboratory for analysis. Standard penetration tests were conducted in Test Holes 102, 103, 105 and 106. Each soil sample was visually examined to determine its textural classification and a natural moisture content test was performed on each sample. An estimate of the undrained shear strength of the undisturbed soil was made using both a pocket penetrometer and a laboratory vane shear apparatus. In addition, Atterberg limits, unconfined compressive strength, dry density and sulphate content tests were completed on selected representative soil samples. Details of the soil profile, samples taken, laboratory test results and stratigraphic interpretations of the subsoils are appended to this report on Drawing Nos. GE-1518-2-5 to -16, inclusive.

The ground surface elevations at the test hole locations were established by representatives of Ground Engineering Consultants Ltd. and are referenced to an assumed datum of 100.00 metres described as the top of the hydrant located at the east side of site, as shown on Drawing No. GE-1518-2-1.

4.0 GEOTECHNICAL ANALYSIS

4.1 Stratigraphy

4.1.1 Building Site No. 1

A total of five (5) test holes (Test Holes 101 to 105, inclusive) were drilled in the area of proposed Building No. 1. The drilling information indicates that the surficial topsoil is underlain by a stratified drift unit. The stratified drift unit is comprised of clayey till, highly plastic clay and fine grained sand layers which extend to depths of 4.9 to 5.6 metres below existing ground surface.

The stratified drift unit is underlain by a glacial till stratigraphic unit which extends to the maximum depth penetrated in the test borings (6.1 metres). The till is a heterogeneous mixture of clay, silt, sand and gravel with occasional cobblestones and boulders.

4.1.2 Building Site No. 2

A total of five (5) test holes (Test Holes 106 to 110, inclusive) were drilled in the area of proposed Building No. 2. The drilling information indicates that the surficial topsoil is underlain by a stratified drift unit comprised of clayey till, highly plastic clay and fine grained sand layers. The drift unit extends to the maximum depth penetrated in the test borings (6.1 metres).

4.2 Groundwater

The drilling information indicates there is a shallow water table at both sites. The soils encountered at this site are generally clayey and cohesive, however, the wet sand lenses are cohesionless and subject to sloughing. Test Holes 101, 104 and 110 were left open for 5.8, 4.2 and 1.5 hours, after which, water levels were measured at depths of 2.1, 1.4 and 1.4 metres below grade, respectively. Piezometers were not installed to monitor the long term groundwater levels.

5.0 DISCUSSION

5.1 Stratified Drift Unit

The stratified drift unit varies in lithology from clayey till to highly plastic clay and silty fine grained sands layers. The average undrained shear strength of the clay and till strata range from 30 to 80 kPa. The fine grained sand layers are wet and generally medium dense with "N" values ranging from 15 to 17 blows per foot. The till has a Plasticity Index ranging from 19 to 23 percent and a Liquid Limit ranging from 33 to 38 percent. The dry density of the clay and till soils range from 1.52 to 1.71 tonnes per cubic metre. The clay is a highly plastic, potentially active (swelling and shrinking) type of clay. The Plasticity Index ranges from 47 to 53 percent and the Liquid Limit ranges from 74 to 81 percent.

5.2 Till Stratigraphic Unit

The till stratigraphic unit is oxidized and stiff to hard in consistency. The term till on the borehole logs indicates that the material originates from geological processes associated with glaciation. These processes produce a material that is heterogeneous in composition and as such, the till may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm), therefore, contractors may encounter them during excavation even if they are not evident in the test borings, as is the case at this site. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample descriptions may be applicable to a very limited area; caution is therefore essential when dealing with sensitive excavations in till material.

5.3 Frost Heaving

In fine-grained soils such as silts and clays, moisture is continuously drawn to the freezing plane where it forms ice lenses. These lenses physically lift the soil above them, thus causing heave at ground surface. The soils at this site have a high susceptibility to frost heaving due to the fine grained soils and shallow groundwater table. The maximum anticipated depth of frost penetration at this site is in the order of 1.8 to 2.2 metres depending on the depth of snow cover.

6.0 FOUNDATION CONSIDERATIONS

Shallow footings are not recommended because of the relatively weak surficial soils and shallow water table encountered at this site. Conventional bored concrete piles are not recommended because of the shallow water table and sloughing conditions. We recommend that the proposed buildings be supported on a driven timber pile and grade beam type of foundation system.

6.1 Driven Timber Piles

.1 The soil conditions at this site are suitable for driven timber piles designed to carry column loads on the basis of side friction between the pile surface and the surrounding soil. Our recommended ultimate skin friction values and geotechnical resistance factors are shown in Tables 1 and 2 below:

TABLE 1

RECOMMENDED LSD CRITERIA FOR DRIVEN TIMBER PILES – SITE 1

ASSUMED ELEVATION* metres	SOIL TYPE	ULTIMATE SKIN FRICTION (kPa)	GEOTECHNICAL RESISTANCE FACTOR (compression)	GEOTECHNICAL RESISTANCE FACTOR (tension)
Above 97.6	Drift	0	0.4	0.3
97.6 to 94.1	Drift	60		
Below 94.1	Till	100		

* Ground Surface Elevation is approximately 99.6 to 100.4 metres, Assumed.

TABLE 2

RECOMMENDED LSD CRITERIA FOR DRIVEN TIMBER PILES – SITE 2

ASSUMED ELEVATION* metres	SOIL TYPE	ULTIMATE SKIN FRICTION (kPa)	GEOTECHNICAL RESISTANCE FACTOR (compression)	GEOTECHNICAL RESISTANCE FACTOR (tension)
Above 96.7	Drift	0	0.4	0.3
Below 96.7	Drift	60		

* Ground Surface Elevation is approximately 98.7 to 99.2 metres, Assumed.

.2 The piles should be driven to a minimum depth of 6.0 metres below existing grade.

.3 Timber pile loads should not exceed the safe structural load carrying capacity of the pile. High pore pressures may develop at this site during pile driving, therefore, piles driven to refusal should be re-driven after 24 hours to ensure adequate set.

.4 Timber piles should conform with the requirements of Subsection 4.2.3 of the National Building Code of Canada (2010).

.5 Timber piles should not be installed at a centre to centre spacing of less than 2.5 times the average pile diameter.

.6 A potential problem associated with the installation of timber piles is the splitting and brooming of the pile tip and the head during driving. To avoid this, the following recommendations are provided:

i) the driving energy per blow (Joules) should be limited to 120*D, where D is the diameter of the pile tip, in millimetres

ii) the maximum driving energy (Joules) per 25 mm be limited to 480*D per 25 mm with a pile driver operating at the above maximum energy.

iii) that driving be stopped immediately when abrupt high resistance to penetration is encountered.

iv) additional tip and head reinforcement may be required to prevent pile damage in difficult driving conditions.

.7 Very stringent site control and inspection by a qualified inspector is recommended during the pile driving operations to ensure that the piles have been driven to the design length or that the specified refusal criteria has been met.

.8 Additional recommendations for driven timber piles are provided in Appendix A.

7.0 EXCAVATION CONSIDERATIONS

Building excavations at this site will be in the stratified drift unit. Conventional excavation procedures should therefore be applicable to the soils at this site. The sand strata are generally saturated and trench instability should be anticipated when excavating in any soils below the water table. Contractors should be aware that cobblestones and boulders may be encountered in the till unit. Excavations shall comply with minimum requirements of Occupational Health and Safety Regulations.

Occupational Health and Safety Regulations require that any trench or excavation in which people must work must be cut back according to the soil "type" or a temporary shoring system must be used to support the sides of the excavation. According to the current Occupational Health and Safety Regulations, the walls of excavations shall be sloped from the bottom of the excavation at one (1) horizontal to one (1) vertical. Any saturated sand layers are "Type 4" Soils which should be sloped at three (3) horizontal to one (1) vertical.

Dewatering may be required for excavations (trenches) which penetrate below a depth of about 1.5 to 2.0 metres. It should be possible to dewater trench excavations with sumps.

8.0 FLOOR SLAB CONSIDERATIONS

With the presence of highly plastic clay subgrade soils, there is a potential for differential movement of grade supported floor slabs at this site. In this regard, a structural floor system would be the more desirable alternative insofar as overcoming the potential problems associated with differential movement of the floor slab. Alternatively, if differential movement can be tolerated, the slab may be constructed as a grade supported slab on a prepared subgrade and granular base.

8.1 Structurally Supported Floor Systems

A structural floor system would be the most positive way to ensure satisfactory long term performance of the floor. We recommend the following items of work for construction of the structural slab:

.1 A minimum 150 mm cardboard void form should be placed beneath the floor slab.

.2 The void form should be covered with a minimum 6 mil polyethylene vapour barrier to deter moisture migration through the floor.

.3 Backfill against the perimeter grade beams should be placed in thin lifts (200 mm) and compacted to a minimum of 95% Standard Proctor density to minimize infiltration of surface water into the void space beneath the floor.

8.2 Grade Supported Floor Slabs

In most commercial buildings, a grade supported floor slab is placed because of the relatively high cost of a structural floor slab. In opting for a grade supported slab, the Owner must accept the risk. At this site, the risk is present because of the potentially active clay subgrade. The following recommendations are given in an attempt to reduce differential movement of the grade supported floor slabs:

.1 Any surficial organics should be stripped from the site. The subgrade under a grade supported slab should be as uniform as possible. The subgrade should be proof-rolled with a heavy sheepsfoot or vibratory padfoot roller. Any soft or spongy areas should be excavated and filled with compacted granular material. A well graded pit

run sand (Type 8) compacted to 95% Standard Proctor density is suitable for this purpose. The total granular fill thickness under the floor slab should be a minimum of 750 mm. A well graded pit run sand (Type 8) compacted to 100% Standard Proctor density may be used to fill within 150 mm below underside of the slab. The final 150 mm below underside of the floor slab should be a well graded granular base course (Type 33) compacted to a minimum of 100% Standard Proctor density. Specifications for granular materials are included in Appendix B.

.2 The concrete slab in areas where only light floor loads are to be supported, may have a minimum thickness of 100 mm. The minimum 28 day concrete compressive strength should be specified as 25 MPa.

.3 It is recommended that the grade supported concrete slabs be designed as floating slabs, completely independent of the foundation walls and/or columns. Isolation joints should be provided at columns and walls to separate the grade supported floor slabs from any connection with the building or appurtenances. It is assumed that the floor slab will possess sufficient rigidity to distribute the loading across the floor slab. The floor slab must be stiff enough to distribute the contact stresses and yet strong enough to resist resulting moments. A generous amount of reinforcing running both ways on the top and bottom of the slab is desirable. Control joints (sawn or premolded) are recommended at a maximum spacing of about 4.5 metres.

.4 A layer of robust polyethylene sheeting should be placed between the granular base and the concrete slab to deter the migration of moisture through the floor.

9.0 OTHER

.1 Adequate drainage away from the buildings should be provided and maintained to minimize infiltration of water into the subgrade. The building sites should be set at as high an elevation as possible in relation to the surrounding area.

.2 Test results on selected samples indicate that the soluble sulphate contents in the soil range from 0.16 to 0.89 percent by dry soil weight. Exposure Class S-2 is considered appropriate for design of concrete in contact with the native soil, as

specified in CSA Standard CAN3-A23.1-09. Minimum requirements for Exposure Class S-2 are as follows:

.1 Cement Type: HS or HSb
.2 Maximum water to cementing materials ratio: 0.45
.3 Air Content: as per CSA CAN-A23.1-09 Tables 2 and 4
.4 Minimum specified Compressive Strength: 32 MPa at 56 days

.3 In the event that changes are made in the design, location or nature of the project, the conclusions and recommendations included in this report would not be deemed valid unless the changes in the project were reviewed by our firm. Modification to this report would then be made if necessary. Furthermore, it is recommended that this firm be allowed an opportunity for a general review of the final design plans and specifications in order to ensure that the recommendations made in this report are properly interpreted and implemented. If this firm is not allowed the opportunity for this review, we assume no responsibility for the misinterpretation of any of the recommendations.

.4 It is recommended that Ground Engineering Consultants Ltd. be retained to provide inspection services during construction of the foundation system for this project. This is to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that the subsurface conditions differ from what was anticipated.

.5 This report has been prepared for Agriculture and Agri-Food Canada and is intended for the specific application to the design and construction of the Proposed AG Canada Buildings to be constructed at SW19-18-12-W2M in the Town of Indian Head, Saskatchewan. The analysis and recommendations are based in part on the data obtained from the test hole logs. The boundaries between soil strata have been established at bore hole locations. Between the bore holes, the boundaries are assumed from geological evidence and may be subject to considerable error. Contractors bidding on the project works are particularly advised against reviewing the report without realizing the limitations of the subsurface information. It is recommended that Contractors should make such tests, inspections and other on-site

investigations as is considered necessary to satisfy themselves as to the nature of the conditions to be encountered.

.6 It is recommended that the geotechnical workscope include the following services in addition to subsurface exploration and development of foundation design recommendations. These two services are:

i) geotechnical review of other design professionals' plans relative to their interpretation of geotechnical findings and recommendations, and;

ii) construction monitoring to observe construction activities in light of plans and specifications, and to help assure that unforeseen conditions are detected quickly to permit prompt corrective action and thus prevent minor problems from growing to major proportion.

.7 The soil samples from this site will be retained in our laboratory for 90 days following the date of this report. Should no instructions be received to the contrary, these samples will then be discarded.

10.0 CLOSURE

We trust that this report is satisfactory for your purposes. If you have any questions or require additional information, please contact this office.

Yours very truly
Ground Engineering Consultants Ltd.

Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
Ground Engineering Consultants Ltd.
Number C0008
Permission to Consult held by:
Disoipline Sk. Reg. No. Signature
GEOTECHNICAL 6307

PROFESSIONAL ENGINEER
M.S. WURM
MEMBER 13573
15 06 10
YR. MN. DAY
SASKATCHEWAN

Prepared by: Michael Wurm, P. Eng.

Reviewed by: Tim Adelman, P. Eng., P. Geo.

