Government of Canada
New Building
Issue for Tender
Elk Point, Alberta

Specification Volume 1

January 29, 2016

Stantec

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 GENERAL REQUIREMENTS

DIVISION 03 CONCRETE

DIVISION 04 MASONRY

DIVISION 05 METALS

DIVISION 06 WOOD, PLASTICS AND COMPOSITES

DIVISION 07 THERMAL AND MOISTURE PROTECTION

DIVISION 08 OPENINGS

DIVISION 09 FINISHES

DIVISION 10 SPECIALTIES

DIVISION 11 EQUIPMENT

DIVISION 12 FURNISHINGS

DIVISION 21 FIRE SUPPRESSION

DIVISION 22 PLUMBING

DIVISION 23 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

DIVISION 26 ELECTRICAL

DIVISION 32 EXTERIOR IMPROVEMENTS

DIVISION 33 UTILITIES

END OF SPECIFICATION INDEX

1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 14 00 - Work Restrictions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises construction of a new building at Elk Point, Alberta for the Government of Canada; and further identified as Project No. 144202690.

1.3 CONTRACT METHOD

.1 Construct Work under single stipulated price contract.

1.4 CONTRACTOR USE OF PREMISES

.1 Unrestricted use of site until Substantial Performance.

1.5 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 List of Outstanding Shop Drawings.
- .6 Change Orders.
- .7 Other Modifications to Contract.
- .8 Field Test Reports.
- .9 Copy of Approved Work Schedule.
- .10 Health and Safety Plan and Other Safety Related Documents.
- .11 Other documents as specified.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 SECURITY

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

.2 Security clearances:

.1 The successful Contractor Team must provide personal data including the full name, date of birth, present address and other data as requested by the Departmental Representative, for each person working on this project, if requested. This information will be used for security clearance purposes. Fingerprinting may be required. This information must be provided within three (3) days of request.

.2 Ensure that all persons who will have access to Departmental Representative's protected information, hold a valid Departmental Representative's reliability status secure clearance issued by Departmental Representative's Security.

.3 The Prime Contractor's Project Manager and Site Supervisor will be required to/ Personal requiring access to the Detachment that are operational or otherwise so identified at time of construction may be required to:

.1 Complete and submit all security clearance forms.

.2 Attain and provide copies of the following documents

.1 drivers licence.

.2 birth certificate.

.3 2 passport pictures.

.4 2 sets of fingerprints.

.3 If born outside of Canada, attain and provide copies of one of the following:

.1 Permanent Residence Card for Canada.

.2 Canada Citizenship Card.

.3 immigration papers (certificate of landing).

.4 valid work permit for Canada

.4 Participate in a Security/ Reliability Interview.

.5 Sign disclosure documents for Departmental Representative's protected material.

.4 All other personal requiring access to the site will be to:

.1 Complete and submit all required security clearance forms

.2 Attain and provide a copy of their drivers licence or passport.

1.3 BUILDING SMOKING ENVIRONMENT

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

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, and equipment and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in monthly certificate for payment.

.7 Prepare schedule jointly with Departmental Representative and Contractor to show when items called for under cash allowances must be authorized by Departmental Representative for ordering purposes so that progress of Work will not be delayed.

.8 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 Section 01 29 83 - Payment Procedures for Testing Laboratory Services, include allowance of $ 120,000.00 for payment for independent testing performed by certified testing agencies, as specified in the individual specification Sections.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under individual specification sections.

1.2 APPOINTMENT AND PAYMENT

.1 Departmental Representative will appoint for services of testing laboratory except follows:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under supervision of Departmental Representative.

.2 The Contractor will pay all costs for testing out of the Cash Allowance specified in Section 01 21 00. Refer to the individual specification Sections for testing requirements.

.3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:
- .1 Provide access to Work for inspection and testing.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs (not out of Cash Allowance) for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

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

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

1.2 PRECONSTRUCTION MEETING

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

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

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:
- .1 Appointment of official representative of participants in the Work.
- .2 Schedule of Work: in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).
- .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment.
.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.8 Owner provided products.
.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
.12 Monthly progress claims, administrative procedures, photographs, hold backs.
.13 Appointment of inspection and testing agencies or firms.
.14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and four (4) weeks prior to project completion, schedule progress meetings monthly.

.2 Contractor, major Subcontractors involved in Work Departmental Representative are to be in attendance.

.3 Notify parties minimum five (5) days prior to meetings.

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

.5 Agenda to include the following:
.1 Review, approval of minutes of previous meeting.
.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Other business.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 REFERENCES

.1 Definitions:

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.

.3 Baseline: original approved plan (for Project, work package, or activity), plus or minus approved scope changes.

.4 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.

.5 Completion Milestones: they are firstly Interim Certificate and secondly Final Certificate.

.6 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.

.7 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

.8 Critical Activity: any activity on a critical path.

.1 Most commonly determined by using critical path method.

.9 Critical Path: sequence of activities that determines duration of Project. Generally, it is the longest path through Project.

.1 Usually defined as those activities with float less than or equal to specified value, often zero.

.10 Critical Path Method (CPM): network analysis technique used to determine the amount of scheduling flexibility (amount of float) on various logical network paths in Project schedule network, and to determine the minimum total Project duration.

.11 Data Date: date through which project status and progress were last determined and reported for analyses, such as scheduling and performance measurements.

.12 Duration: total number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element.

.1 Usually expressed as workdays or work weeks.

.13 Early Finish Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints.

.1 Early finish dates can change as Project progresses and changes are made to Project plan.

.14 Early Start Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints.

.1 Early start dates can change as Project progresses and changes are made to Project Plan.

.15 Finish Date: point in time associated with activity's completion.
- .1 Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.16 Float: amount of time that activity may be delayed from its early start without delaying Project finish date.
- .1 This resource is available to both Departmental Representative and Contractor.

.17 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.

.18 Lag: modification of logical relationship that directs delay in successor activity.

.19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).

.20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).

.21 Lead: modification of logical relationship that allows acceleration of successor task.

.22 Logic Diagram: see Project network diagram.

.23 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.

.24 Milestone: significant point or event in Project, usually completion of major deliverable.

.25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.

.26 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.

.27 Project Control System: fully computerized system utilizing commercially available software packages.

.28 Project Network Diagram: schematic display of logical relationships of Project activities.
- .1 Always drawn from left to right to reflect Project chronology.

.29 Project Plan: formal, approved document used to guide both Project execution and Project control.
- .1 Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.
- .2 Project plan may be summary or detailed.

.30 Project Planning: development and maintenance of Project Plan.

.31 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.

.32 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.

.33 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.

.34 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.

.35 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

.36 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.

.2 Reference Standards:

.1 Project Management Institute (PMI Standards)

.1 A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fourth Edition.

.2 Practice Standard for Scheduling - 2011.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Project Meeting:

.1 Meet with Departmental Representative within five (5) working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

.2 Participate in regular project progress meetings with Departmental Representative specifically intended to discuss update of detailed schedule and contract changes.

.2 Scheduling:

.1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.

.2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed..

.3 Monitor sufficiently often so that causes of delays can immediately be identified and removed.

.3 Project monitoring and reporting:

.1 Keep team aware of changes to schedule, and possible consequences as project progresses.

.2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.

.3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

.4 Critical Path Method (CPM) Requirements:

.1 Ensure Master Plan and Detail Schedule are practical and remain within specified Contract duration.

.2 Revise Master Schedule and Detail Schedule deemed impractical by Departmental Representative and resubmit for approval.

.3 Change to Contract Duration:
  .1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.
  .2 Duration of Contract may only be changed through bilateral Agreement.
.4 Consider Master Schedule and Detail Schedule deemed practical by Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
.5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.
.6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.
.7 Interim Certificate with "LF" constraint equal to calculated date.
.8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.
.9 Delays to non-critical activities, those with float may not be basis for time extension.
.10 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times and imposed dates other than required by Contract.
.11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.
  .1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
.12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.
  .1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
.13 Arrange participation on and off site of subcontractors and suppliers, as required by Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring.
  .1 Approvals by Departmental Representative of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.
.14 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit to Departmental Representative Project Control System for planning, scheduling, monitoring and reporting of project progress.

.3 Submit Project Control System to Departmental Representative for approval.
  .1 Failure to comply with each required submission, may result in progress payment being withheld in accordance with Federal Government's GC 5 Terms of Payment.

.4 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

.5 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.

.6 Refer to article "PROGRESS MONITORING AND REPORTING" of this specification Section for frequency of Project control system submittals.

.7 Submit impact analysis of schedule for changes that result in extension of contract duration.

.1 Include draft schedule update and report as outlined in article "PROGRESS MONITORING AND REPORTING".

.8 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting as required by Departmental Representative in following form.

.1 CD files in original scheduling software containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.

.2 Master Schedule Bar Chart.

.3 Construction Detail schedule Bar Chart.

.4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.5 Criticality report listing activities and milestones with up to 5 days total float used as first sort for ready identification of critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within 2 months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

1.4 QUALITY ASSURANCE

.1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

1.5 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within five (5) working days of Award of Contract date.

.1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

1.6 PROJECT MILESTONES

.1 Project milestones form targets for both Master Schedule and Detail Schedule of CPM construction network system. Indicate the project milestone dates for the following items:
- .1 Excavation
- .2 Substructure completed.
- .3 Superstructure completed.
- .4 Building closed-in and weatherproofed.
- .5 Interior finishing and fitting, mechanical and electrical work.
- .6 Interim Certificate (substantial completion).
- .7 Outside work completed.
- .8 Final Certificate completion.