PROFESSIONAL ENGINEER
T J ADELMAN
MEMBER 6307
15 06 10
YR. MN. DAY
SASKATCHEWAN

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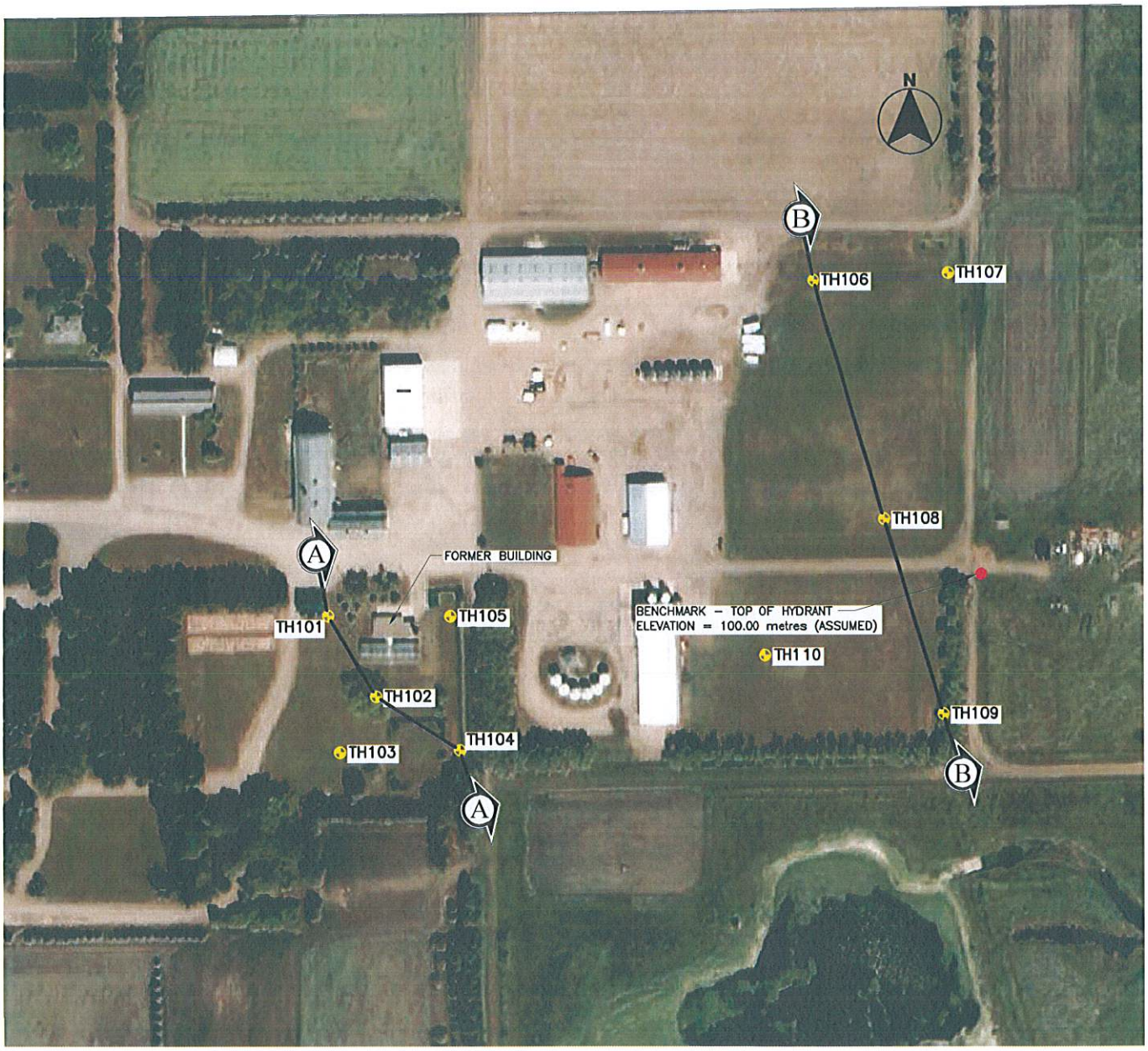
DRAWINGS



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GROUND ENGINEERING CONSULTANTS LTD.

CIVIL & GEOENVIRONMENTAL ENGINEERS
415–7th AVENUE
REGINA, SASKATCHEWAN, CANADA

SITE PLAN SHOWING LOCATION OF TEST HOLES
PROPOSED AG CANADA BUILDINGS
SW 19–18–12–W2M
INDIAN HEAD, SASKATCHEWAN

CLIENT:	APPROVED:	DATE:	DWG. No.:
AGRICULTURE & AGRI–FOOD CANADA	M. WURM	JUNE 10, 2015	GE–1518–2–1

ARCHIVE: 2015 FILES\2015 ENG.FILES\1518–2 GI AG CANADA INDIAN HEAD\DRAWINGS\1518–2 SITE PLAN.DWG

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 – 69 AND D 2488 – 69

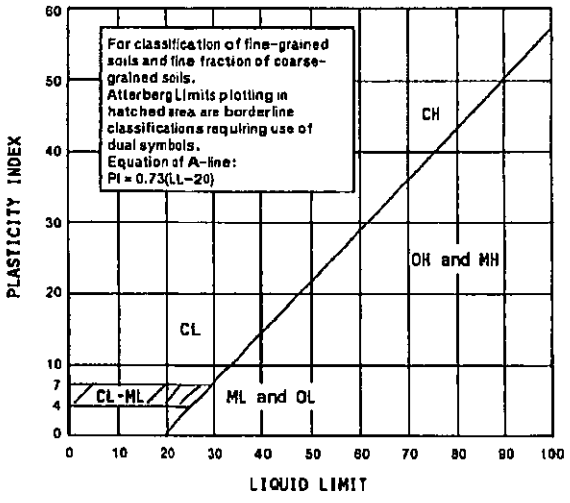
(Unified Soil Classification System)

Major Divisions			Group Symbols	Typical Names	Classification Criteria
Coarse-grained soils* More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4: $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Not meeting both criteria for GW
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean sands	SW	Well-graded sands and gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6: $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands and gravelly sands, little or no fines	Not meeting both criteria for SW
		Sands with fines	SM	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
Fine-grained soils* 50% or more passes No. 200 sieve	Silts and clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity	
	Highly organic soils		Pt	Peat, muck and other highly organic soils	

Classification on basis of percentage of fines
Less than 5% pass No. 200 sieve ..... GW, GP, SW, SP
More than 12% pass No. 200 sieve ..... GM, GC, SM, SC
5 to 12% pass No. 200 sieve ..... Borderline classifications requiring use of dual symbols

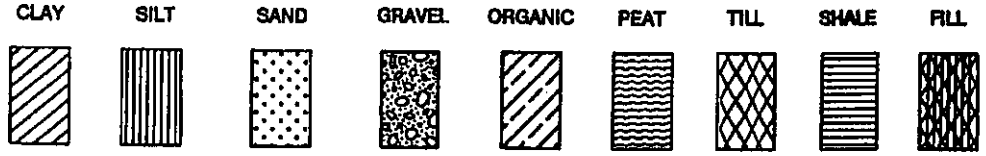
Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols

PLASTICITY CHART



*Based on the material passing the 75mm (3in) sieve.

SYMBOLS AND TERMS USED IN THE REPORT



The symbols may be combined to denote various soil combinations, the predominate soil being heavier.

RELATIVE PROPORTIONS

TERM	RANGE
Trace	0 - 5%
A Little	5 - 15%
Some	15 - 30%
With	30 - 50%

ASTM CLASSIFICATION BY PARTICLE SIZE

Boulder		> 300 mm
Cobble		300 mm - 75 mm
Gravel		75 mm - 4.75 mm
Sand		
	coarse	4.75 mm - 2 mm
	medium	2 mm - 425 um
	fine	425 um - 75 um
Silt		75 um - 5 um
Clay		< 5 um

DENSITY OF SANDS AND GRAVELS

DESCRIPTIVE TERM	RELATIVE DENSITY [1]	N VALUE STANDARD [2] PENETRATION TEST
Very loose	0 - 15%	0 - 4 Blows per 300mm
Loose	15 - 35%	4 - 10 Blows per 300mm
Medium Dense	35 - 65%	10 - 30 Blows per 300mm
Dense	65 - 85%	30 - 50 Blows per 300mm
Very Dense	85 - 100%	> 50 Blows per 300mm

CONSISTENCY OF CLAYS AND SILTS

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa) (CFEM, 2nd Edt., 1985)	N VALUE STANDARD [2] PENETRATION TEST	FIELD IDENTIFICATION (ASTM D 2488-84)
Very Soft	<12	< 2 Blows per 300mm	Thumb will penetrate soil more than 25 mm
Soft	12 - 25	2 - 4 Blows per 300mm	Thumb will penetrate soil about 25 mm
Firm	25 - 50	4 - 8 Blows per 300mm	Thumb will indent soil about 6 mm
Stiff	50 - 100	8 - 15 Blows per 300mm	Thumb will indent, but only with great effort (CFEM)
Very Stiff	100 - 200	15 - 30 Blows per 300mm	Readily indented by thumbnail (CFEM)
Hard	>200	> 30 Blows per 300mm	Thumb will not indent soil but readily indented with thumbnail

NOTES: 1. Relative Density determined by standard laboratory tests.
2. N Value - Blows/300mm of a 620N hammer falling 762mm on a 50mm O.D. Split Spoon.

SYMBOLS AND TERMS USED IN THE REPORT (continued)

GROUNDWATER

▼	Water level measured in the borings at the time and under the conditions indicated. In sand, the indicated levels can be considered reliable groundwater levels. In clay soil, it is not possible to determine the groundwater level within the normal scope of a test boring investigation, except where lenses or layers of more pervious waterbearing soil are present and then a long period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the groundwater table. The available water level information is given at the bottom of the log sheet.
▽	Water level determined by piezometer installation – In all soils the levels can be considered reliable groundwater levels.

DESCRIPTIVE SOIL TERMS

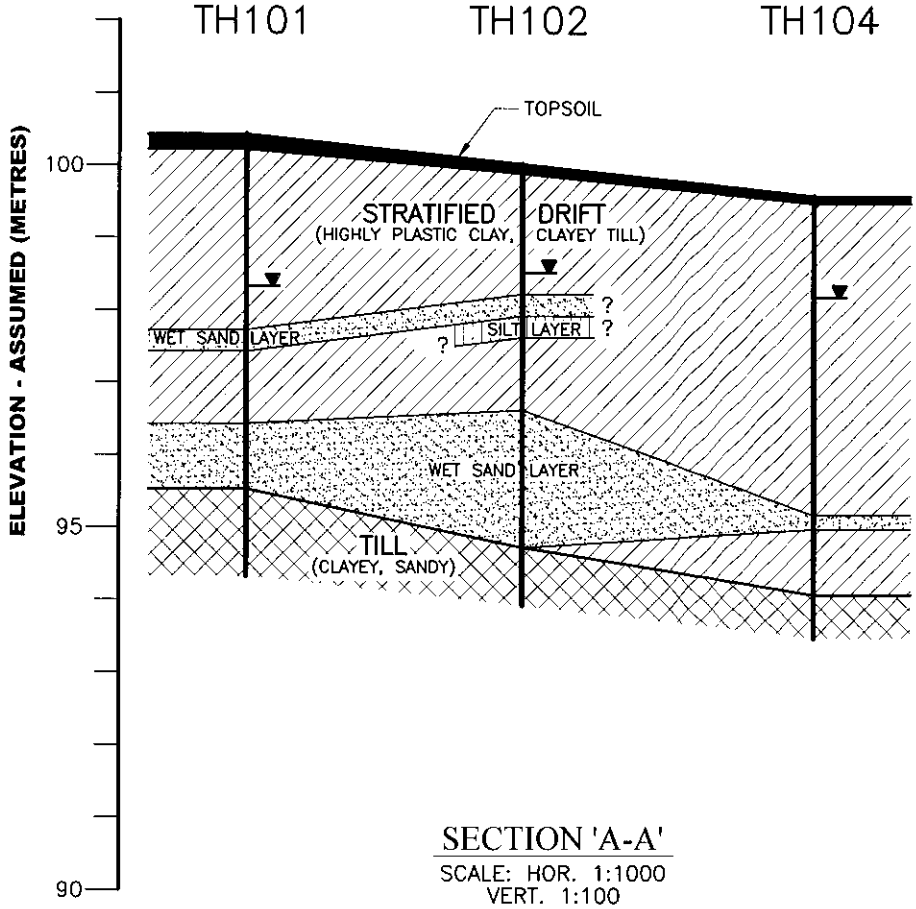
WELL GRADED	Having wide range of grain sizes and substantial amounts of all intermediate sizes.
POORLY GRADED	Predominantly of one grain size.
SLICKENSIDES	Refers to a clay that has planes that are slick and glossy in appearance; slickensides are caused by shear movements.
SENSITIVE	Exhibiting loss of strength on remolding.
FISSURED	Containing cracks, usually attributable to shrinkage. Fissured clays are sometimes described as having a nuggetty structure.
STRATIFIED	Containing layers of different soil types.
ORGANIC	Containing organic matter; may be decomposed or fibrous.
PEAT	A fibrous mass of organic matter in various stages of decomposition. Generally dark brown to black in color and of spongy consistency.
BEDROCK	Preglacial material.
DRIFT	Material deposited directly by glaciers or glacial melt-water.
ALLUVIAL	Soils that have been deposited from suspension from moving water.
LACUSTRINE	Soils that have been deposited from suspension in fresh water lakes.