1.7 MASTER SCHEDULE

.1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.

.2 Prepare comprehensive construction Master Schedule (CPM logic diagram) and dependent Cash Flow Projection within five (5) working days of finalizing Agreement to confirm validity or alternates of identified milestones.
- .1 Master Schedule will be used as baseline.
  - .1 Revise baseline as conditions dictate and as required by Departmental Representative.
  - .2 Departmental Representative as Project progresses will review and return revised baseline within ten (10) work days.

.3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail. Provide annual (fiscal year April 01 - to March 31) cash flow projections for the project duration at start of contract, at P6, P9, P10, P11 or each fiscal year.

.4 Initial and subsequent Master Schedule will include:
- .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
- .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.
- .3 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.
- .4 Actual/projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.

1.8 DETAIL SCHEDULE

.1 Provide detailed project schedule (CPM logic diagram) within twenty (20) working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:
- .1 Shop drawings.
- .2 Samples.
- .3 Approvals.
- .4 Procurement.
- .5 Construction.

.6 Installation.
.7 Site works.
.8 Testing.
.9 Commissioning and acceptance.

.2 Detail CPM schedule to cover in detail minimum period of six (6) months beginning from Award of Contract date with each activity duration indicated in days.
.1 Show remaining activities for CPM construction network system up to Final Certificate and develop complete detail as project progresses.
.2 Detail activities completely and comprehensively throughout duration of project.

.3 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.

.4 Clearly show sequence and interdependence of construction activities and indicate:
.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
.1 Time for submittals, resubmittals and review.
.2 Time for fabrication and delivery of manufactured products for Work.
.3 Interdependence of procurement and construction activities.
.3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.

.5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

.6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.

.7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

1.9 REVIEW OF THE CONSTRUCTION DETAIL SCHEDULE

.1 Allow 5 work days for review by Departmental Representative of proposed construction Detail Schedule.

.2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit to Departmental Representative for review within 5 work days.

.3 Promptly provide additional information to validate practicability of Detail Schedule as required by Departmental Representative.

.4 Submittal of Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.

1.10 COMPLIANCE WITH DETAIL SCHEDULE

.1 Comply with reviewed Detail Schedule.

.2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by Departmental Representative.

.3 Identify activities that are behind schedule and causing delay. Provide measures to regain slippage.
- .1 Corrective measures may include:
  - .1 Increase of personnel on site for effected activities or work package.
  - .2 Increase in materials and equipment.
  - .3 Overtime work.

.4 Submit to Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence:
- .1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
- .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.
- .3 Other supporting evidence requested by Departmental Representative.
- .4 Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative.

.5 In event of Contract extension, display in Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
- .1 Departmental Representative will determine and advise Contractor number of allowable days for extension of Contract based on project schedule updates for period in question, and other factual information.
- .2 Construction delays affecting project schedule will not constitute justification for extension of contract completion date.

1.11 PROGRESS MONITORING AND REPORTING

.1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Departmental Representative at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to Departmental Representative copies of updated Detail Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
- .1 Description of progress made.
- .2 Pending items and status of: permits, shop drawings, change orders, possible time extensions.
- .3 Status of Contract completion date and milestones.
- .4 Current and anticipated problem areas, potential delays and corrective measures.
- .5 Review of progress and status of Critical Path activities.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 50 - Delegated Design Submittals.

1.2 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

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

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

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

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta. Refer to Section 01 33 50 - Delegated Design Submittals.

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

.4 Allow fourteen (14) days for Departmental Representative's review of each submission.

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

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

.7 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 shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions 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 Contractor's 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.

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

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

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

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

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
- .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

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

.17 Submit electronic copies and two (2) hard copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

.20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies 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 same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 SAMPLES

.1 Submit four (4) samples for review as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

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

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

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

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

1.5 MOCK-UPS

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

1.6 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in .jpg format, fine resolution monthly with progress statement as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 24 interior and exterior locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: monthly as directed by Departmental Representative.

1.7 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Requirements.

1.2 CONTRACTOR♣S DESIGN REQUIREMENTS

.1 For all Sections of Work which require the Contractor and Subcontractors to provide professional engineering services by a Professional Engineer registered in the Province of Alberta, have the Contractor♣s and Subcontractor♣s Registered Professional Engineer design and engineer components for the project which the Contractor♣s and Subcontractor♣s Registered Professional Engineer is responsible for, and sign and seal all shop drawings and supporting documentation, to the satisfaction of the Consultant and according to requirements of the authority having jurisdiction.

.2 The Contractor♣s and Subcontractor♣s Engineer, must be a Professional Engineer registered in the Province of Alberta and must be fully qualified and experienced in the design of items which he/she is designing and to be responsible for the design of such components and systems, and to prepare, seal, and sign all shop drawings and to perform field reviews.

.3 The Contractor♣s and Subcontractor's Professional Engineer responsible for this work is to inspect the fabrication and erection of all items in accordance with APEGA "Responsibilities for Engineering Services on Building Projects" - dated March 2009.

.4 Submit a signed and sealed Letter of Commitment in accordance with format in Appendix A attached to the end of this Section prior to starting Work requiring design and seal of a Professional Engineer registered in the province of Alberta. Note: where signed and sealed shop drawings are requested in the specifications, this letter is required in addition to the shop drawings.

.5 At completion of the Work, have each of the Contractor♣s and Subcontractor♣s Registered Professional Engineers provide a letter confirming that:

- .1 Relevant civil, structural, architectural, mechanical, electrical and other components are fabricated and erected in conformance with their design.
- .2 Relevant components are capable of supporting all the loads or capable of performance specified or indicated on the reviewed shop drawings.
- .3 All changes to the Contract Documents have been reviewed and are acceptable.
- .4 Relevant components have been designed, fabricated and installed to substantially comply with the applicable requirements of the Alberta Building Code 2014.
- .5 Relevant components have been designed and installed to conform with the seismic restraint requirements of the Alberta Building Code 2014.
- .6 The fabrication and installation of such components has been reviewed and accepted by the Contractor♣s and Subcontractor♣s Registered Professional Engineers.
- .7 Relevant components are fabricated and erected in accordance with the reviewed shop drawings.

.8 Submit a signed and sealed Letter of Compliance on company letterhead addressed to Consultant in accordance with format in Appendix B attached to the end of this Section on completion of Work requiring design and seal of a Professional Engineer registered in the province of Alberta.

1.3 SEISMIC DESIGN AND REQUIREMENTS

.1 Design components of the Building, as applicable, and comply with all Regulations and requirements of any authority having jurisdiction and Part 4 of the Alberta Building Code 2014.

.2 Provide seismic restraint to new and relocated fixtures, equipment, and devices to the satisfaction of the authority having jurisdiction.

.3 Provide vibrating equipment with seismically designed vibration isolation. Only non vibrating equipment is permitted to be secured to the structure. Provide structural connection by means of direct connection to the structure by bolting, using rigid seismic restraints or taut cable restraints. Locate connection to the structure where capable of withstanding the forces applied.

.4 Describe the proposed connections and general design of products, equipment and systems in shop drawing format with identification and location of forces imposed on the structure. Have the shop drawings signed and sealed by a professional engineer registered in the Province of Alberta and have the appropriate understanding of the issues at hand.

.5 Submit shop drawings as specified in this Section.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

APPENDIX ■A•

Model Schedule S-B
ASSURANCE OF PROFESSIONAL DESIGN AND COMMITMENT FOR FIELD REVIEW
by
Supporting Registered Professional

Note: 1. The applicable Code is the Alberta Building Code 2014 and National Building Code of Canada 2010, hereinafter referred to as the Code.
2. In this letter the words in italics have the same meaning as in the Code.

To: (RPR) _____ Date: _____

_____

_____

_____

Re: _____
Name of Project (Print)

_____
Address of Project (Print)

This is to advise that the undersigned is the *Registered Professional* retained by _____ to design engineering/architectural components for the captioned project in accordance with the Code.

The undersigned hereby gives assurance that the design and supporting documents prepared by this *Registered Professional* in support of the project for _____

_____
(Insert here the area of responsibility, e.g. seismic restraint, fire resistance, acoustic properties, structural capacity)
substantially comply with the Code and other applicable enactments respecting safety except for construction safety aspects.
These engineering/architectural components are addressed in the report/drawings prepared by me, or under my direct supervision, which bear my Professional Seal and signature.
(With respect to field reviews, initial or cross out the following statement as applicable)

____ The undersigned hereby undertakes to be responsible for field reviews of the above referenced components during construction.

Project Address

I confirm I have liaised as required with the appropriate *Registered Professionals* for the purposes of my services.

I hereby give my assurance that I am a registered professional as defined in the Code.

Name (Print)

Signed

Date

Address (Print)

Phone

(PROFESSIONAL SEAL)

Email

(If the *Registered Professional* is a member of a firm, complete the following.)

I am a member of the firm

(Print name of firm)

and I sign this letter on behalf of the firm.

Note: The above letter must be signed by a *Registered Professional*. The Code defines a *Registered Professional* to mean:

(a) a person who is registered or licensed to practise as an architect under the *Architects Act*, or

(b) a person who is registered or licensed to practise as a professional engineer under the *Engineering and Geoscience Professions Act.*

APPENDIX ■B•

Model Schedule S-C
ASSURANCE OF PROFESSIONAL FIELD REVIEW AND COMPLIANCE
by
Supporting Registered Professional

Note: 1. The applicable Code is the Alberta Building Code 2014 and National Building Code of Canada 2010, hereinafter referred to as the Code.
2. In this letter the words in italics have the same meaning as in the Code.

To: (RPR)_____ Date:_____

_____

_____

_____

Re: _____
Name of Project (Print)

_____
Address of Project (Print)

(With respect to field reviews, initial the applicable statement (A or B) and cross out the non-applicable statement below)

DESIGN AND FIELD REVIEW

A. ____ I hereby give assurance that I have fulfilled my obligations for field review as outlined in the Code and in the previously submitted Schedule S-B, Assurance of Professional Design and Commitment for Field Review, and
that those components of the project identified in the Schedule S-B substantially comply in all requests for information with the applicable requirements of the Code and other enactments respecting safety, not including construction safety aspects, and the plans and supporting documents prepared by the undersigned, respecting:

____ _____

(Insert here the area of responsibility, e.g. seismic restraint, fire resistance, acoustic properties, structural capacity)

FIELD REVIEW ONLY

B. ____ I hereby give assurance that I have fulfilled my obligations for field review as outlined in the Code and that those components of the project substantially comply in all requests for information with the applicable requirements of the Code and other enactments respecting safety, not including construction safety aspects, and the plans and supporting documents, respecting

____ _____

_____

(Insert here the area of responsibility, e.g. seismic restraint, fire resistance, and the like.)

_____

Project Address

I confirm I have liaised as required with the appropriate *Registered Professionals* for the purposes of my services.

I hereby give my assurance that I am a *Registered Professional* as defined in the Code.

_____

Name (Print)

_____ _____

Signed

Date

_____

Address (Print)

_____

_____

_____

Phone

_____ (PROFESSIONAL SEAL)

Email

(If the *Registered Professional* is a member of a firm, complete the following.)

I am a member of the firm _____

(Print name of firm)

and I sign this letter on behalf of the firm.

Note: The above letter must be signed by a *Registered Professional*. The Code defines a registered professional to mean:

(a) a person who is registered or licensed to practise as an architect under the *Architects Act*, or
(b) a person who is registered or licensed to practise as a professional engineer under the *Engineering and Geoscience Professions Act.*

END OF SECTION

1 General

1.1 REFERENCES

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

.2 Province of Alberta
.1 Occupational Health and Safety Act, R.S.A. - Updated 2013.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit three (3) copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction, weekly to the Departmental Representative.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within ten (10) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five (5) days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

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

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

.2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award. Contractor to submit written acknowledgement to CSST along with Ouverture de Chantier Notice.

.3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.8 RESPONSIBILITY

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

.2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

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

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, Occupational Health and Safety Code 2009.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.11 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
- .1 Have site-related working experience specific to activities associated with the Work.
- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

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

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

1.14 BLASTING

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

1.15 POWDER ACTUATED DEVICES

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

1.16 WORK STOPPAGE

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

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 REFERENCES

.1 Definitions:
- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

.2 Reference Standards:
- .1 Canadian Environmental Protection Act, 1999
  - .1 Federal Halocarbon Regulations, 2003 (SOR/2003-289)
- .2 Canadian Environmental Assessment Act, 2012
- .3 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
  - .2 EPA General Construction Permit (GCP) 2012.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Include in Environmental Protection Plan:
- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations and EPA 832/R-92-005, Chapter 3.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Pesticide treatment plan to be included and updated, as required.

1.3 FIRES

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

1.4 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.5 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas designated by Departmental Representative.

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where directed by Departmental Representative.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.7 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 CLEANING

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

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

.3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

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

END OF SECTION

1 General

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with Alberta Building Code 2014 and the National Building Code of Canada 2010 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 INTENT

.1 All references to codes, standards and standard specifications and any amendments or updates referred to in these Specifications or used on drawings means those that are in force on the day of receipt of Bids are applicable to the Work during the duration of the Contract regardless of the date of the reference indicated in the individual specification Sections.

.2 Where referenced standards contain provisions on required methods of fabrication, procedure, and the like, comply with all such provisions.

.3 Where these specifications are in conflict with a referenced standard, the most stringent requirements govern.

.4 In some Sections of these specifications, items from the referenced standards are duplicated, in short form. Interpret these as advisory and to facilitate inspection. The full provisions of the referenced standards govern.

1.2 BUILDING CODE

.1 Conform to and perform work in accordance with the Alberta Building Code 2014 and National Building Code of Canada 2010, as a minimum, except as indicated as being performed to a higher standard in the Contract Documents.

1.3 STANDARDS ORGANIZATIONS

.1 The following list of standards organizations indicate the most common standards that may be referenced within the technical specifications:
- .1 ANSI - American National Standards Institute
- .2 ASTM - American Society for Testing and Materials
- .3 CGA - Canadian Gas Association
- .4 CGSB - Canadian General Standards Board
- .5 CSA - Canadian Standards Association
- .6 CAN1 - National Standard of Canada (published by CGA)
- .7 CAN2 - National Standard of Canada (published by CGSB)
- .8 CAN3 - National Standard of Canada (published by CSA)
- .9 CAN4 - National Standard of Canada (published by ULC)
- .10 ULC - Underwriters Laboratories of Canada
- .11 UL or ULI - Underwriters Laboratories Inc.
- .12 WHI - Warnock Hersey / Intertek Testing Services

.2 The following limitations on marks issued by standards organizations will apply to the standards issued by the organizations listed in 1.3.1 above:
- .1 Underwriters Laboratories Inc.: Only systems designated by “cUL” or “cULus” will be acceptable for use on this project. Systems indicating “UL” or “ULus” will only be considered where local authorities having jurisdiction have reviewed and accepted the systems in writing.

.2 Warnock Hersey Intertek: Only materials designated by “cWHI” or cWHIus will be acceptable for use on this project. Materials bearing a “WH”, “WHI” or “WHIus” mark will only be considered where local authorities having jurisdiction have reviewed and accepted the materials in writing.

.3 Contractor will be responsible for obtaining written acceptance of materials and submitting them to the Departmental Representative prior to installation.

1.4 REFERENCES

.1 Within the text of the specifications, reference may be made to published standards and codes, including but not limited to the following:

ABC	-	Alberta Building Code 2014
ACI	-	American Concrete Institute
AFCA	-	Alberta Floor Covering Association
AISC	-	American Institute of Steel Construction
AISI	-	American Iron & Steel Institute
AMCA	-	Air Movement & Control Association
ANSI	-	American National Standards Institute
ARCA	-	Alberta Roofing Contractor's Association
ASA	-	American Standards Association
ASHRAE		American Society of Heating, Refrigerating & Airconditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
AWCC	-	Association of Wall and Ceiling Contractors
AWMAC	-	Architectural Woodwork and Millwork Association of Canada
AWPA	-	American Wood Preservers' Association
CAN	-	National Standard of Canada, as follows: CAN1: CGA - Canadian Gas Association CAN2(or CAN/CGSB): CGSB - Canadian General Standards Board CAN3(or CAN/CSA): CSA - Canadian Standards Association CAN4: ULC - Underwriters' Laboratories of Canada
CEC	-	Canadian Electrical Code (published by CSA)
CEMA	-	Canadian Electrical Manufacturer's Association
CGSB	-	Canadian General Standards Board
CISC	-	Canadian Institute of Steel Construction
CLA	-	Canadian Lumberman's Association
CSA	-	Canadian Standards Association
CWB	-	Canadian Welding Bureau
FM	-	Factory Mutual Engineering Corporation
HRAI	-	Heating, Refrigerating and Air-Conditioning Institute of Canada
HI	-	Hydronics Institute
IEEE	-	Institute of Electrical and Electronic Engineers
ICEA	-	Insulated Cable Engineers Association
IFAI	-	Industrial Fabric Association International
IGMAC	-	Insulated Glass Manufacturers Association of Canada
ITS	-	Intertek Testing Services
MPI	-	Master Painters Institute
NAAMM	-	National Association of Architectural Metal Manufacturers

NBCC	-	National Building Code of Canada 2010
NEMA	-	National Electrical Manufacturers' Association
NFPA	-	National Fire Protection Association
NLGA	-	National Lumber Grades Authority
SSPC	-	The Society for Protective Coatings
TTMAC	-	Terrazzo, Tile and Marble Association of Canada
ULC	-	Underwriters' Laboratories of Canada
ULI	-	Underwriters' Laboratories Incorporated (U.S.)
WHI	-	Warnock Hersey Inc.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 21 00 - Allowances.

.2 Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

1.2 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give minimum five (5) days notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

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

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

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor out of the Cash Allowance specified in Section 01 21 00.

.2 Refer also to Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

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

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

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

.6 Provide independent acoustic testing for all STC rated rooms.

1.4 ACCESS TO WORK

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

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

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

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

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

1.6 REJECTED WORK

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

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

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

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

1.9 MOCK-UPS

.1 Prepare mock-ups for Work as specified herein. Include for Work of Sections required to provide mock-ups. Provide mockups for the following items:
- .1 Exterior masonry wall, including brick veneer, concrete block masonry veneer, air space, insulation, air/vapour barrier and concrete block back up wall.
- .2 Cementitious composite panel exterior wall, including cementitious composite panels, including joints, exposed fasteners, wood strapping, self adhered exterior sheathing membrane, wood framed construction backup wall, insulation, sheet vapour retarder and gypsum board.
- .3 One complete aluminum window installation, including aluminum frames and glazing, adjacent cementitious composite panels, self adhered exterior sheathing membrane tie-in, sheet vapour retarder tie-in, adjacent wood framed construction, foam-in-place insulation around windows.
- .4 One complete prisoner cell, including all walls, ceilings, floors, cell doors and frames, special coatings to wall and ceiling finishes, epoxy flooring, cell bed/bench and all mechanical fixtures.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work. If the Departmental Representative cannot make it to the site within the time specified for review of each mockup, then provide video of mockups showing all aspects of the mockup as requested by the Consultant.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

.7 Mock-ups may remain as part of Work.