DRILLING AND SAMPLING TERMS

SYMBOL	DEFINITION
C.S.	Continuous Sampling
Sy	75mm Thin Wall Tube Sample
Sy (2)	50mm Thin Wall Tube Sample
SPT (SS)	50mm O.D. Split Spoon Sample
BLOWS / 300mm	"N" Value – Standard Penetration Test
Bag	Disturbed Bag Sample
No.	Sample Identification Number
——→	Piezometer Tip
S.I.	Slope Indicator
SPG →▼	Observed Seepage

LABORATORY TEST SYMBOLS

SYMBOL	DEFINITION
●	Moisture Content – Percent of Dry Weight
⊢→	Plastic and Liquid Limit determined in accordance with ASTM D-423 and D-424
◆	Dry Density – t/m^3
■	Shear Strength – As determined by Unconfined Compression Test
▲	Shear Strength – As determined by Field Vane
▲	Shear Strength – As determined by Pocket Penetrometer Test
$\%SO_4$	Water Soluable Sulphates – Percent of Dry Weight
M.A.	Grain Size Analysis



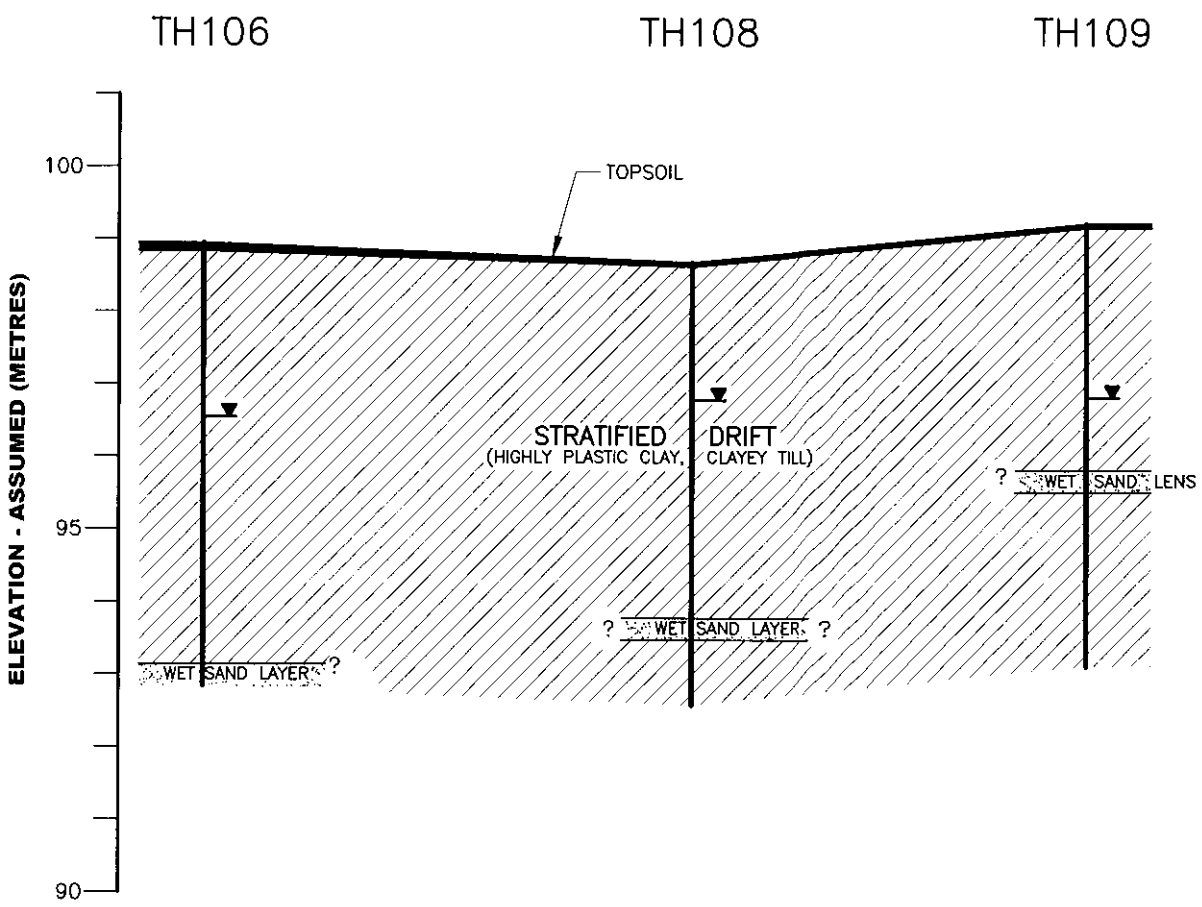
SECTION 'A-A'

SCALE: HOR. 1:1000
VERT. 1:100

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes, the boundaries are interpolated and may be subject to considerable error.

GROUND ENGINEERING CONSULTANTS LTD. CIVIL & GEOENVIRONMENTAL ENGINEERS 415–7th AVENUE REGINA, SASKATCHEWAN, CANADA	STRATIGRAPHIC CROSS SECTION 'A–A' PROPOSED AG CANADA BUILDINGS SW 19–18–12–W2M INDIAN HEAD, SASKATCHEWAN

CLIENT:	APPROVED:	DATE:	DWG. No.:
AGRICULTURE & AGRI–FOOD CANADA	M. WURM	JUNE 10, 2015	GE–1518–2–5



SECTION 'B-B'

SCALE: HOR. 1:1500
VERT. 1:100

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes, the boundaries are interpolated and may be subject to considerable error.

GROUND ENGINEERING CONSULTANTS LTD. CIVIL & GEOENVIRONMENTAL ENGINEERS 415–7th AVENUE REGINA, SASKATCHEWAN, CANADA	STRATIGRAPHIC CROSS SECTION 'B–B' PROPOSED AG CANADA BUILDINGS SW 19–18–12–W2M INDIAN HEAD, SASKATCHEWAN			
CLIENT: AGRICULTURE & AGRI–FOOD CANADA	APPROVED: M. WURM	DATE: JUNE 10, 2015	DWG. No.: GE–1518–2–6	

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH101
Project No.: GE-1518-2	Coordinate: 5598725 N; 595682 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 100.42 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample

Depth (m) | Sample Type | Sample No. | UCS | Soil Symbol | ▲ Dry Density (t/m3) ▲ 0.4 0.8 1.2 1.6 | ■ Sulphate Cont. (%) ■ 0.2 0.4 0.6 0.8 | Plastic M.C. Liquid 20 40 60 80 | ● Blow Count ● 20 40 60 80 | ▲Vane Shear (kPa) ▲ | ◆ Pocket Pen (kPa) ◆ | ■ Unconfined (kPa) ■ 60 120 180 240 | Elevation (m) (Assumed)

Soil Description

0.00 m — 100.4 m
TOPSOIL

0.20 m — 100.2 m
STRATIFIED DRIFT
- stratified layers of clayey till and highly plastic clay
- laminated with silt and fine grained sand layers below 2.4 metres
- wet, fine grained sand layers at 2.7 and 4.0 metres
- moist to very moist, firm to stiff
- oxidized, iron stains
- salt crystals
- very dark grayish brown (2.5Y 3/2) to dark grayish brown (2.5Y 4/2)

4.90 m — 95.5 m
TILL - silty, clayey
- moist, very stiff to hard
- oxidized, iron stains
- dark grayish brown (2.5Y 4/2)

Test hole terminated at 6.1 m below grade.

Notes:
1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 4.3 metres immediately after completion of drilling. Test hole sloughed to 4.4 metres.
3. Water level was measured at 2.1 metres, 5.75 hours after completion of drilling. Test hole had sloughed to 2.8 metres.
4. Test hole was backfilled to surface with drill cuttings.

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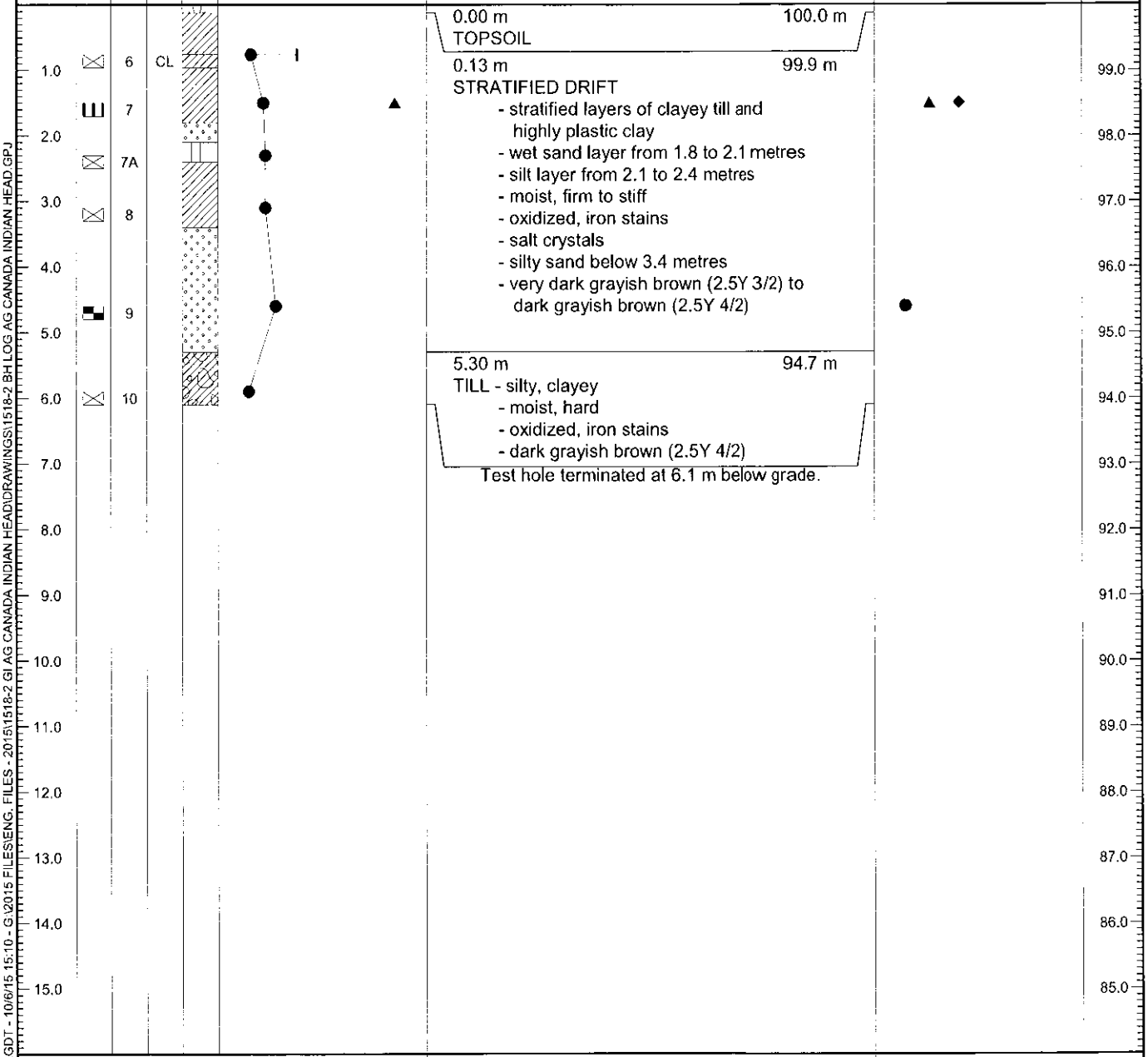
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-7
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 1 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH102
Project No.: GE-1518-2	Coordinate: 5598692 N; 595702 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 100.01 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. No groundwater accumulation was noted immediately after completion of drilling. Test hole sloughed to 4.1 metres.
3. Water level was measured at 1.5 metres, 5.0 hours after completion of drilling. Test hole had sloughed to 2.8 metres.
4. Test hole was backfilled to surface with drill cuttings.

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415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-8
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 2 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH103
Project No.: GE-1518-2	Coordinate: 5598669 N; 595687 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 100.23 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample

Depth (m) | Sample Type | Sample No. | UCS | Soil Symbol | ▲ Dry Density (t/m3) ▲ 0.4 0.8 1.2 1.6 | ■ Sulphate Cont. (%) ■ 0.2 0.4 0.6 0.8 | Plastic M.C. Liquid 20 40 60 80 | ● Blow Count ● 20 40 60 80 | ▲Vane Shear (kPa) ▲ | ◆ Pocket Pen (kPa) ◆ | ■ Unconfined (kPa) ■ 60 120 180 240 | Elevation (m) (Assumed)

Soil Description

0.00 m — 100.2 m
TOPSOIL

0.13 m — 100.1 m
STRATIFIED DRIFT
- stratified layers of clayey till and highly plastic clay
- wet sand layer from 3.4 to 3.5 metres
- wet sand layer from 4.3 to 4.6 metres
- wet sand layer from 4.9 to 5.2 metres
- moist, firm to stiff
- oxidized, iron stains
- salt crystals
- very dark grayish brown (2.5Y 3/2) to dark grayish brown (2.5Y 4/2)

Sample 11 at 1.0 m; Sample 12 at 2.0 m; Sample 13 at 3.0 m; Sample 13A at 4.0 m; Sample 14 at 5.0 m; Sample 15 at 6.0 m

5.50 m — 94.7 m
TILL - silty, clayey
- moist, stiff to hard
- oxidized, iron stains
- dark grayish brown (2.5Y 4/2)

Test hole terminated at 6.1 m below grade.

Elevation (m): 100.0, 99.0, 98.0, 97.0, 96.0, 95.0, 94.0, 93.0, 92.0, 91.0, 90.0, 89.0, 88.0, 87.0, 86.0, 85.0

Notes:
1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 1.8 metres immediately after completion of drilling. Test hole sloughed to 2.1 metres.
3. Water level was measured at 1.6 metres, 4.75 hours after completion of drilling. Test hole had sloughed to 1.7 metres.
4. Test hole was backfilled to surface with drill cuttings.

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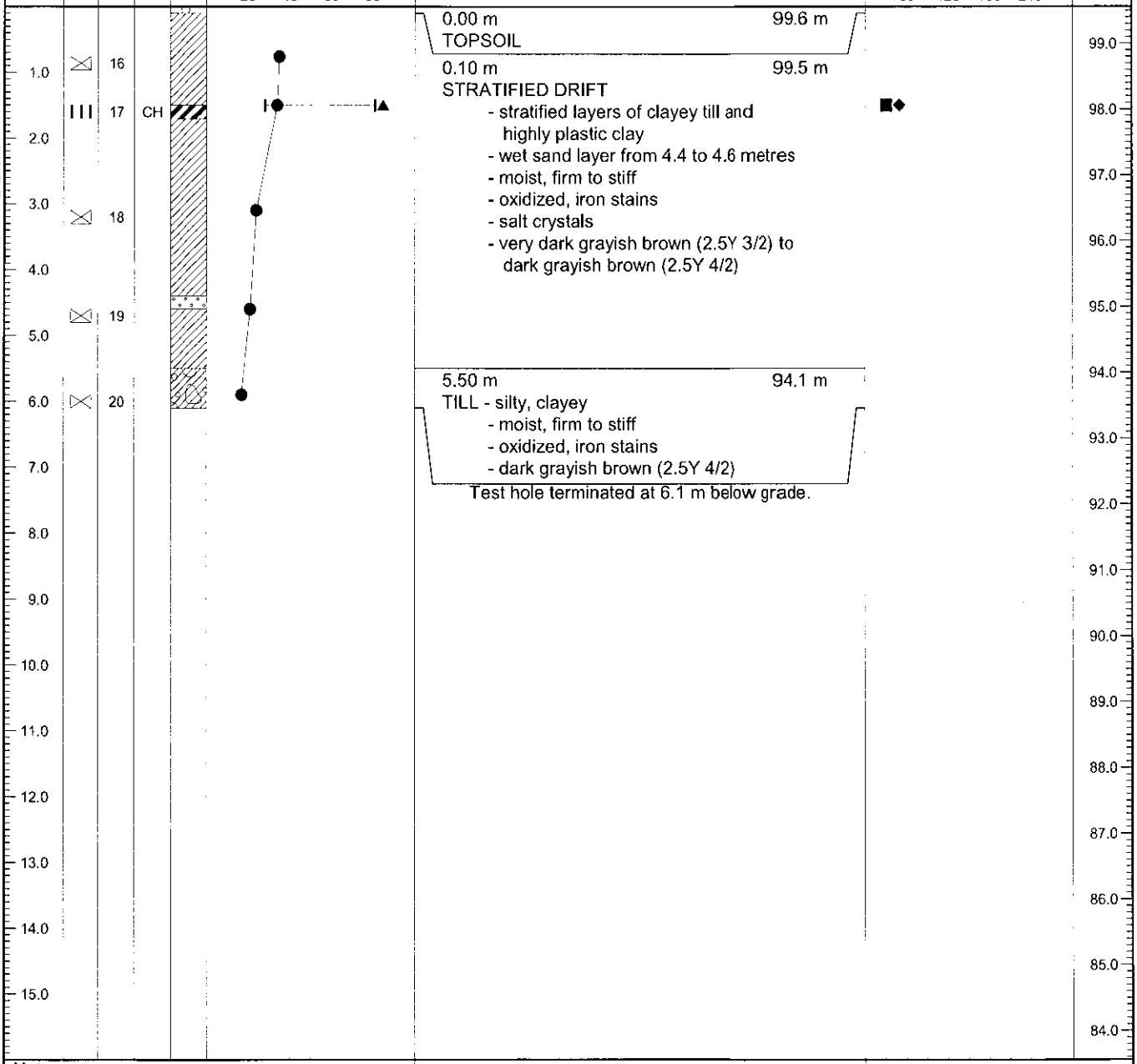
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-9
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 3 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH104
Project No.: GE-1518-2	Coordinate: 5598670 N; 595737 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 99.56 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 3.4 metres immediately after completion of drilling. Test hole sloughed to 4.6 metres.
3. Water level was measured at 1.4 metres, 4.25 hours after completion of drilling. Test hole had sloughed to 2.4 metres.
4. Test hole was backfilled to surface with drill cuttings.