.8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.10 MILL TESTS

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

1.11 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 REFERENCES

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 DEWATERING

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

1.5 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

.3 Pay for utility charges at prevailing rates.

1.6 TEMPORARY HEATING AND VENTILATION

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

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

.3 Provide temporary heat and ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.

.6 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.4 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.

.6 On completion of Work for which permanent heating system is used, replace filters and restore heating equipment to new condition.

.7 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Departmental Representative.

.8 Pay costs for maintaining temporary heat, when using permanent heating system within the new addition. Departmental Representative will pay utility charges when temporary heat source is existing building equipment.

.9 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

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

1.7 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power required during construction for lighting and operating power tools, cranes, other equipment and other temporary power requirements for construction.

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

.3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.4 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.8 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax and data hook up, lines and equipment necessary for own use and use of Departmental Representative.

1.9 FIRE PROTECTION

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

.2 Burning rubbish and construction waste materials is not permitted on site.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.189, Exterior Alkyd Primer for Wood.
- .2 CGSB 1.59, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CAN/CSA-A23.1-14/A23.2-14: Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA O121-08(R2013), Douglas Fir Plywood.
- .3 CAN/CSA O141-05(R2014), Softwood Lumber.
- .4 CSA O151-09(R2014), Canadian Softwood Plywood.
- .5 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.

.3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, temporary stairs.

1.5 HOISTING

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

.2 Hoists to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

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

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

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Clean runways and taxi areas where used by Contractor's equipment.

1.8 SECURITY

.1 The Contractor is responsible for all site and building security of site including after working hours and during holidays.

1.9 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

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

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

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

.3 The use of permanent sanitary facilities will not be permitted.

1.12 CONSTRUCTION SIGNAGE

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

.2 Construction sign 1220 mm x 2440 mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, name of Owner, Consultant, Contractor and Subcontractor, of design style established by Departmental Representative.

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

.5 Provide project identification site sign comprising framing, foundation, and one 1220 x 2440 mm signboard as detailed and as described below.

.1 Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
.2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
.3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
.4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
.5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
.6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Departmental Representative.

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

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

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

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

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

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

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

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

.7 Construct access and haul roads necessary.

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

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

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

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

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

.13 Provide snow removal during period of Work.

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

1.14 CLEAN-UP

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

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

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

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

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

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

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

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA-O121-08(R2013), Douglas Fir Plywood.

.2 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect hoarding to protect the public, workers, building staff and visitors, public and private property from injury or damage and to the approval of the authority having jurisdiction and to maintain access to areas which are to remain operational.

.2 Erect site fencing/hoarding and gates around temporary parking area for construction personnel and temporary Contractor’s laydown area.

.3 Obtain and pay for all necessary permits to erect hoarding as required.

.4 Provide all other temporary safeguards and protection to adequately protect against accident or injury to any workers or other persons on the site, and adjacent work and property, roads and walks, damage to any part of the work, while under construction and to any adjacent structure, property, pavements, walks, services and other similar items, by frost, weather, overloading and any other cause resulting from the execution of the work.

.5 Provide hoarding with prefabricated temporary steel framed construction fence with mesh, 2400 mm high, with sections interlocked together and fence being self supporting, protecting public and private property from injury or damage.

.6 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 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.

.2 Provide as required by governing authorities.

1.5 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; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

1.6 DUST TIGHT SCREENS

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

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

1.7 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.8 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.9 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.11 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule three (3) days prior to installation.

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

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 01 42 00 -References.

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

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

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

1.2 QUALITY

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

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

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

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

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

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

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify

Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.4 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

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

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

1.5 TRANSPORTATION

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

.2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.7 QUALITY OF WORK

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

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

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

1.8 CO-ORDINATION

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

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

1.9 CONCEALMENT

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

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

1.10 REMEDIAL WORK

.1 Refer to Section 01 73 00 - Execution Requirements.
.2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

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

1.11 LOCATION OF FIXTURES

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

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

1.12 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

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

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

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

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

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

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 REFERENCES

.1 Owner's identification of existing survey control points and property limits.

1.2 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

1.3 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to Departmental Representative.

.4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.4 SURVEY REQUIREMENTS

.1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes.

.5 Establish pipe invert elevations.

.6 Stake batter boards for foundations.

.7 Establish foundation, column locations and floor elevations.

.8 Establish lines and levels for mechanical and electrical work.

1.5 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Where applicable, remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.7 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.9 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

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

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

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

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

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

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

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

.9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

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

.11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.

.13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 PROJECT CLEANLINESS

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

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

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

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

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

.6 Dispose of waste materials and debris off site in a legal manner.

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

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

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

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

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

1.2 FINAL CLEANING

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

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

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

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

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

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

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and 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, ceilings, floors and other exposed surfaces.

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

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

.11 Wax, seal or prepare floor finishes, as recommended by manufacturer.

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

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

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs, gutters, areaways, and sunken wells.

.16 Sweep and wash clean paved areas.

.17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.18 Clean roofs, downspouts, and drainage systems.

.19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.20 Remove snow and ice from access to building.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
- .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  - .2 Request Departmental Representative's inspection.
- .2 Departmental Representative's Inspection:
  - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
  - .2 Contractor to correct Work as directed.
- .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Equipment and systems: tested, adjusted, balanced and fully operational.
  - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner and Utility companies: submitted.
  - .5 Operation of systems: demonstrated to Owner's personnel.
  - .6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements and copies of final Commissioning Report submitted to Departmental Representative.
  - .7 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
  - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

- .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

- .7 Final Payment:
  - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

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

1.2 FINAL CLEANING

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

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, one (1) final hard copy and two unprotected PDF electronic copies on CDs of as built drawings and two (2) final hard copies and three (3) unprotected electronic copies on CDs, of operating and maintenance manuals and Building Management Manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.
- .1 Identify contents of each binder on spine.

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

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

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

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

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

.9 Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

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

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

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

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

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

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, at site for Departmental Representative one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

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

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

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

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

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative, and on one electronic CADD drawing set and one electronic PDF copy of the Project Manual.

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

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

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
.1 Measured 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.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

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

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

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

1.7 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.
  .1 Give function, normal operation characteristics and limiting conditions.
  .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  .2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning (Cx) Requirements.

.15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

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

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

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

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

1.10 MAINTENANCE MATERIALS

.1 Spare Parts:
  .1 Provide spare parts, in quantities specified in individual specification sections.
  .2 Provide items of same manufacture and quality as items in Work.
  .3 Deliver to location as directed; place and store.
  .4 Receive and catalogue items.
    .1 Submit inventory listing to Departmental Representative.
    .2 Include approved listings in Maintenance Manual.
  .5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:
  .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
  .2 Provide items of same manufacture and quality as items in Work.
  .3 Deliver to location as directed; place and store.
  .4 Receive and catalogue items.
    .1 Submit inventory listing to Departmental Representative.
    .2 Include approved listings in Maintenance Manual.
  .5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:
  .1 Provide special tools, in quantities specified in individual specification section.
  .2 Provide items with tags identifying their associated function and equipment.
  .3 Deliver to location as directed; place and store.
  .4 Receive and catalogue items.
    .1 Submit inventory listing to Departmental Representative.
    .2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

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

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

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

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

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

1.12 WARRANTIES AND BONDS

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

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

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

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

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

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to 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 days after completion of applicable item of work.

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

.5 Co-execute submittals when required.

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

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

.8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers,

commissioned systems, fire protection, alarm systems, sprinkler systems and the like.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:
- .1 Name of item.
- .2 Model and serial numbers.
- .3 Location where installed.
- .4 Name and phone numbers of manufacturers or suppliers.
- .5 Names, addresses and telephone numbers of sources of spare parts.
- .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

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

1.13 WARRANTY TAGS

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

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

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

.4 Indicate following information on tag:
- .1 Type of product/material.
- .2 Model number.
- .3 Serial number.
- .4 Contract number.
- .5 Warranty period.

.6 Inspector's signature.
.7 Construction Contractor.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of Substantial Performance.

.2 Departmental Representative: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:
- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation.
- .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.

.4 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 or designated location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system is adequate to fully demonstrate equipment use, trouble shooting, maintenance and the like as required.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
  .1 Instruct Owner's personnel.
  .2 Provide written report that demonstration and instructions have been completed.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1. General

1.1 Summary

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to performance verification of components, equipment, sub-systems, systems, and integrated systems.

.2 Related Sections:

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 91 31 - Commissioning Plan

.3 Acronyms:

.1 Cx - Commissioning.

.2 CxA- Commissioning Authority

.3 EMCS - Energy Management and Control Systems.

.4 O&M - Operation and Maintenance.

.5 PI - Product Information.

.6 FPT - Functional Performance Testing.

.7 TAB - Testing, Adjusting and Balancing.

1.2 General

.1 Commissioning is a systematic verification, documentation and training process applied to all activities during the design, construction, static verification, start-up and functional performance testing of equipment and systems in a facility to ensure that the facility operates in conformity with the owner’s project requirements, the basis of design and the contract documents.. Objectives:

.1 Static Verification: The commissioning team shall verify and document that all identified commissionable equipment are in accordance with the design requirements and correctly installed, connected and labelled.

.2 Start-up: The commissioning team shall witness and document all start-up activities

.3 Functional Performance Testing: The commissioning team shall verify and document that the equipment and systems have been installed and activated in accordance the contract documents and manufacturer’s instructions. Verification

shall be completed and accepted before equipment or systems are handed over and or interim acceptance.

.4 Effectively train O&M staff.

.2 The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished, fully functioning product.

.3 The Commissioning Authority (CxA) is not responsible for primary quality assurance or quality control on the project. The role of the CxA is supplementary to the QA/QC role supplied by the Contractor and the Engineer of Record.

.4 The Commissioning Authority (CxA) is not responsible for the design concept, design criteria, compliance with codes design or general construction scheduling, cost estimating or construction management.

.5 The Commissioning Authority (CxA) is not responsible for system evaluations; adequacy of systems to meet owner's project requirements, capacity of systems, quality control checks, or any other elements and recommended final acceptance of systems to the Owner resides with the Engineer of Record.

.6 Corrective repairs should be completed prior to any scheduled testing.

1.3 Definitions

.1 The terms noted below will be used throughout the Cx process and within the Cx documentation. Any reference to these terms carries the stated and associated definition as outlined below.

.1 **Commissioning Authority (CxA) / Commissioning Manager** - Is the individual designated to organize, lead, and review the completion of commissioning process activities. The CxA facilitates communication among the Owner, Designer, and Contractors to ensure that complex systems are installed and function in accordance with the Owner's Project Requirements.

.2 **Commissioning Agents** - The internal technical resource staff of the Commissioning Authority that will be responsible for the execution of field reviews and the on-site "hands on" testing activities.

.3 **Commissioning Team** - Personnel that will be directly involved in the building commissioning process. The Commissioning Team will be made up of the Commissioning Agents, Contractors, Design Consultants, LEED Consultants, Owners' Representatives, Independent Third Party Testing Agencies, and Government of Alberta Representatives.

.4 **Commissioning Plan** - The Commissioning Plan is a document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process. The Commissioning Plan is a dynamic document; which is open to be updated by the Commissioning Team throughout the commissioning process to ensure accuracy and relevance as the project

progresses. The final Commissioning Plan will be submitted in Commissioning Report.

.5 **Contractor's Site Cx Coordinator:** Personnel that represent the mechanical and electrical contractors that coordinate the commissioning process with the CxA.

.6 **Owner's Project Requirements** - Is a written document that details the ideas, concepts, and criteria that are determined by the Owner to be important to the success of the project.

.7 **Design Narrative** - The Design Narrative (DN) is where the design team describes in detail the concepts and features it intends to incorporate during schematic design.

.8 **Basis of Design** - Includes the necessary design information needed to accomplish the Owner's Project Requirements, including system descriptions, indoor environmental quality criteria, design assumptions and references to applicable codes, standards, regulations and guidelines.

.9 **Contractors** – Includes those responsible for physical construction of the project. This designation may include Prime Construction Contractors, and sub-contractors such as Electrical, Mechanical, and Controls firms.

.10 **Third Party Testing Firms** - Specialty firms or agencies retained to conduct acceptance tests on a system or component and provide a certificate of acceptance and conformance to governing standards.

.11 **Project Manager** - The individual or firm responsible for the overall management and delivery of the project to the Owner.

.12 **Consultants** - The Architects and Engineers responsible for producing the design drawings and specifications for this project, as well as the base contract administration inspection, quality assurance and acceptance activities.

.13 **User / Operator** - A User or Operator is an individual or group that will work in and operate various aspects of the facility once the project has been turned over.

.14 **In Contract Tests** - Testing requirements that are defined in the contract documents that are a Contractor's responsibility to carry out and document appropriately.

.15 **Out of Contract Tests** – Testing requirements that are not covered as part of the construction documents but are required to be carried out by certified agencies.

.16 **Commissioning Checksheets (Verification Forms)** – Mechanical and electrical equipment checksheets that are specific to each system, and its major components. These are used to verify system operation and are developed by the CxA with the support of the project team and OEM suppliers.

.17 **Static Installation Checks** – Systematic, detailed checks of mechanical and electrical system components. Contractors will utilize commissioning

checksheets for recording installation compliance. The timing of the performance of static checks is tied to construction progress and occurs once the contractor's construction installation process and construction checks have been completed for the individual equipment components, or systems.

.18 **Contractor Start-Up Program** - Contractor start-up and verification program activities are conducted by the Contractors and/or their sub-trades and equipment vendors. Contractor / Vendor verification of the physical installation of equipment, and reviewing the completion of system installation and readiness, shall be completed prior to the Commissioning Agent's functional performance testing and verification activities.

.19 **Functional Performance Testing** - Functional performance tests are specific hands-on tests, used to verify that the equipment and associated systems meet the specified design parameters and operate as fully integrated components or systems through their respective level of automation. This testing also confirms the capabilities of each system to meet the requirements of the facility, and the Owner's Project Requirements. To test all systems under peak operating conditions, some functional performance testing may be deferred to times when peak operation occurs.

.20 **Acceptance Inspections** - A series of formal inspections carried out for systems that result in acceptance of the work as complete. These typically would consist of In-Wall, Above-Ceiling, and Semi-Final / Final site reviews.

1.4 Scope of Work

.1 Detailed testing shall be performed on identified commissionable installed equipment and systems to ensure that operation and performance conform to contract documents. All tests shall be performed by the responsible trade contractor, evaluated and witnessed by Commissioning Authority. After each grade of checklist and test are complete the system will be upgraded to the next test.

.2 Once a system(s) has been completed and passed all functional tests it will be ready for acceptance by the CxA and CM, with recommendation for turn-over to the Owner. The following testing is required as part of the commissioning process and is the responsibility of the appropriate trade contractor:

.1 Pre-Installation Checklists - completed for all equipment inspection for damage or compliance with an approved submittal upon arrival at the site from the supplier. Checklists are provided and completed and submitted by the respective manufacturer and/or contractor.

.2 Installation Checklists are comprised of a full range of checks developed to insure that all systems were actually installed correctly. This includes piping is complete, all electric is tied in and complete and all accessories are installed.

.3 Pre-functional checklists are comprised of a full range checks developed to insure that all systems were actually installed correctly. Following the installation and vendor start-up, the installing contractor along with the manufacturer's representative are required to perform a series of physical installation checks,

instrumentation inspections and control wiring verifications to ensure that the equipment is installed in accordance with the manufacturers recommendations, and all components, equipment, systems and interfaces between systems operate in accordance with the contract documents. This include piping is complete, all electric is tied-in and complete, all accessories are installed, interlocks verified. This includes all operating modes, interlocks, control responses, and specific responses to abnormal or emergency conditions.

.4 Functional Performance Tests (FPT) – Functional testing will not be permitted if any of the items are not completed as part of the start-up and pre-functional phases of the project. Functional performance testing phase is where operation of the equipment and/or systems is demonstrated to the CM, engineer and CxA for acceptance. This will include operation of the various components of the equipment as a complete system under load conditions in all operating modes, and determine if the mechanical and electrical systems are providing the required services in accordance with the finalized design intent. These tests shall also determine the installed capacity of the cooling and heating plant and the individual heat transfer components

.5 Integrated System Testing – Integrated testing shall not be permitted until all functional testing procedures have been completed and deficiencies corrected. This phase of the commissioning process will test the mechanical and emergency generator equipment/systems as complete systems to check interaction of systems and demonstrate integrated system operations during normal and failure scenarios.

.3 Comprehensive training O&M personnel shall be performed by the CM, MEP Contractors and where appropriate by other subcontractors and factory trained manufacturer's / vendor technicians prior to turnover of building to the Owner. The training shall include on-site classroom instruction, along with hands-on instruction on the installed equipment and systems

1.5 Equipment/Systems to be Commissioned

.1 The following equipment/systems will be commissioned as part of this project

.1 Mechanical

.1 Rooftop Units

.2 Makeup Air Units

.3 Exhaust Air Systems

.4 Heating Systems

.5 Cooling Systems

.6 Domestic Water Systems

.7 Fire Protection Systems

.8 Controls

.2 Electrical

.1 Lighting systems (interior and exterior)

.2 Panel Boards

1.6 Commissioning Overview

.1 Refer to Section 01 91 31 – Commissioning (Cx) Plan.

.2 For commissioning team responsibilities refer to the Commissioning (Cx) Plan.

.3 A commissioning kick-off meeting of all commissioning team members shall be held at a time and place designated by the CxA. The purpose shall be to familiarize all parties with the commissioning process, and to ensure that the responsibilities of each party are clearly understood.

.4 During the construction process commissioning meetings will take place that will include attendance for all necessary trades or a company representative that are involve in the commissioning process. During the beginning of construction they will take place monthly and increase in frequency as the project progresses.

.5 The contractor(s) shall complete all phases of work so the system can be started, tested, balanced, and acceptance procedures undertaken. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc. per the Contract Documents and related directives, clarifications and change orders.

.6 The CxA shall develop the Commissioning Plan. The Draft Commissioning Plan has been included as part of the Contract Documents. The Contractor shall assist the Commissioning Authority in preparing and up-dating the Commissioning Plan by providing necessary information pertaining to the actual equipment and installation. If contractor initiated system changes have been made that alter the commissioning process; the Commissioning Authority shall notify the CM and Owner. The Commissioning Plan can be modified based on the construction schedule and can be done so after consolation with the OWNER at the discretion of the CxA.