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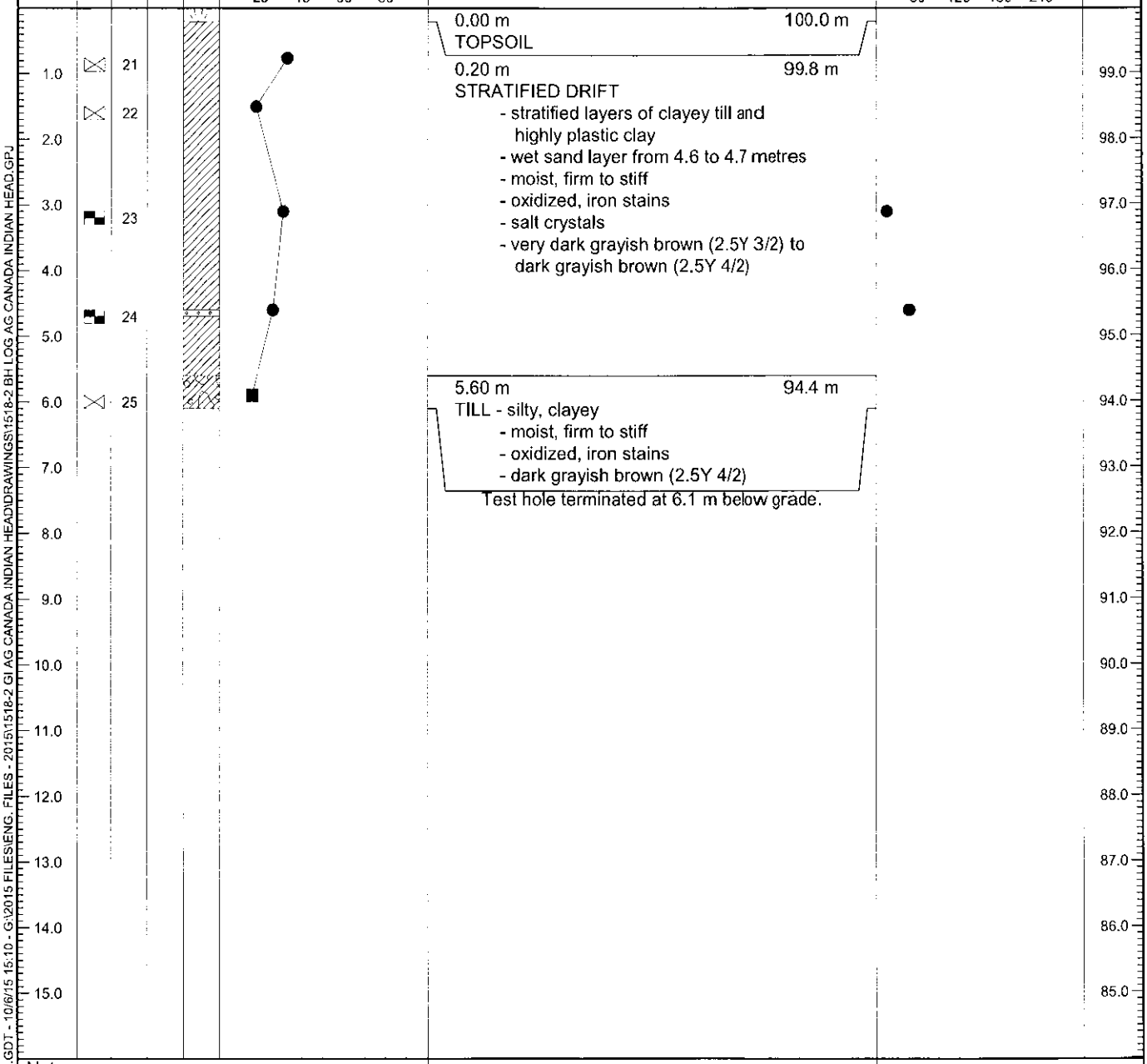
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

	Logged By: R. Yaremko	Figure No.: GE-1518-2-10
	Drawn By: M. Creary	Date Plotted: 10/06/2015
	Reviewed By: P. Walsh	Page 4 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.: TH105
Project No.: GE-1518-2	Coordinate: 5598725 N; 595733 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 99.98 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 2.7 metres immediately after completion of drilling. Test hole sloughed to 4.3 metres.
3. Water level was measured at 2.1 metres, 4.0 hours after completion of drilling. Test hole had sloughed to 2.6 metres.
4. Test hole was backfilled to surface with drill cuttings.

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415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-11
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 5 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH106
Project No.: GE-1518-2	Coordinate: 5598863 N; 595885 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 98.94 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample

Depth (m) | Sample Type | Sample No. | UCS | Soil Symbol

▲ Dry Density (t/m3) ▲ 0.4 0.8 1.2 1.6

■ Sulphate Cont. (%) ■ 0.2 0.4 0.6 0.8

Plastic M.C. Liquid 20 40 60 80

Soil Description

● Blow Count ● 20 40 60 80

▲Vane Shear (kPa) ▲

◆ Pocket Pen (kPa) ◆

■ Unconfined (kPa) ■ 60 120 180 240

Elevation (m) (Assumed)

Depth (m)	Sample No.	Elevation (m) (Assumed)
1.0	26	98.0
2.0	27	97.0
3.0	28	96.0
4.0		95.0
5.0	29	94.0
6.0	30	93.0
7.0		92.0
8.0		91.0
9.0		90.0
10.0		89.0
11.0		88.0
12.0		87.0
13.0		86.0
14.0		85.0
15.0		84.0

0.00 m 98.9 m
TOPSOIL

0.10 m 98.8 m
STRATIFIED DRIFT
- stratified layers of clayey till and highly plastic clay
- wet sand layer below 5.8 metres
- moist, firm to stiff
- oxidized, iron stains
- salt crystals
- very dark grayish brown (2.5Y 3/2) to dark grayish brown (2.5Y 4/2)

Test hole terminated at 6.1 m below grade.

Notes:
1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 4.9 metres immediately after completion of drilling. Test hole sloughed to 5.6 metres.
3. Water level was measured at 2.4 metres, 2.75 hours after completion of drilling. Test hole had sloughed to 4.6 metres.
4. Test hole was backfilled to surface with drill cuttings.

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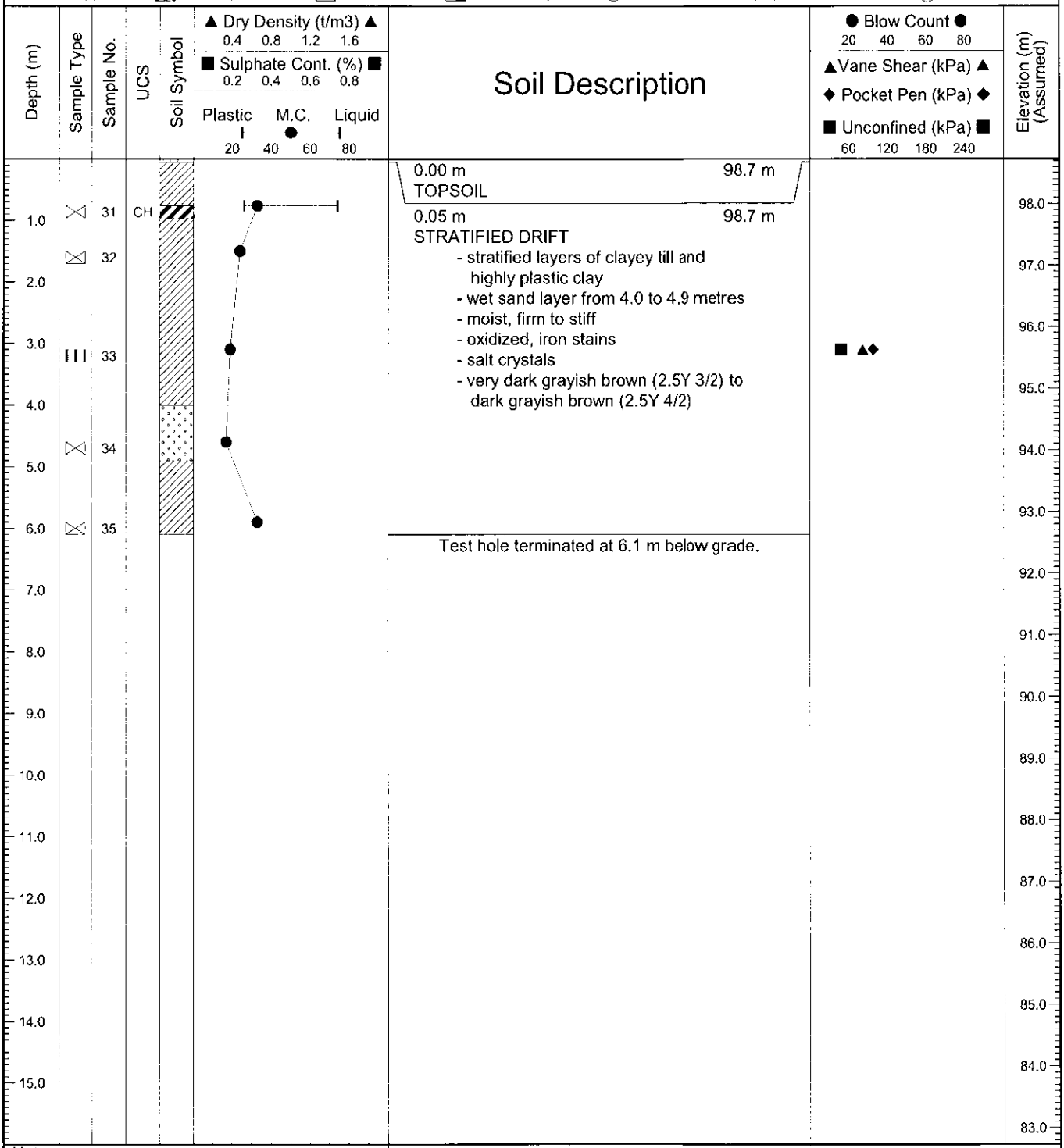
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko
Drawn By: M. Creary
Reviewed By: P. Walsh

Figure No.: GE-1518-2-12
Date Plotted: 10/06/2015

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH107
Project No.: GE-1518-2	Coordinate: 5598866 N; 595942 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 98.73 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 2.4 metres immediately after completion of drilling. Test hole sloughed to 4.0 metres.
3. Water level was measured at 2.2 metres, 2.25 hours after completion of drilling. Test hole had sloughed to 3.5 metres.
4. Test hole was backfilled to surface with drill cuttings.