.7 Acceptance procedures are normally intended to being prior to completion of a system and/or sub-system, and shall be coordinated with Division 15 and 16. Start of acceptance procedures before system completion does not relieve the contractor from completing those systems as per the schedule

.8 Engineer will issue Substantial Completion when:

.1 Completed Cx documentation has been received, reviewed for suitability and approved by CxA.

.2 Equipment, components and systems have been commissioned.

.3 O&M training has been completed.

1.7 Non-Conformance to Performance Verification Requirements

.1 The CxA will observe and document the results of all functional performance tests performed by the trade contractors using the test procedural forms developed for that purpose.

.2 The CxA will record the results of the functional test on the procedure or test form. All issues shall be noted and reported to the Owner, CM and Contractors on an issues log.

.3 As tests progress and an issue are identified, the CxA shall discuss the issue with the commissioning team, and the executing contractor.

.4 When there is no dispute on the deficiency and the contractor accepts responsibility to correct it:

.1 The CxA will document the deficiency and the contractor's response and intentions or corrections. The CxA and contractor then proceed to another test or sequence. The contractor corrects the issues, and confirms that equipment is ready to be retested.

.2 Once the contractor corrects the deficiency, the test is rescheduled and repeated in the anticipation of correct operation or function. If a deficiency is identified, the cost of retesting will be as called for in "Cost of Retesting".

.5 Should equipment, system components, and associated controls be incorrectly installed or malfunction during commissioning, correct documented deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by Engineer, to ensure effective performance.

.6 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor.

.7 Cost for the contractor to retest a Pre-functional or Functional test if they are responsible shall be borne by responsible contractor. The CxA shall be compensated for the additional testing and shall submit a change order to the Owner for the additional commissioning cost.

.8 For an issue identified, not related to any Pre-functional checklist or start- up fault, the following shall apply: The CxA will direct the retesting of the equipment once at no "charge". However, the CxA's and owner's time for a second retest will be charged to the CM who may choose to recover costs from the responsible contractor or subcontractor. Before retesting occurs, the CM will inspect the deficiency and respond to the CxA that the issue has been addressed.

.9 The time for the CxA and Owner to direct any retesting required because a specific Prefuntional checklist or startup test item, reported to have been successfully completed but determined during functional testing to be faulty, will be back charged to the CM who may choose to recover costs from the party responsible for misinformation or deficiency.

.10 The contractor shall submit in writing to the CxA and CM at least as often as commissioning meetings are being scheduled concerning the status of each apparent

outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreement and proposals for their resolutions.

.11 Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for an extension of time by the CM, contractors or subcontractors.

1.8 Submittals

.1 The CxA will review approved submittals related to the commissioned equipment for conformance to the contract documents as it relates to the commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance procedures and only secondarily to verify compliance with equipment specifications. The CxA will notify the Owner of items missing or areas that are not in conformance with contract documents and which requires resubmission.

.2 Include O&M manuals specific for each piece of equipment together with all equipment submitted for engineer review and approval.

.3 The CxA may request additional design narrative from the A/E and controls contractor, depending on the completeness of the OPR documentation and sequences provided with the specifications.

.4 The CxA will review the submittals once. The CxA will receive a copy of the final approved submittals.

1.9 Commissioning Schedule

.1 The Commissioning Schedule is generated based on information provided to the commissioning team regarding construction dates and project timelines as supplied by the project and commissioning teams. The Commissioning Schedule is a dynamic process and designed to incorporate updates from the ongoing construction process as they become available. The overall commissioning process is targeted to dovetail into the construction process wherever practical by following the construction completion and readiness milestones. As project construction milestones and projected completion updates are made available to the Commissioning Team, the Commissioning Schedule will be updated and resubmitted accordingly.

.2 The Commissioning Authority will update the Commissioning Schedule on regular intervals to show commissioning progress and whenever significant changes occur to the dates provided for commissioning activities. The Commissioning Schedules are sent to the Owner to be distributed.

1.10 Commissioning Meetings

.1 Convene Cx meetings following project meetings: 01 91 31 - Commissioning Plan and as specified herein.

.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.4 At 60% construction completion stage the is Contractor to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:

.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.

.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.6 Meetings will be scheduled and chaired by Contractor, who will record and distribute minutes.

.7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.11 Starting and Testing

.1 Construction checklists are important to verify that the equipment and systems are fully connected and operational. It ensures that performance testing (in-depth system checkout) may proceed without unnecessary delays. The construction checklists for a given system must be successfully completed and approved prior to startup and formal performance testing of equipment or subsystems of the given system.

.2 Provide 14 days' notice prior to commencement.

.3 Engineer and/or Cx Agent may witness start-up and testing.

.4 Startup and Checkout Plan: The CxA will assist the project commissioning team members responsible for startup of any equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. The CxA shall provide construction checklists and startup shall be identified in the commissioning scoping meeting and on the checklist forms

.1 The construction checklists (draft/samples) are provided in the attachment section of the Commissioning Plan. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.

.2 The contractor shall determine which trade is responsible for executing and documenting each of the line item tasks and transmit the checklists to the responsible subcontractors. Each form may have more than one trade responsible for its execution.

.3 The contractor/subcontractor with assistance from the CxA responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the construction checklists.

.4 The contractor/subcontractor shall submit the full startup plan to the CxA for review and approval.

.5 The contractor will transmit the full startup plan to the subcontractors for their review and use.

.6 Operation and Maintenance Data – Contractors will provide a copy of O & M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment systems. The CxA will review the O & M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O & M literature once corrections have been made by the contractor.

.7 Demonstration and Training – Contractors, their sub-contractors, equipment manufacturers and vendors will provide demonstration and training as required by the specification and these commissioning requirements. A complete training plan and schedule must be submitted by the Contractor to the CxA four (4) weeks prior to any training. A training agenda for each training session must be submitted to the CxA two (2) weeks prior to the training session.

1.12 Manufacturer's Involvement

.1 Factory testing: manufacturer to:

.1 Coordinate time and location of testing.

.2 Provide testing documentation for approval by Engineer.

.3 Arrange for Engineer to witness tests.

.4 Obtain written approval of test results and documentation from Engineer before delivery to site.

.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Engineer and Cx Agent.

.1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.

.2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.3 Integrity of warranties:

.1 Use manufacturers trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

.2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 To report results in clear, concise, logical manner.

1.13 Operation and Maintenance of Equipment and Systems

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit to Engineer for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.14 Test Results

.1 If start-up, or testing produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.15 Instruments / Equipment

.1 Submit to Cx Agent for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including; serial number, current calibration certificate, calibration date, and calibration expiry date and calibration accuracy.

.2 Provide the following equipment as required:

.1 2-way radios.

.2 Ladders

.3 Equipment as required to complete work.

1.16 Extrapolation of Results

.1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Engineer in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.17 Completion of Commissioning

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Engineer.

1.18 Activities Upon Completion of Commissioning

.1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.19 Training

.1 In accordance with Section 01 79 00 – Demonstration and Training

1.20 Occupancy

.1 Cooperate fully with Engineer during stages of acceptance and occupancy of facility.

END OF SECTION

1. General

1.1 GENERAL

.1 Appended is a Commissioning Plan (DRAFT). The Commissioning Plan is a document that outlines the organization, roles and responsibilities, schedule, allocation of resources, and documentation requirements of the commissioning process. The Commissioning Plan is a dynamic document; which is open to be updated by the Commissioning Team throughout the commissioning process to ensure accuracy and relevance as the project progresses.

2. Products

2.1 NOT USED

3. Execution

3.1 NOT USED

END OF SECTION

Government of Canada New Building
Elk Point, AB COMMISSIONING PLAN

DRAFT

Prepared by:
Stantec Consulting Ltd.

Rev 0

Sign-off Sheet

This document entitled Government of Canada New Building Elk Point, AB COMMISSIONING PLAN was prepared by Stantec Consulting Ltd. for the account of the Government of Canada. The material in it reflects Stantec's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Reviewed by ___

(signature)

Stantec
200 - 325 25th Street SE Calgary AB T2A 7H8

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

1.0 Introduction - Brief Overview of the Commissioning Process

The new building in Elk Point, AB, will be a 753m² facility which will accommodate Government of Canada resources and public servants.

Commissioning is a quality assurance process continued throughout the entire project life cycle (Schematic through to Post Occupancy) in which the functional requirements and the operational requirements of the Project are tested, verified and proven to function as intended and documented.

System performance will be verified to meet the design parameters set out for it by the designer, and appropriate documentation will be produced to record the results of the verification tests. The final performance data will then be used to benchmark the systems operations that can be referenced in the years to follow to maintain system efficiencies.

Good lines of communication will be maintained throughout the project to keep all parties informed on the commissioning program progress. This will be done by keeping the commissioning documentation concise and facilitating all commissioning team members keeping an active dialogue going throughout the project. The focus for the project will to be to identify and resolve issues on the project as early as possible in the commissioning process through cooperation by all parties.

1.1 DEFINITIONS

The terms noted below will be used throughout the Cx process and within the Cx documentation. Any reference to these terms carries the stated and associated definition as outlined below.

Commissioning Authority (CxA) / Commissioning Manager - Is the individual designated to organize, lead, and review the completion of commissioning process activities. The CxA facilitates communication among the Owner, Designer, and Contractors to ensure that complex systems are installed and function in accordance with the Owner's Project Requirements.