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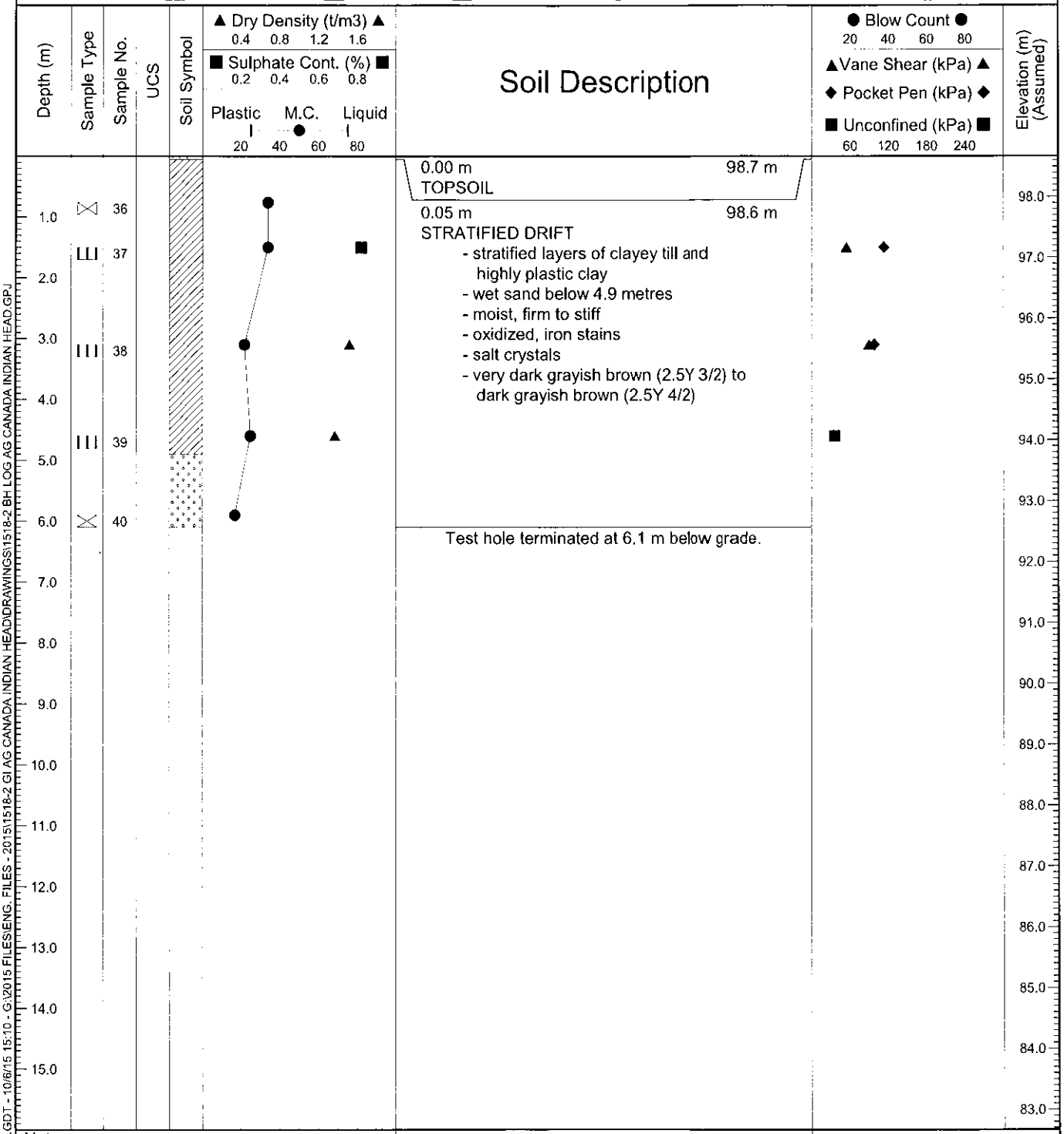
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

	Logged By: R. Yaremko	Figure No.: GE-1518-2-13
	Drawn By: M. Creary	Date Plotted: 10/06/2015
	Reviewed By: P. Walsh	Page 7 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH108
Project No.: GE-1518-2	Coordinate: 5598765 N; 595915 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 98.67 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 3.1 metres immediately after completion of drilling. Test hole sloughed to 4.3 metres.
3. Water level was measured at 1.9 metres, 2.0 hours after completion of drilling. Test hole had sloughed to 3.1 metres.
4. Test hole was backfilled to surface with drill cuttings.

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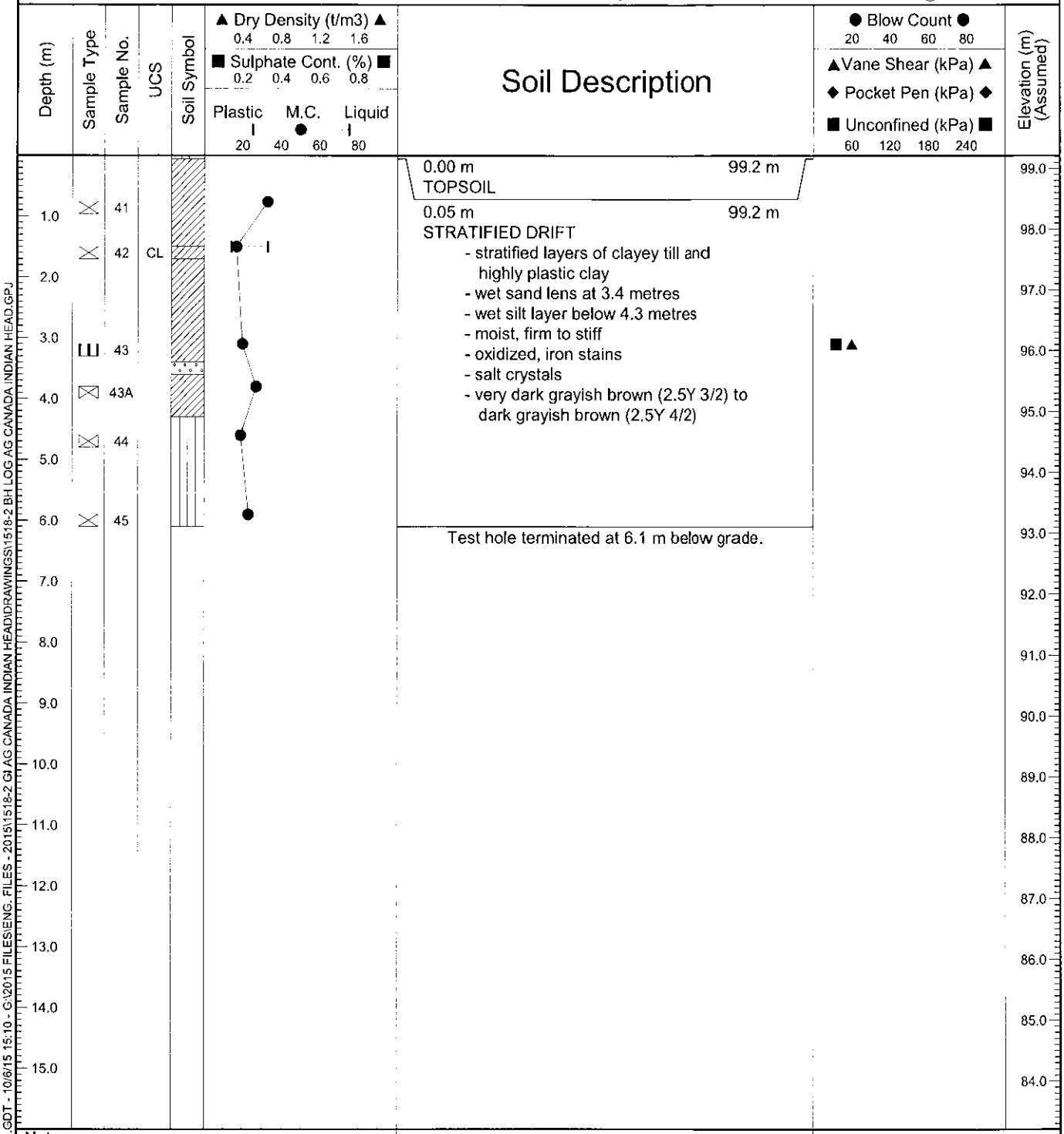
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-14
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 8 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH109
Project No.: GE-1518-2	Coordinate: 5598685 N; 595940 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 99.21 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample



Test hole terminated at 6.1 m below grade.

Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 2.4 metres immediately after completion of drilling. Test hole sloughed to 4.9 metres.
3. Water level was measured at 2.4 metres, 1.75 hours after completion of drilling. Test hole had sloughed to 2.6 metres.
4. Test hole was backfilled to surface with drill cuttings.

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415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko	Figure No.: GE-1518-2-15
Drawn By: M. Creary	Date Plotted: 10/06/2015
Reviewed By: P. Walsh	Page 9 OF 10

Project: Proposed AG-Canada Buildings	Location: SW 19-18-12-W2M	Test Hole No.:TH110
Project No.: GE-1518-2	Coordinate: 5598709 N; 595865 E (NAD83)	Drill Rig: Brat 22
Client: Agriculture & Agri-Food Canada	Elevation: 98.87 m (Assumed)	Date Drilled: 27/04/2015

Sample Type: Shelby Tube | Disturbed | SPT Sample | Pail Sample | No Recovery | Jar Sample

Depth (m) | Sample Type | Sample No. | UCS | Soil Symbol

▲ Dry Density (t/m3) ▲ 0.4 0.8 1.2 1.6

■ Sulphate Cont. (%) ■ 0.2 0.4 0.6 0.8

Plastic M.C. Liquid 20 40 60 80

Soil Description

● Blow Count ● 20 40 60 80

▲Vane Shear (kPa) ▲

◆ Pocket Pen (kPa) ◆

■ Unconfined (kPa) ■ 60 120 180 240

Elevation (m) (Assumed)

Depth (m)	Sample No.	Elevation (m) (Assumed)
0.00		98.9
	TOPSOIL	
0.05		98.8
	STRATIFIED DRIFT - stratified layers of clayey till and highly plastic clay - moist, firm to stiff - oxidized, iron stains - salt crystals - unoxidized below 4.9 metres - wet sand layers - very dark grayish brown (2.5Y 3/2) to dark grayish brown (2.5Y 4/2)	
1.0	46	98.0
1.5	47	97.5
2.0		97.0
3.0	48	96.0
4.0		95.0
4.5	49	94.5
5.0		94.0
6.0	50	93.0
	Test hole terminated at 6.1 m below grade.	
7.0		92.0
8.0		91.0
9.0		90.0
10.0		89.0
11.0		88.0
12.0		87.0
13.0		86.0
14.0		85.0
15.0		84.0
		83.0

Notes:

1. Test hole was excavated on April 27, 2015 using a 150 mm dia. continuous flight auger.
2. Water level was measured at 3.8 metres immediately after completion of drilling. Test hole sloughed to 4.0 metres.
3. Water level was measured at 1.4 metres, 1.5 hours after completion of drilling. Test hole had sloughed to 3.4 metres.
4. Test hole was backfilled to surface with drill cuttings.

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CIVIL & GEOENVIRONMENTAL ENGINEERS
415 - 7th AVENUE, REGINA, SASKATCHEWAN, S4N 4P1

Logged By: R. Yaremko | Figure No.: GE-1518-2-16
Drawn By: M. Creary | Date Plotted: 10/06/2015
Reviewed By: P. Walsh | Page 10 OF 10

APPENDIX A

PRESSURE

TREATED TIMBER

CANADIAN INSTITUTE OF TIMBER CONSTRUCTION

TECHNICAL BULLETIN WP–101

Specifying Timber Foundation Piles

DEFINITION OF FOUNDATION PILES

A Timber Foundation Pile is one which is embedded in the ground and capped with masonry. For example, timber piles supporting buildings, bridge abutments or other structures on masonry footings at or below ground level.

Trestle and Marine piles differ from foundation piles in that an appreciable unsupported length extends above ground level.

PILE QUALITY

In Canada, the requirements for the quality and production of timber piling are specified by Canadian Standards Association Specification O56–1962 "Round Timber Piles".

PILE SIZES

Appendix A to CSA Standard O56–1962 includes a table of pile sizes which are normally available. The table A–1 (repeated below) can be used for specifying piling in two ways.

(i) By minimum tip size – diameter of tip or small end in inches.

(ii) By size designation – size designations correspond to the diameter of the extreme butt or large end in inches.

TABLE A–1 – SIZES OF TIMBER PILES

Size Designation	Size 14	Size 13	Size 12	Size 11	Size 10	Size 9
Diameter at Extreme Butt (Large End) in inches	14	13	12	11	10	9
Length feet	Diameter at Tip (Small End) in inches					
Up to 20	10	10	9	8	7	6
20 to 34	10	9	8	7	6	6
35 to 44	9	8	7	6	–	–
45 to 59	8	7	7	–	–	–
60 to 69	8	7	6	–	–	–
70 to 89	7	6	–	–	–	–
90 to 100	6	5	–	–	–	–

Notes: 1. Diameters are minimum, except tolerances allowed by Clause 4.2.1.5 will apply. i.e. (A variation of minus ½ inch in not more than 25 per cent of the piles of that diameter shall be allowed in the diameter at the tip or at the butt of any one pile, but not in both diameters.)

2. Maximum diameter at butt shall not exceed 20 inches for any size.

3. The table is written in such a way that the butt size governs in most cases other than for very long piles, and tip sizes shown are only restrictive in excluding abnormal piles.

When design requirements are such that tip size only governs the selection of the size of pile, it is recommended that minimum tip size only be specified with maximum butt diameter not to exceed 20 inches.

When selecting a piling species to meet design and length requirements it is advisable to determine its availability or permit the use of one or more alternative species having sufficient strength.

PILE SPECIES

In Canada, species recommended for use as foundation piling are restricted to the following if piles are to be pressure treated:

Pacific Coast Douglas Fir, Jack Pine, Red (Norway) Pine and Lodgepole Pine.

PILE LENGTHS

Piles produced from Jack Pine, Red Pine and Lodgepole Pine are mainly limited in length to 50 feet particularly in the larger sizes. For longer lengths, Douglas Fir is available for use everywhere.

PRESSURE TREATMENT

To safeguard against decay and insect attack, the National Building Code of Canada requires that timber piles which are cut off above the permanent water table be pressure treated in accordance with the O80 Series of the Canadian Standards Association Specifications.

Piles to be cut off below the ground water level should be pressure treated as protection against exposure to decay from possible lowering of the ground water level.

Standard C12 of the O80 series of C.S.A. restricts recognition for timber foundation piles to the following species, preservative and retention of preservative.

Species	Preservative	Minimum Retention of Preservative
Pacific Coast Douglas Fir Lodgepole Pine Red (Norway) Pine Jack Pine	Creosote	12 lbs per cu. ft. of wood

TYPICAL SPECIFICATION

The following is suggested as a typical specification for timber foundation piles:

> "Timber piles shall be in accordance with CSA Standard O56–1962 and Size _____ shown in Appendix A thereof. Species shall be _____, _____ or _____.
>
> All timber piles shall be pressure treated with creosote in accordance with Standard C12 of the O80 series of CSA Specifications to a net retention of 12 pounds per cubic foot of wood."

FIELD TREATMENT OF PILE HEADS

Specifications should also include provisions for protecting the pile heads after field cut-off. The following paragraph, an excerpt from C12, is recommended for this purpose.

> "Pile heads, after cut-offs are made to final elevation, shall be brushed liberally with two coats of hot creosote, followed by an application of a coat of coal tar pitch. There shall be sufficient interval between applications to permit absorption of each coat before the succeeding one is applied".

ORDERING INFORMATION

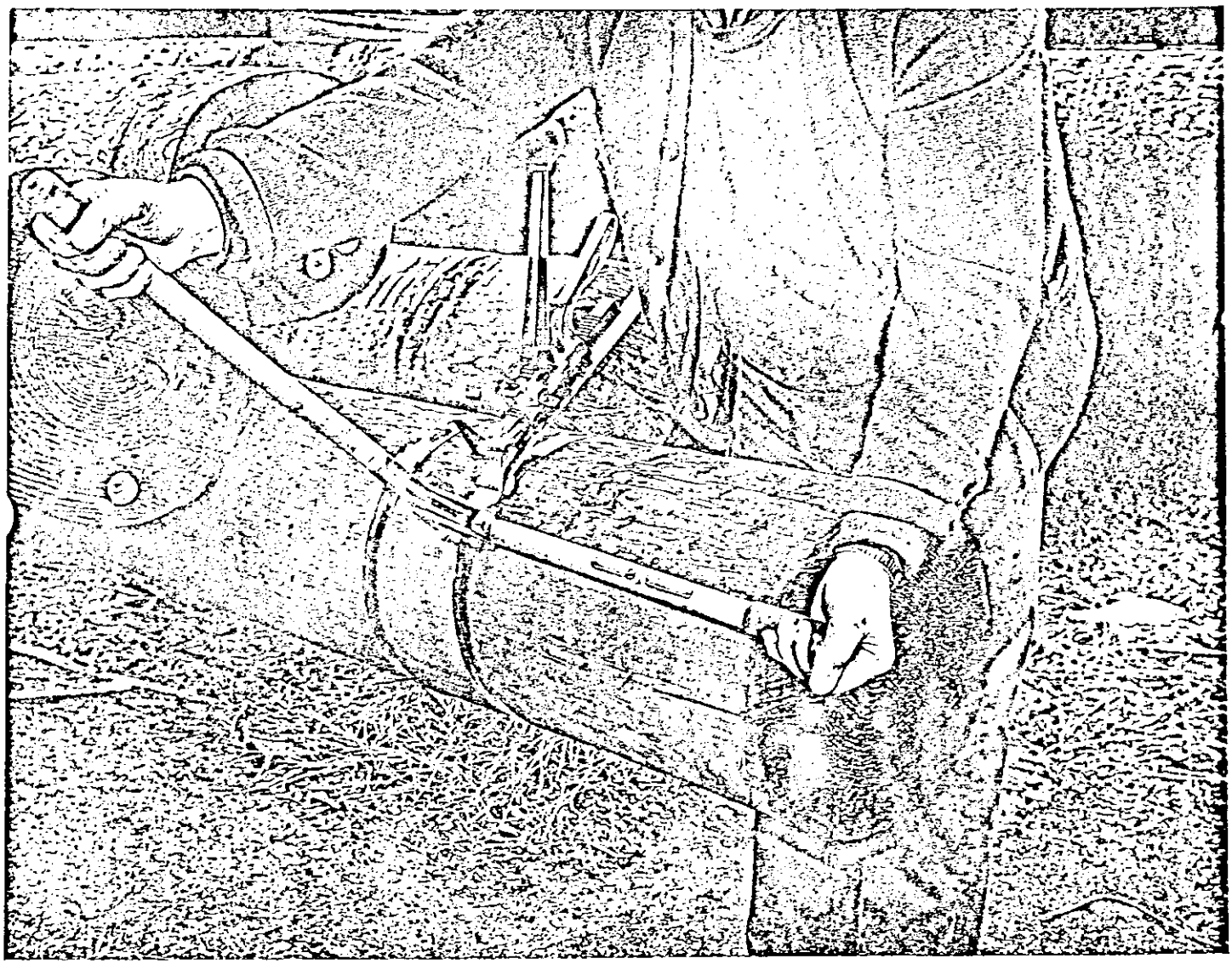
Piles should be ordered by the piece and the following information should be given:

(a) Species and quality (CSA Standard O56).
(b) Size and length.
(c) Quantity in each length.
(d) Type of peeling (Piles to be treated must have inner and outer bark removed. i.e. Clean Peeled, as defined in CSA O56.)
(e) Preservative treatment
  (i) Net retention of preservative (12 lbs creosote per cu. ft. of wood).
  (ii) CSA standard (Pressure treatment in accordance with latest CSA Specification, C12, for Foundation Piles).
(f) Shipping instructions.

Information for this bulletin has been condensed from the book "Pressure Treated Timber Piles", a comprehensive source of reference and current design procedures and field practices. Available from the Canadian Institute of Timber Construction at $4.50 per copy postpaid.

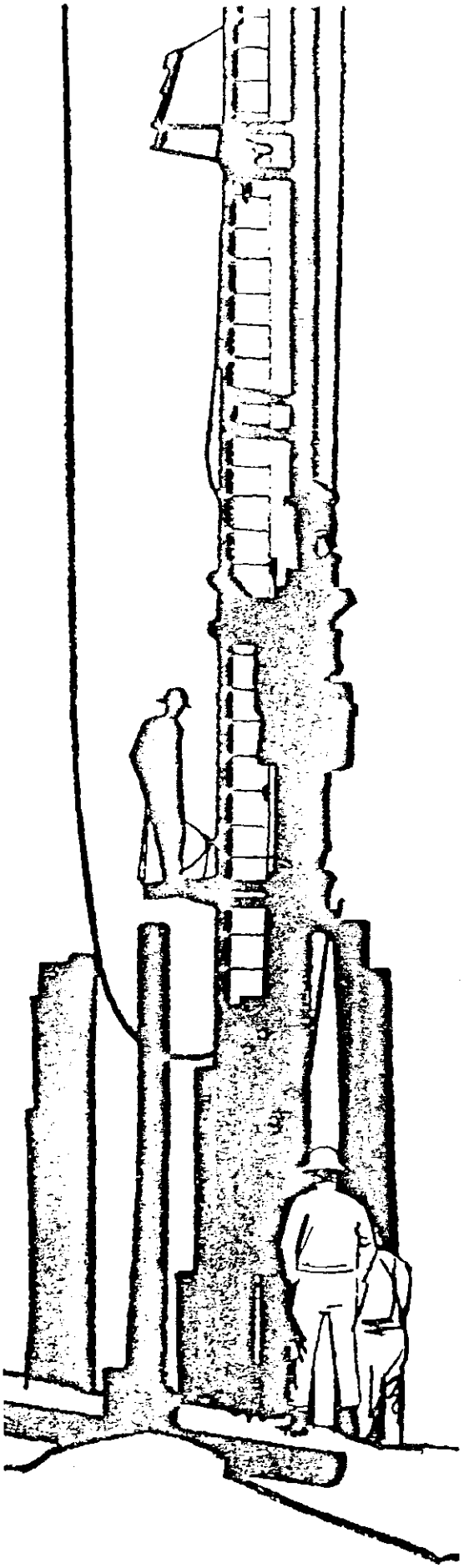
PH

SPECIFICATION FOR STRAPPING TIMBER PILING



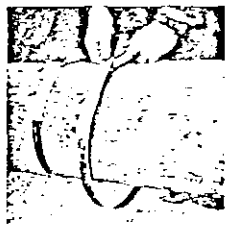
AMERICAN WOOD PRESERVERS INSTITUTE

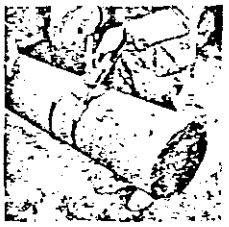
1651 OLD MEADOW ROAD MCLEAN, VA. 22101

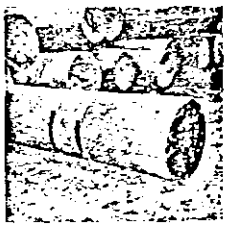


strapping of timber piling for severe driving conditions minimizes driving problems allows more driving energy—

strapping procedure treated foundation piling







TYPE OF STRAP

1¼ inch wide, .031 thickness cold rolled, fully heat treated, high tensile strapping, painted and waxed. (This strap has a tensile strength of 5100 lbs.)

TYPE OF CLIP

2¼" long 20 gauge, seal should be crimped twice with notch type sealer. (This furnishes a joint yielding 80% of the strap tensile strength, i.e., 4080 lbs.)

TOOLS REQUIRED

Either a hand operated or pneumatic tensioner may be used.

METHOD OF APPLYING

strapping should encircle pile once and be tensioned as tight as possible.

LOCATION OF STRAPPING

Two straps, one approximately 18" and the other approximately 24" from the butt. Additional straps at the tip and intermediate points may also be utilized depending on pile lengths, handling or driving conditions.

WHEN TO APPLY

After pressure treating or as conditions warrant during driving.

AWPI District Offices:

1499 Bayshore Highway, Burlingame, California 94010
P.O. Box 426, Picayune, Mississippi 39466
P.O. Box 55066 Station B, Omaha, Nebraska 68155
200 Harrison Avenue, Harrison, New York 10528
1021 Yeon Building, Portland, Oregon 97204
P.O. Box 856, Columbia, South Carolina 29202

TYPES OF ANCHORS FOR CONNECTING TIMBER PILES

TO CONCRETE CAPS OR GRADE BEAMS

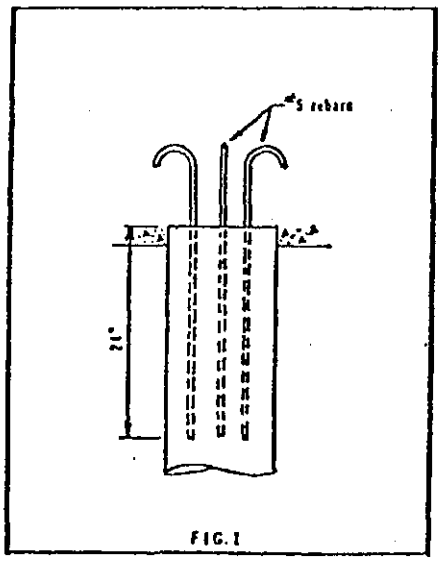


FIG. 1

AXIAL DOWELS

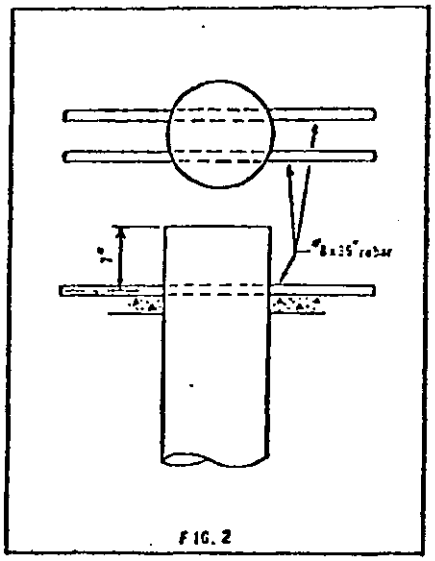


FIG. 2

TRANSVERSE DOWELS

TYPE OF ANCHOR	WORKING LOAD Per Unit Illustrated	Minimum Concrete Cover
Fig. 1 - Dowels, axial 3-#5 x 24"	10,584 lbs.	2"
Fig. 2 - Dowels, transverse 2-#8 x 36"	10,060 lbs.	9½"

APPENDIX B

3300 - 1 DESCRIPTION

1.01 The work shall consist of spreading and compacting screened or crushed aggregate on a prepared surface.

1.02 The following definitions shall apply for this specification:

(a) Mean:

The arithmetic average of a set of 'n' test results constituting the sample.

(b) Moving average:

The arithmetic mean of 3 consecutive test results.

(c) Sub-base aggregate:

The aggregate before mixing, when binder is to be added or the aggregate before spreading and compacting, when no binder is to be added.

(d) Sub-base mix:

The sub-base aggregate after mixing with binder and water but before spreading and compacting.

(e) Sub-base course:

The sub-base aggregate or sub-base mix in place on the road during and after spreading and compacting.

3300 - 2 MATERIALS

Aggregate

2.01 Sub-base aggregate shall be composed of sound, hard, and durable particles of sand, gravel and rock free from injurious quantities of soft or flaky particles, shale, loam, clay balls and organic or other deleterious material.

3300 - 3 CONSTRUCTION

General

3.01 (a) Sub-base course shall comply with the requirements listed in Table 1:

TABLE 1

Sieve Designation	Percent By Weight Passing Canadian Metric Sieve Series		
	TYPE		
	6	8	10
50.0 mm	100.0	100.0	100.0
2.0 mm	0 - 80.0	0 - 90.0	
400 um	0 - 45.0	0 - 60.0	
160 um	0 - 20.0	0- 25.0	
71 um	0 - 6.0	0 - 15.0	0 - 20.0
Plasticity Index (all types)	0 - 6.0		

3505 - 2 MATERIALS

Aggregate

2.01 Base aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock free from injurious quantities of elongated, soft or flaky particles, shale, loam, clay balls and organic or other deleterious material.

3505 - 3 CONSTRUCTION

General

3.01 (a) Base course shall comply with the requirements listed in Table 1.

TABLE 1

SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING CANADIAN METRIC SIEVE SERIES		
	TYPE		
	31	33	35
31.5 mm	100.0		
18.0 mm	75.0 - 90.0	100.0	100.0
12.5 mm	65.0 - 83.0	75.0 - 100.0	81.0 - 100.0
5.0 mm	40.0 - 69.0	50.0 - 75.0	50.0 - 85.0
2.0 mm	26.0 - 47.0	32.0 - 52.0	32.0 - 65.0
900 um	17.0 - 32.0	20.0 - 35.0	20.0 - 43.0
400 um	12.0 - 22.0	15.0 - 25.0	15.0 - 30.0
160 um	7.0 - 14.0	8.0 - 15.0	8.0 - 18.0
71 um	6.0 - 11.0	6.0 - 11.0	7.0 - 12.0
Plasticity Index	0 - 7.0	0 - 6.0	0 - 5.0
Fractured Face %	50.0 Minimum		
Light Weight Pieces %	5.0 Maximum		

(b) A tolerance of 3% in the percent by weight passing the maximum size sieve shall be permitted providing 100% of the oversize passes the 40.0 mm sieve for Type 31 base course and the 22.4 mm sieve for Types 33 and 35 base course.

3.02 The following shall apply to Department owned or controlled aggregate sources shown on the plans or as described in the Special Provisions:

(a) Overburden shall be removed from material deposits in accordance with Specification 2260 For Removal Of Overburden.

(b) Rock passing a 450 mm square opening screen and larger than the maximum specified size shall be crushed and incorporated simultaneously throughout the crushing operation.

(c) Stockpiles shall be constructed in accordance with Specification 3600 For Stockpiling Aggregates.

3.03 Binder, filler, and blender sand shall be provided in accordance with Specification 3400 For Binder, Filler And Blender Sand.

3.04 Binder, filler and blender sand shall be added using a separate conveyor system.

3.05 Binder, filler and blender sand feeds shall be accurately controlled and coordinated.

PART 1 GENERAL

1.1 Section Includes

Note: See Construction Drawings

.1 Excavation for building foundations in accordance with underground locates, construction drawings and Geotechnical Report. LOCATE EXISTING UNDERGROUND UTILITIES (conduit, piping, etc.).

.2 Excavation for asphalt paving, landscaping, gravel paving, and for granular base and sub-base material installation, as per recommendations of the Geotechnical Report.

.3 Excavation for site structures/footing trenches, underground utilities and roadways.

1.2 Related Sections

.1 Section 014000 - Quality Control: Inspection of bearing surfaces.

.2 Section 015000 - Construction Facilities and Temporary Controls: De-watering excavations and water control.