Commissioning Agents - The internal technical resource staff of the Commissioning Authority that will be responsible for the execution of field reviews and the on-site "hands on" testing activities.

Commissioning Team - Personnel that will be directly involved in the building commissioning process. The Commissioning Team will be made up of the Commissioning Agents, Contractors, Design Consultants, LEED Consultants, Owners' Representatives, Independent Third Party Testing Agencies, and Government of Alberta Representatives.

Commissioning Plan - The Commissioning Plan is a document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process. The Commissioning Plan is a dynamic document; which is open to be updated by the

Commissioning Team throughout the commissioning process to ensure accuracy and relevance as the project progresses. The final Commissioning Plan will be submitted in Commissioning Report.

Contractor's Site Cx Coordinator: Personnel that represent the mechanical and electrical contractors that coordinate the commissioning process with the CxA.

Owner's Project Requirements - Is a written document that details the ideas, concepts, and criteria that are determined by the Owner to be important to the success of the project.

Design Narrative - The Design Narrative (DN) is where the design team describes in detail the concepts and features it intends to incorporate during schematic design.

Basis of Design - Includes the necessary design information needed to accomplish the Owner's Project Requirements, including system descriptions, indoor environmental quality criteria, design assumptions and references to applicable codes, standards, regulations and guidelines.

Contractors – Includes those responsible for physical construction of the project. This designation may include Prime Construction Contractors, and sub-contractors such as Electrical, Mechanical, and Controls firms.

Third Party Testing Firms - Specialty firms or agencies retained to conduct acceptance tests on a system or component and provide a certificate of acceptance and conformance to governing standards.

Project Manager - The individual or firm responsible for the overall management and delivery of the project to the Owner.

Consultants - The Architects and Engineers responsible for producing the design drawings and specifications for this project, as well as the base contract administration inspection, quality assurance and acceptance activities.

User / Operator - A User or Operator is an individual or group that will work in and operate various aspects of the facility once the project has been turned over.

In Contract Tests - Testing requirements that are defined in the contract documents that are a Contractor's responsibility to carry out and document appropriately.

Out of Contract Tests – Testing requirements that are not covered as part of the construction documents but are required to be carried out by certified agencies.

Commissioning Checksheets (Verification Forms) – Mechanical and electrical equipment checksheets that are specific to each system, and its major components. These are used to verify system operation and are developed by the CxA with the support of the project team and OEM suppliers.

Static Installation Checks – Systematic, detailed checks of mechanical and electrical system components. Contractors will utilize commissioning checksheets for recording installation compliance. The timing of the performance of static checks is tied to construction progress and occurs once the contractor's construction installation process and construction checks have been completed for the individual equipment components, or systems.

Contractor Start-Up Program - Contractor start-up and verification program activities are conducted by the Contractors and/or their sub-trades and equipment vendors. Contractor / Vendor verification of the physical installation of equipment, and reviewing the completion of system installation and readiness, shall be completed **prior** to the Commissioning Agent's functional performance testing and verification activities.

Functional Performance Testing - Functional performance tests are specific hands-on tests, used to verify that the equipment and associated systems meet the specified design parameters and operate as fully integrated components or systems through their respective level of automation. This testing also confirms the capabilities of each system to meet the requirements of the facility, and the Owner's Project Requirements. To test all systems under peak operating conditions, some functional performance testing may be deferred to times when peak operation occurs.

Acceptance Inspections - A series of formal inspections carried out for systems that result in acceptance of the work as complete. These typically would consist of In-Wall, Above-Ceiling, and Semi-Final / Final site reviews.

2.0 Building Information

Project Name: GOVERNMENT OF CANADA, NEW BUILDING, ELK POINT, AB

Location: Elk Point, Alberta

Building Type: _

Square Footage: 753 m2

3.0 Project Team

Table 1: Project Team Information

Title	Name / Company	Contact information
Owners Representative	Chuck Koch Project Manager NWR Project Management Office	Tel: (780) 412-5326
Owner		Tel:
Commissioning Team Lead	Stantec Consulting Jason Hancock	Tel: (403) 806-1564
Design Consultant	Enzo Vicenzino	Tel: (403) 569-5355
Mechanical Designer	Jason Hancock	Tel: (403) 806-1564
Electrical Designer	Ron Bonnett	Tel: (403) 716-1493
General Contractor		Tel:
Mechanical Contractor	--- ---	Tel: ---
Electrical Contractor	--- ---	Tel: --- ---
Control Contractor	--- ---	Tel: --- ---

3.1 COMMISSIONING TEAM'S RESPONSIBILITIES AND LIST OF COMMISSIONING PROCESS MILESTONES

3.1.1 Commissioning Authority

Commissioning Authority will:

Develop and implement a Commissioning Plan referencing CSA Z320-11 and as lead of the Commissioning Team, assist the Commissioning Team throughout the project to ensure that all systems work with one another specific to components, systems and integrated systems within the fit-up space to produce a functional and integrated facility including:

- Commissioning Plan and specifications
- Method of verification, check sheets, forms, system / component matrix and commissioning issues log;
- Resources required to complete commissioning responsibly;
- Final commissioning Report
- Verify user training and orientation
  Design Builder
- The Contractor will:
- Provide any available information to the CxA needed to develop the Check Sheets.
- Provide any clarifications or required information on any design related issues as requested by the CxA.
- Verify that sufficient materials and manpower are scheduled and available to carry out the commissioning activities; including subcontractors, specific equipment vendors/manufacturers, and individual testing agents/specialists.
- Provide all services requiring tools or the use of tools to start-up, test, adjust, or otherwise bring the equipment and systems into a fully operational state.
- Integrate the key commissioning events/activities from the Commissioning Plan (CP) into the construction schedule, including timelines indicating when the Seasonal or Deferred Commissioning Plan (SDCP) will be completed.
- Participate in all Commissioning Meetings (include representatives of the design team, equipment vendors, and individual testing agents as may be required). Carry out all commissioning activities; as described in the CP and the Contract documents.

- The Design Team and Owner shall be the vehicle to determine systems are ready. Additional commissioning cost shall:
    - Cost for Cx and Owner personnel to reschedule a functional performance test, made necessary because an item certified by a Certificate of Readiness signee is found in fault or incomplete, shall be charged to the responsible party.
    - A deficiency identified during functional testing not identified during installation inspection, shall be re-tested once at no Cx or Owner charge. All costs for subsequent re-testing shall be charge to the responsible party.
    - Items that are left incomplete by a contractor or vendor and later causing deficiencies or delays during functional testing may result in back-charges to the responsible party.
- Sub-Trades to provide written notification to the Construction Manager and Commissioning Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems and sub-systems are operating as required:
    - All MEP equipment and systems called for in the Scope of Work and all other equipment are furnished under the contract documents.
    - Heating and cooling equipment,
    - Fire stopping in the fire rated construction, including fire damper installation, caulking, gasketing and sealing of smoke barriers.
    - Fire detection and smoke detection devices furnished under the divisions of this specification as they affect the operations of the smoke controls system
    - The building control systems are functioning to control MEP equipment.

Documentation Requirements:

- Collaborate with the CxA to ensure that all equipment, installation and performance checks are fully documented.
- In consultation with subcontractors, equipment suppliers, and vendors ensure that Equipment Start-Up and Acceptance Reports are completed.
- Issue a statement and certify that testing and balancing work has been completed; and submit the final testing and balancing reports for review.

- Issue a statement and certify that BMS system controls have been calibrated, checked-out, and that the control of equipment and systems are fully operational and functionally tested in all sequences and operating modes.

- Issue a certificate of readiness that will be provided by the CxA that functional test performed by trade contractors have been completed and tested including all BMS control requirements and other control or monitoring systems have been reviewed and observed and are fully operational, functionally tested and ready for demonstration to the commissioning authority.

Review:

- All construction and manufacturer submittals (including Shop Drawings).

- Testing procedures, as identified in the Design-Build Contract, prior to the execution of tests.

- Operating / maintenance data prior to submission.

3.1.2 Design Consultants

Design Consultants will:

- Work in co-operation with the Commissioning Authority to produce design documentation that includes project specific Commissioning activities.

- On-Going Field Reviews – Visits to the site to observe progress for claim approval and to determine if the installations generally comply with the intent of the Contract Documents. This is not a quality control function, but a sampling for quality assurance. Ultimately, all quality control is the responsibility of the contractors. As part of the contract responsibilities, the Consultants are to provide interpretations of the Contract Documents when required and resolution of construction-related issues.

- Provide clarification and/or required information as requested by the Commissioning Agent

- Be provided with all Commissioning reports and schedules. They shall review all recommendations in the reports, and provide direction.

- Witness (at their discretion) Functional Performance tests as conducted by the Commissioning Agent. This however, is not a requirement of the Consultant.

- Provide copies of all Inspection Reports to the Commissioning Authority to allow for better tracking of the construction progress and issues.

Table 2 gives a brief task breakdown of the Commissioning Process and lists the responsible parties. The completion of each of the following commissioning tasks is considered a Commissioning Process Milestone.