.3 Section 312000 - Geotechnical Investigation Report.

.4 Section 312311 - Backfilling.

.5 Section 312312 - Trenching: Excavation for utility trenches.

1.3 Field Measurements

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

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 Preparation

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

.5 Identify known underground, above ground, and aerial utilities. Stake and flag locations.

.6 Notify utility company to remove and relocate utilities.

.7 Protect above and below grade utilities, which are to remain.

.8 Protect plant life and other features remaining as a portion of final landscaping.

.9 Protect benchmarks and curbs from excavation equipment and vehicular traffic.

3.2 Excavation

.1 Excavate subsoil required to accommodate building foundations, paving, site structures, construction operations. **NOTES: locate underground utilities and protect them during construction. Excavation work must be performed in the February-March 2016 interval. Provisions for cold-weather digging/drilling must be included in the scope of work,**

.2 Excavate to working elevation for piling work.

.3 Machine slope banks to 45 degrees.
.4 Excavation cut not to interfere with normal bearing splay of foundation.
.5 Grade top perimeter of excavation to prevent surface water from draining into excavation.
.6 Hand trim excavation. Remove loose matter.
.10 Remove lumped subsoil, boulders, and rock up to 0.25 cu m measured by volume.
.8 Remove foundations of existing building, which is to be removed by others.
.9 Notify Departmental Representative f unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
.10 Correct unauthorized excavation at no extra cost to Owner.
.11 Correct areas over excavated by error in accordance with Section 02223.
.12 Stockpile excavated material in area designated on site and remove excess material not being reused, from site.

3.3 Field Quality Control

.1 Field inspection will be performed under provisions of Section 014000.
.2 Provide for visual inspection of bearing surfaces. Refer to Section 014000 Quality Control and Section 312311 Backfilling.

3.4 Protection

.1 Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
.2 Protect bottom of excavations and soil adjacent to and beneath foundation from freezing, in case work is being done during the cold season.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Building perimeter and site structure backfilling to sub-grade elevations.
.2 Site filling and backfilling.
.3 Fill under paving.
.4 Consolidation and compaction.
.5 Fill for over-excavation.
.6 Sheet vapour barrier and fill.

1.2 Related Sections

.1 Section 014000 - Quality Control: Testing fill compaction.
.2 Section 312000 – Geotechnical Investigation Report. Recommendations to be complied with.
.3 Section 312310 - Excavation.
.4 Section 312312 - Trenching: Backfilling of utility trenches.
.5 Section 033000 - Cast-in-Place Concrete: Concrete materials.

1.3 References

.1 ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
.2 ASTM D698 - Test Methods for Moisture, Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb. (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
.3 ASTM D1556 Test Method for Density of Soil in Place by the Sand-Cone Method.
.4 ASTM D1557 Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 Samples

.1 Submit samples to requirements of Section 013300.
.2 Submit 4.5 kg sample of each type of Type fill to testing laboratory, in air tight containers.

PART 2 PRODUCTS

2.1 Fill Materials

.1 Type A: Granular sub-base, Saskatchewan Highways and Transportation Type 10.
.2 Type B: Granular base consisting of 18 mm maximum, Saskatchewan Highways and Transportation Type 33, crushed gravel with a minimum CBR of 60 and compacted to not less than 100 percent of Standard Proctor maximum Dry Density (ASTM D698).
.3 Type C: Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ASTM C136 within the following limits:

Sieve Size	Percent Passing
4.75 mm	100
1.40 mm	10 to 100
300 micro m	5 to 90
150 micro m	4 to 30
75 micro m	0

.4 Type D: Pea Gravel: Natural stone; free of clay, shale, organic matter; in accordance with ASTM C136 to the following:
  .1 Minimum Size: 6 mm

.2 Maximum Size: 16 mm

.5 Type E: Concrete sand.

.6 Type F: Sub-base: Sand material recovered from the site or new engineered granular fill, Saskatchewan Highway Standard Type 8, 10 or 12 A maximum 18 mm aggregate size, and compacted to 100 percent of the Standard Proctor Dry Density.

.7 Subsoil: Reused, free of gravel larger than 75 mm size, and debris.

2.2 Accessories

.1 Vapour Retardant: 10 mm (min.) membrane manufactured from virgin polyolefin resins, and when tested according to all requirements of ASTM E1745, shall meet the following minimum performance requirements:

.1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B or ASTM F1249).

.a As received: 0.0183 perms.

.b After Wetting and Drying: 0.0210 perms.

.c Resistance to Plastic Flow and Temperature: 0.0197 perms.

.d Effect Low Temperature and Flexibility: 0.0212 perms.

.e Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0198 perms.

.2 Puncture Resistance (ASTM D1709): >3,500 grams.

.3 Tensile Strength ASTM E154, Section 9: 52 Lb. Force/Inch.

PART 3 EXECUTION

3.1 Examination

.7 Verify fill materials to be reused, is acceptable.

.8 Verify foundation perimeter drainage installation has been inspected.

.9 Verify underground tanks are anchored to their own foundation to avoid floatation after backfilling.

3.2 Preparation

.1 Generally, compact sub-grade to density requirements for subsequent backfill materials.

.2 Cut out soft areas of sub-grade not capable of insitu compaction. Backfill with Type D fill and compact to density equal to or greater than requirements for subsequent backfill material.

.3 Prior to placement of aggregate base course material at paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with ASTM D698.

3.3 Backfilling

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

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

.3 Granular Fill: Place and compact materials in continuous layers not exceeding 150 mm compacted depth.

.10 Soil Fill: Place and compact material in continuous layers not exceeding 200 mm compacted depth.

.11 Employ a placement method that does not disturb or damage foundation perimeter drainage, foundation damp proofing.

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

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

.14 Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
.15 Slope grade away from building minimum 150 mm in 3 m, unless noted otherwise.

.16 Make grade changes gradual. Blend slope into level areas.
.17 Remove surplus backfill materials from site.
.18 Leave fill material stockpile areas completely free of excess fill materials.

3.4 Tolerances

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

3.5 Field Quality Control

.1 Field inspection and testing will be performed under provisions of Section 014000.
.2 Tests and analysis of fill material will be performed in accordance with ASTM D698 and with Section 014000.
.3 Compaction testing will be performed in accordance with ASTM D1556 ASTM D1557 ASTM D698 and with Section 014000.
.4 If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
.5 Frequency of Tests:
  .1 Excavated Surfaces: When undisturbed excavated surfaces are being prepared, make a series of three tests for each 500 square m area.
  .2 Backfill in Utility Trenches: Make three tests for every two lifts of compacted fill for each 500 square m area.
.6 Proof roll compacted fill surfaces under paving.

3.6 Protection of Work

.1 Protect finished Work under provisions of Section 015000.
.2 Re-compact fills subjected to vehicular traffic.

3.7 Schedule

.1 Interior Crawl Spaces (if any):
  1. Subsoil fill, compacted to 90 percent,
  2. Cover with Type C fill, 50 mm thick, compacted to 95 percent.
.2 Exterior Side of Foundation Walls and Over Granular Filter Material and Foundation Perimeter Drainage:
  1. Subsoil for upper 1 m, free draining backfill material to top of Type C fill above drain tile, 200 mm each lift, compacted to 90 percent.
.3 Fill Under Grass Areas:
  1. Subsoil, to 150 mm below finish grade, compacted.
.4 Fill Under Landscaped Areas:
  1. Subsoil fill, to 300 mm below finish grade, compacted
.5 Fill Under Light Duty Asphaltic Concrete Areas as per Geotechnical Investigation Report, and if not noted in the report, to be as follows:
  .1 Minimum 150 mm Type B fill material.
  .2 Type F as required.
.6 Fill Under Heavy Duty Asphaltic Concrete Areas as per Geotechnical Investigation Report, and if

not noted in the report, to be as follows:

.1 Minimum 240 mm Type B fill material.

.2 Type F as required.

.7 Sub-Grade Preparation for Asphaltic Concrete Paving:

.1 Excavate to the required design elevation.

.2 Excavate and waste all debris, deleterious materials and organic soils that are exposed below the initial excavation depth. Scarify the sub-grade to a minimum average of 98 percent of Standard Proctor Maximum Dry Density.

.3 Re-establish the design sub-grade elevation (to the bottom of the pavement sub-base) by placement of Standard Proctor Maximum Dry Density.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes
.1 Excavate trenches for utilities from outside building to municipal utilities (if any).
.2 Compacted bedding under and fill over utilities to sub-grade elevations.
.3 Backfilling and compaction.

1.2 Related Sections
.1 Section 014000 - Quality Control: Testing fill compaction.
.2 Section 015000 - Construction Facilities and Temporary Controls: Water control in excavations.
.3 Section 312313 - Site Grading: Topsoil and subsoil removal from site surface.
.4 Section 312310 - Excavation: General building excavation.
.5 Section 312311 - Backfilling: General backfilling.
.6 Divisions 22-23 - Mechanical: Sewer piping, water piping, gas piping, from building to municipal utilities, and Division 26 – Electrical

1.3 References
.1 ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
.2 ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
.3 ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
.4 ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 Test Samples
.1 Submit samples in accordance with Section 014000.
.2 Submit 4.5 kg sample of each type of fill to testing laboratory, in air tight containers.

1.5 Field Measurements
.1 Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

2.1 Fill Materials
.1 Materials as specified in Section 312311.

PART 3 EXECUTION

3.1 Examination
.1 Verify fill materials to be reused, is acceptable.

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

3.3 Excavation
.1 Excavate subsoil required for sanitary sewer, water, gas piping to municipal utilities.
.2 Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

.3 Excavation shall not interfere with normal 45 degree bearing splay of foundations.

.4 Hand trim excavation. Remove loose matter.
.5 Remove lumped subsoil, boulders, and rock up to 0.25 cu m, measured by volume.
.6 Correct unauthorized excavation at no cost to Owner.
.7 Correct areas over excavated by error in accordance with Section 312310.
.8 Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.4 Bedding

.1 Support pipe and conduit during placement and compaction of bedding fill.

3.5 Backfilling

.1 Backfill trenches to contours and elevations with unfrozen materials.
.2 Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy sub-grade surfaces.
.3 Granular Fill: Place and compact materials in continuous layers not exceeding 150 mm compacted depth.
.4 Soil Fill: Place and compact material in continuous layers not exceeding 150 mm compacted depth.
.5 Employ a placement method that does not disturb or damage conduit duct in trench.
.6 Maintain optimum moisture content of backfill materials to attain required compaction density.
.7 Remove surplus backfill materials from site.
.8 Leave fill material stockpile areas completely free of excess fill materials.

3.6 Tolerances

.1 Top Surface of general backfilling: Plus or minus 25 mm from required elevations.

3.7 Field Quality Control

.1 Field inspection and testing will be performed under provisions of Section 014000, and Tests and analysis of fill material will be performed in accordance with ASTM D698.
.3 Compaction testing will be performed in accordance with ASTM D698 and with Section 014000.
.4 If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.8 Protection of Work

.1 Protect finished Work under provisions of Section 015000.
.2 Re-compact fills subjected to vehicular traffic.

3.9 Schedule

.1 Underground Services
  .1 Pipe and conduit bedding and immediate protective cover: Cradle half diameter of pipe or conduit using 100 mm depth of Type D fill. After pipe or conduit is in place, cover with 600 mm depth of Type D fill.
  .2 Cable & cable duct bedding and immediate protective cover: Cover bottom of trench with 150 mm Type D fill. After cables and ducts are in place, side fill ducts with type D fill to top. Tamp around ducts with hand tampers, cover with 600 mm of same material.

.3 Remaining fill: In areas within buildings and where paving and walks occur, fill remainder with type D fill. In other areas, fill to sub-grade level using Type G fill.

.4 Compaction: Compact bedding and immediate protective cover to 95% density. In areas within buildings and where paving and walks occur, compact remainder of fill to 95% density. In other areas, compact remainder of fill to 85%.

.5 Notify Departmental Representative prior to backfilling trenches.

END OF SECTION

PART I GENERAL

1.1 Section Includes

.1 Remove topsoil and stockpile for later reuse, and remove excess from site.
.2 Excavate topsoil and stockpile for later reuse and remove excess from site.
.3 Grade and rough contour site.

1.2 Related Sections

.1 Section 312000 - Geotechnical Investigation Report
.2 Section 312310 - Excavation: Building excavation.
.3 Section 312311 - Backfilling: Building and site backfilling.
.4 Section 312312 - Trenching: Trenching and backfilling for utilities.

1.3 Project Record Documents

.1 Submit documents in accordance with Section 017839.
.2 Accurately record location of utilities remaining, re-routed utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 Protection

.1 Protect benchmarks, roads, sidewalks, paving.
.2 Protect above or below grade utilities which are to remain.
.3 Repair damage.

PART 2 PRODUCTS

2.1 Materials

.1 Topsoil: Excavated material, graded free of roots, rocks larger than 25 mm, subsoil, debris, and large weeds.
.2 Subsoil: Excavated material, graded free of lumps larger than 150 mm, rocks larger than 75 mm, and debris.

PART 3 EXECUTION

3.1 Preparation

Note: Site grading complete, but will be disturbed by the new building addition. Undertake site inspection and document extent of topsoil removal and stock piling and extent of required re-contouring.

.1 Identify required lines, levels, contours, and datum.
.2 Identify known below grade utilities. Stake and flag locations.
.3 Identify and flag above grade utilities.
.4 Maintain and protect existing utilities remaining which pass through work area.
.5 Notify utility company to remove and relocate utilities.

.6 Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Departmental Representative.

3.2 Topsoil / Paving Excavation

.1 Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded and stockpile in area designated on site, remove excess topsoil not being reused from site.
.2 Remove portions of existing paving (sidewalk)/curb as required, with provisions for re-connecting new paving (sidewalk) after new addition gets built.
.3 Do not excavate wet topsoil.
.4 Stockpile topsoil to depth not exceeding 2.5 m. Cover to protect from erosion.

3.3 Subsoil Excavation

.1 Excavate subsoil from areas to be re-landscaped or re-graded and stockpile in area designated on site remove excess subsoil not being reused from site.
.2 Do not remove wet subsoil.
.3 Stockpile subsoil to depth not exceeding 2.5 m.
.4 When excavation through roots is necessary, perform work by hand and cut roots with sharp axe.

3.4 Tolerances

.1 Top Surface of sub-grade: Plus or minus 25 mm.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes

.1 Drilled cast-in-place augured piles.
.2 Supply only of dowels to superimposed concrete.
.3 Boring, pile shaft, concrete, reinforcing steel and other related work to provide complete foundation system.
.4 Placing steel shaft casings as required.
.5 De-watering of bored holes.
.6 Placing concrete and reinforcing steel and preparing piles for capping.
.7 Removal of waste materials from bored holes.

1.2 Related Sections

.1 Geotechnical Investigation Report Section 312000.
.2 Excavation Section 312310.
.3 Backfill Section 312311.
.4 Concrete Form Work Section 031000.
.5 Concrete Reinforcement Section 032000.
.6 Cast-in-Place Concrete Section 033000.

1.3 Reference Standards

.1 CAN3-A23.1 (Latest Edition), CSA A23.1-94 "Concrete Materials and Methods of Concrete Construction".
.2 CAN3-A23.2 (Latest Edition), CSA A23.2-94 "Methods of Test for Concrete".
.3 CSA G30.18-M92-(Latest Edition) "Billet Steel Bars for Concrete Reinforcement".
.4 CAN3-A23.3-(Latest Edition) "Design of Concrete Structures for Buildings".

1.4 Quality Assurance

.1 If required by Consultant, produce satisfactory proof of successful installation experience with this type of foundation in similar conditions and with piles of similar capacities.

1.5 Soils Conditions

.1 The soils information is provided in good faith for the Contractor's guidance. This Consultant assumes no liability for the accuracy of this information nor does the furnishing of this information relieve the Contractor of the responsibility for determining the nature of the site conditions for himself.
.2 See the Geotechnical Investigation Report Section 312000. Recommendation for bored and augured piles to be complied with.

1.6 Submittals

.1 Prior to commencement of work, submit shop drawings for reinforcing steel in accordance with Section 031300, Submittals.
.2 Submit Record Drawings survey of completed work indicated pile centers, top elevations and projecting steel layouts, prepared and signed by a Land Surveyor registered in the province.
.3 Submit "Supplementary Data" on each pile as follows;
    .1 Bottom elevation
    .2 Plumbness

.4 Submit Record Drawings and supplementary Data immediately upon completion of superimposed work.

1.7 Protection

.1 Provide steel shaft liners during inspections and manual excavation of piles. Size liners to suit shaft dimensions.

.2 Where shaft excavation requires continuous support to prevent sides sloughing in during placement of reinforcing steel and concrete, provide steel liner and leave in place at Owner's expense.

1.8 Inspection and Testing

.1 Inspection of piling work will be performed by an Inspection Agency appointed and paid by the Contractor.

.2 Concrete sampling and testing will be performed by a Testing Agencies appointed and paid by the Contractor. See Section 014000 Quality Control.

.3 Before placing any concrete, notify Inspection and Testing Agencies and the Departmental Representative in ample time to permit scheduling inspections and tests.

.4 Prior to commencement of work, submit statistically valid evidence of the past performance of the mix design to the Departmental Representative for review.

.5 Three concrete test cylinders will be taken for every 50 m3 or less of concrete placed, and at least three concrete test cylinders will be taken on any day when concrete is placed

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

.7 Slump tests will be taken as necessary to verify quality of concrete. The concrete and atmospheric temperatures will also be recorded.

.8 Testing of concrete will be performed in accordance with CAN/CSA A23.2-94.

.9 At no cost to the Owner, retest as required due to defective materials or workmanship.

.10 Inspection firm may inspect shaft and bottom bearing prior to placement of concrete or reinforcing. Co-operate and schedule inspection visits.

1.9 Field Records

.1 Maintain accurate records of each pile placed, including the following;

- .1 Pile sizes and lengths.
- .2 Final bearing and head elevations.
- .3 Condition of base materials.
- .4 Tested concrete strengths; concrete slumps; date and time concrete placed.
- .5 Reinforcing details.
- .6 Shaft diameters.

.2 Submit three copies of field records to Departmental Representative.

PART 2 PRODUCTS

2.1 Reinforcing Steel

.1 Reinforcing Steel: deformed steel bars conforming to requirements of CSA G30.18-M94 (Latest Edition); 300 MPa yield strength for 10 M bars; 400 MPa yield strength for 15 M and larger.

.2 Reinforcement to conform to standards as specified under Section 03200 Concrete Reinforcement. Submit shop drawings of reinforcing steel to Consultant in accordance with the requirements of Section 032000.

.3 Length of reinforcement to be shown on drawings.

.4 No splicing in reinforcement permitted unless specifically shown on drawings or approved by Consultant. Where splices permitted length = 36 bar diameters minimum; adjacent spliced staggered minimum full lap length.

.5 Welding ties to main reinforcement not permitted.

2.2 Concrete Materials

.1 Cement: High Sulfate Resistant (HS) hydraulic cement conforming to CAN3-A5-93 (Latest Edition).

.2 Coarse and Fine Aggregates: Standard concrete type, conforming to CAN3-A23.1-94 (Latest Edition).

.3 Water: Clean and free of injurious amounts of oil, alkali, organic matter or other deleterious materials.

.4 As per CSA A23.1 1-M04, minimum 56 day compressive strength for concrete, 35 mpa, with a minimum water cement ration of 0.4.

2.3 Admixtures

.1 Air Entrainment: To CSA A266.1-M78 (Latest Edition) "Air Entraining Admixtures for Concrete".

.2 Chemicals: To CSA A266.2-M78 (Latest Edition) "Chemical Admixtures for Concrete"; water reducing, strength increasing Type WN - normal setting.

.3 Pozzolanic Mineral: To CSA A266.3-A23.5-M86 (Latest Edition) "Pozzolanic Mineral Admixtures for use in Portland Cement Concrete". Typcor Type F fly ash is permitted in piles only to a maximum of 15% of the cement content.

.4 Use of calcium Chloride in concrete is strictly prohibited.

2.4 Concrete Mix

.1 Mix concrete in accordance with the following;

UNIT	MEASUREMENT
Minimum compressive strength	35 MPa at 28 days
Aggregate size (maximum)	20 mm
Air content (Category 2)	4% to 7%
Slump	75 +/- 25 mm
Cement symbol	Type 50

Minimum cement content to e 280 kg/cubic meters.
Maximum free water/cement to be ≤ 0.40."

.2 Chemicals: To CSA A266.2-M78 (Latest Edition), "Chemical Admixtures for Concrete"; water reducing, strength increasing Type WN - Normal setting.

.3 Pozzolanic Mineral: To CSA A23.5-M86 (Latest Edition) "Pozzolanic Mineral Admixtures for use in Portland Cement Concrete". Fly ash is permitted in piles only and can be maximized providing w/cm ratio and strength requirements are met.

.4 Use of calcium chloride in concrete is strictly prohibited.

2.5 Casing

.1 Removable steel protective casing adequate for its function.

PART 3 EXECUTION

3.1 Examination

.1 Ensure that site conditions at each pile location are adequate to support piling equipment to properly install piles and permit load testing when required.

3.2 Preparation

.1 Locate foundations with reference to building lines and level.

.2 Protect any survey reference points during construction.

.3 Locate underground utility lines prior to the commencement of piling and be responsible for any disruptions.

.4 Provide necessary equipment including pumps, piping and temporary drains and trenches.

.5 Do no discharge drainage water into municipal sewers without municipal approval.

3.3 Installation

.1 Bore pile holes continuously until required depth is reached.

.2 Do not bore for adjacent piles less than 48 hours after piles have been formed unless piles are more than 1500 mm apart.

.3 Immediately following boring, install steel casings in excavations required to prevent cave-ins and water entry.

.4 If removable liner is required, withdraw liner as concrete is placed. Maintain at least 1.5 m depth of concrete in liner at all times.

.5 Remove boulders as encountered.

.6 Permit inspection of pile holes to verify bell dimensions and to confirm that required soil bearing values are available.

.7 Maximum permissible error in location 40 mm in any direction. Place piles not more than 2 percent of their lengths out of plumb or batter called for on drawings. Elevation of top of piles to be within 25 mm of elevation called for on drawings. Reinforcing steel clearances within 15 mm of dimensions called for on drawings.

.8 Where water is encountered, pump to maintain dry hole until concrete placement is completed.

.9 Reinforce in accordance with drawings. Place reinforcement and secure in position. Provide concrete cover in accordance with Clause 12, CAN/CSA-A231 (Latest Edition). Conform to CSA W186 for welding.

.10 Place concrete carefully using chutes or elephant trucks to direct concrete down shaft to minimize segregation.

.11 Place concrete by means of a tremie should an inflow of water occur that cannot be removed by pumping. Place to a height sufficient to affect a seal. Notify Departmental Representative prior to carrying out this work.

.12 Form pile tops at cut-off elevations. Length of friction piles indicated on drawings, to be from cutoff elevations where noted or underside of grade beams, pile caps or equipment bases.

.13 Ensure friction piles develop full friction value of soils encountered.

.14 Vibrate top 3.0 m continuously during placement.

.15 Upon completing concrete placement, fill reminder of hole with granular fill to minimum depth of 1.0 m above concrete.

.16 Cure concrete in accordance with CAN/CSA-A23.1 (Latest Edition).

.17 Provide cold weather protection as required to maintain temperature of 22° for 3 days or 10° for 5 days after placing concrete.

.18 Schedule work so that excavations are filled with concrete as soon as completed. If conditions prevent placement of concrete on same day, protect excavation overnight and allow for re-cleaning and re-inspection prior to placement of concrete.

.19 Minimum pile diameter as per drawings.

.20 Piles placed outside above tolerances may be rejected by the Departmental Representative. Place additional piles and pile caps as directed by the Departmental Representative to replace rejected piles entirely at the Contractor's expense.

.21 Bore piles using power augers to suit diameter and length of piles indicated on drawings. Use only personnel well experienced in this trade and provide to the Departmental Representative as requested, experience record of personnel actually engaged in the work. Remove all tailings and debris from area of bore holes prior to casting concrete. Cover bore hole to prevent loose materials falling in during removal. Distribute tailings from site or distribute on site as per Contractor's Instructions. After hole drilled, place reinforcing steel and concrete. Do not drill any holes, which cannot be reinforced and filled with concrete the same day as drilled.

.22 Place reinforcing steel in such a manner to prevent loose earth and debris from falling into the hole. Place reinforcing at proper elevation and hold during course of placing concrete. Placing of steel will not be allowed after the concrete is poured.

.23 Before commencing placing concrete, obtain Departmental Representative's approval of proposed method of transporting and placing concrete. Form piles projecting above grade with removable steel sleeves or wax coated cardboard fibre forms. Place concrete continuously to final cut-off elevation as soon as possible after hole drilled, cleaned out and reinforcing steel secured in position. Take every care to ensure that hole is completely filled with concrete. Concrete must be placed in the dry. Under no circumstances will tremie concrete be permitted. Protect tops of piles against loss of moisture. When concrete is being placed through a frozen ground surface, the diameter of the portion of the pile surface passing through the frozen ground shall be increased by 100 mm.

END OF SECTION

PART 1 GENERAL

1.1 Section Includes
.1 Concrete aprons.

1.2 Related Sections
.1 Section 312313 - Site Grading: Preparation of site for paving and base.
.2 Section 312311 - Backfilling: Compacted sub-base for paving.
.3 Section 079200 - Sealants: Sealant for joints.

1.3 References
.1 CAN3-A5M - Portland Cements.
.2 CAN3-A23.1M - Concrete Materials and Methods of Concrete Construction.
.3 CAN3A266.1M – Air Entraining Admixtures for Concrete.
.4 CAN3-G30.12M - Billet Steel Bars for Concrete Reinforcement.
.5 CSA G30.5M - Welded Steel Wire Fabric for Concrete Reinforcement.
.6 ASTM C309 -Liquid Membrane Forming Compounds for Curing Concrete.
.7 ASTM D1751 - Pre-formed Expansion Joint Fillers for Concrete Paving and Structural Construction.
.8 ASTM D1752 - Pre-formed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 Quality Assurance
.1 Perform work in accordance with ACI 301 requirements of Sections 031000, 032000 and 033000 Province of Saskatchewan Highway Standards.
.2 Obtain cementitious materials from same source throughout.

1.5 Regulatory Requirements
.1 Conform to applicable standards for paving work on property.

PART 2 PRODUCTS

2.1 Form Materials
.1 Form Materials: Conform to CAN/CSA-A23.1M as specified in Section 031000.
.2 Joint Filler: ANSI/ASTM D1751 D1752 type.

2.2 Reinforcement
.1 Reinforcing Steel and Wire Fabric: Type specified in Section 032000.
.2 Dowels: 275 MPa yield grade, plain steel.

2.3 Concrete Materials
.1 Concrete Materials: As specified in Section 033000.

2.4 Concrete Mix
.1 Mix and deliver concrete in accordance with Section 033000.

2.5 Source Quality Control

.1 Submit proposed mix design of each class of concrete to appointed firm for review prior to commencement of work.

.2 Tests on cement and aggregates will be performed to ensure conformance with specified requirements.

PART 3 EXECUTION

3.1 Examination

.1 Verify compacted sub-grade, granular base is ready to support paving and imposed loads.

.2 Verify gradients and elevations of base are correct.

3.2 Sub-Base

.1 Section 312311 - Backfilling

3.3 Preparation

.1 Moisten base to minimize absorption of water from fresh concrete.

.2 Notify Departmental Representative minimum 24 hours prior to commencement of concrete operations.

3.4 Forming

.1 Place and secure forms to correct location, dimension, and profile.

.2 Assemble form work to permit easy stripping and dismantling without damaging concrete.

.3 Place joint filler vertical in position, in straight lines. Secure to form work during concrete placement.

3.5 Reinforcement

.1 Interrupt reinforcement at expansion joints.

.2 Place reinforcement to achieve pavement and curb alignment as detailed.

3.6 Joints

.1 Place expansion joints at 6 m intervals. Align curb, gutter, and sidewalk joints.

.2 Place joint filler between paving components and building or other appurtenances. Recess top of filler 6 mm for sealant placement by Section 079200.

.3 Provide scored joints at 1 m intervals between sidewalks and curbs.

3.7 Placing Concrete

.1 Place concrete in accordance with CAN/CSA-A23.1M as specified in Section 033000.

3.8 Finishing

.1 Sidewalk Paving: Light broom, and trowel joint edges.

.2 Curbs and Gutters: Light broom.

.3 Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.9 Field Quality Control

.1 Field inspection and testing will be performed under provisions of Section 014000.

.2 Testing firm will take cylinders and perform slump and air entrainment tests in accordance with CAN/CSA-A23.1M.

.3 Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.10 Protection

.1 Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

3.11 Schedules

.1 Concrete aprons (pads): 20 MPa 28-day concrete, 100 mm thick or as per drawings, buff colour Portland cement.

END OF SECTION