Table 2: Project Team Responsibilities

Commissioning Tasks	Contractor	Commissioning Agent	Architect	Mechanical Designer	Electrical Designer	Builders' Cx Coordinator	Owner / Owner's Rep.
Develop Commissioning and equipment testing required specifications			x	x	x		x
Develop the Commissioning Plan and update as necessary		x					
Develop Commissioning installation check sheets		x					
Review Commissioning installation check sheets		x		x	x	x	
Complete installation check sheets	x	x					
Complete equipment startup	x						
Witness equipment startup	x	x				x	x
Develop Functional Performance Testing procedures	x	x				x	
Review Functional Performance Testing procedures	x	x				x	
Perform Functional Performance Testing procedures	x	x					
Organize O&M manual	x					x	
Complete Final Commissioning Report		x					
Perform seasonal functional testing (if applicable)	x	x					

3.2 LIST OF KEY COMMISSIONING MILESTONES

The major commissioning milestones for this project are as follows:

Pre-Construction	
Commissioning Specifications generated	---
Prepare Commissioning Plan / Org Chart (Final Issue)	---
Construction	
Commissioning Kick-off Meeting (65% Construction)	---
Develop the Equipment Installation Checksheets	---
Begin Equipment Installation Checks	---
Develop Functional Performance Testing Procedures	---
M&E System Start-up	---
Verification of Installation Procedure	---
Functional Performance Testing	---
Operations and Maintenance Manuals submitted for review	---
Post Construction	
Issue Resolution/Deferred Testing	---
Lessons Learned	---
Final Commissioning Report Issued	---
Performing a post occupancy review with the Tenant Representative	---

4.0 Description of the Management, Communication and Reporting Aspects of the Commissioning Process

The Commissioning Team shall follow the following communication protocol in the event that issues arise. Table 3 is an identification tool for proper management, communication and reporting to be used by the Commissioning Team. The Project Team shall understand the following to insure their responsibility in the event of an issue is understood.

All communication and management throughout the commissioning process is structured as follows. If there is a request for information or a formal document requested the Commissioning Authority first approaches the Project Manager for resolution. If the Commissioning Authority requires verbal information for clarification they are to go directly to the informed party. If the Commissioning Authority needs to notify contractors of deficiencies they are to document deficiencies through the Project Manager. When the Commissioning Authority requires training or functional testing to be scheduled they can supply some input but do not do any scheduling. The Commissioning Authority does not have the authority to issue any change orders. Should Subcontractors disagree with the requests or interpretations by the Commissioning Authority, the Subcontractor should try to resolve the issue with the Commissioning Authority and notify the Project Manager. For further reference see Table 3.

4.1 DESCRIPTION OF REPORTING WITHIN THE COMMISSIONING PROCESS

All reporting from the Commissioning Authority is sent to the Project Manager and Owner. The Project Manager is then responsible for distributing appropriate contents to other parties and subcontractors. For further reference see Table 3.

Table 3: Description of management, communication and reporting within the commissioning process

Issue	Protocol
For requests for information (RFI) or formal documentation requests.	Request goes to Builders' Commissioning Coordinator who coordinates accordingly
For verbal information or clarification.	The CxA / Agents goes directly to the informed party.
For notifying contractors of construction deficiencies or the Design Consultants on design issues.	The CxA / Agents will verbally discuss issues of note on site with the installing contractors and then document all observations, including deficiencies, in field commissioning reports copied to the Project Team first hand to speed up the process for issue resolve.
For scheduling of field reviews and functional tests.	The CxA may provide input and do some coordination, but scheduling the timing of the commissioning reviews is based on dates provided by the contractors working with the Builders' Commissioning Coordinator.

Table 3: Description of management, communication and reporting within the commissioning process

Issue	Protocol
For making requests for significant changes.	The CxA has no authority to issue change orders. If a design change is required, action will be directed to the Design Consultants.
Subcontractors disagreeing with requests or interpretations by the CxA shall:	The Subcontractor may review this issue directly with the CxA / and his Agents, but the Builders' Commissioning Coordinator to be informed of all issues that require additional input for resolve.
Issue Sign-off	The CxA / Agents follow up on all documented commissioning issues for sign-off and issues a summary log report noted how each issued was resolved or highlights the status of all issues that remain open in the logs.

5.0 Commissioning Scope of Work

5.1 LISTING OF THE SYSTEMS AND ASSEMBLIES INCLUDED IN THE COMMISSIONING AUTHORITY'S SCOPE OF WORK.

The facility systems and sampling rate of systems to be commissioned are as follows:

1. MECHANICAL SYSTEMS

1. Heating, Ventilating and Air - Conditioning (HVAC) Systems
    1. Heating System
        - o Unit Heaters 100%
        - o Electric Baseboard Heaters 100%
    2. Cooling System(s) 100%
2. Air Systems
    - o Air Handling Units / Make-up Air Units 100%
    - o Exhaust Fans 100%
    - o Ductwork 20%
    - o Duct Cleaning 10%
    - o Fire Dampers 100%
3. Variable Frequency Drives (VFDs) 100%
4. Air and Water Balancing 25%

2. PLUMBING SYSTEMS

1. Domestic Cold Water System
    - o Meter 100%
    - o Backflow Preventers 100%
    - o Domestic Water Booster Package 100%
    - o Disinfection 100%
2. Domestic Hot Water and Recirculation System
    - o Water Heating Equipment 100%
    - o Pump 100%
3. Plumbing Fixtures 50%

4. Drainage Systems
   - o Sanitary Piping 10%
   - o Storm Piping 10%

3. BUILDING AUTOMATED CONTROL SYSTEM (BAS)

1. Sequence of Operation 100%

2. Every connected physical point and end devices including:
   - o Temperature / Humidity Sensors 100%
   - o Pressure Sensors and Controllers 100%
   - o Occupancy Sensors 100%
   - o Carbon Dioxide Sensors 100%
   - o Damper/Valve Actuators 100%
   - o Meters 100%

3. Fire Protection System 100%

4. ELECTRICAL SYSTEMS

1. Power Distribution
   - o Main Switchgear 100%
   - o 600 V and 208 V Distribution Panel boards 100%
   - o Branch Circuit Panel boards 25%
   - o Transformers 100%
   - o UPS 100%
   - o Motor Starters 50%
   - o Variable Frequency Drives 100%
   - o Branch Circuit Receptacles 10%

2. Lighting
   1. Interior Lighting
      - o Illumination Levels 20%
      - o Lighting Controls 100%
      - o Occupancy Sensors/Daylighting Sensors 100%
      - o Interface with BAS 100%
   2. Exterior Lighting
      - o Illumination Levels 50%
      - o Lighting Controls 100%

	o Interface with BAS	100%
3.	Exit Lights	100%
4.	Emergency Lighting Battery Units	100%
5.	Fire Alarm System	
	o Integration with HVAC	100%
	o Integration with Elevators	100%
	o Connection to Fire Department	100%
6.	Electronic Systems	
	o Electronic Access Control	100%
	o Intrusion Detection	100%
	o Telephones	10%
	o Data	10%
	o Clocks	100%

5. BUILDING INTEGRATED SYSTEM TEST

1.	Building Integration System Test	100%

6. ARCHITECTURAL SYSTEMS

1.	Electric Door Hardware	100%
2.	Overhead Coiling Doors/Grilles and Sensors	100%
3.	Operation of Doors and Hardware	100%

Systems not included in this Commissioning Plan – The following building systems are not required to be commissioned under LEED 2009 EAp1 and therefore are not included with the Commissioning Agent's scope of work:

- Portables – Commissioning scope is limited to confirming that the Automation Controls from the Portable Classrooms are communicating with the Base Building Controls System. The Builder and the sub-contractors are responsible for completing the start-up checks for the portables and submitting a report.
- Building Envelope
- CATV Systems
- Intercom System
- Public Address

6.0 Commissioning Process

6.1 DEFINITION OF COMMISSIONING

"Building Commissioning" is the process of bringing a facility from a static operating state to a dynamic operating state, while also meeting the specific building requirements for the intended use of the facility. More specifically, commissioning includes bringing the facility to a working and fully operational condition that is in compliance with the design intent. Commissioning is a systematic process to ensure that all building systems perform interactively according to the contract documents, the design intent and the Owner's operational needs.

6.2 ELEMENTS OF COMMISSIONING

The Fundamental Commissioning procedures must be planned well in advance of construction and implemented throughout the pre-design, design, construction, and installation phases of the project. The commissioning process is closely associated with the construction of the building, specifically the timing, and is grossly 'driven' by the construction schedule.

During construction, the Commissioning Authority, in accordance with the Commissioning Plan, will coordinate the commissioning activities and track the completion of testing for each component, and building system.

Commissioning activities:

- **Commissioning Kick-Off Meeting** – After all major shop drawings submittals have been approved and the commissioning checksheets have been prepared, the Commissioning Authority will arrange for a Commissioning Meeting to kick-off the commissioning process in the field. This meeting will be used to go over in detail, the process for completing the commissioning checksheets, review roles and responsibilities, and begin to establish a commissioning schedule of activities. Typically, this meeting takes place around the 65% Construction Phase. The Commissioning Authority will coordinate additional Commissioning Meetings with the Project Construction Team as required, to provide updates on commissioning progress along with reviews of any issues or potential concerns.

- **Installation of Building Equipment** – After notification from the contractors that a system's equipment components have been installed and are ready for review, the Commissioning Team conducts dynamic functional checks to verify performance. Following each commissioning site review, the Commissioning Agents will prepare and issue a Witnessing Report documenting findings and potential issues.

- **Schedule** – The Commissioning Schedule is generated based on information provided to the commissioning team regarding construction dates and project timelines as supplied

by the project and commissioning teams. The Commissioning Schedule is a dynamic process and designed to incorporate updates from the ongoing construction process as they become available. The overall commissioning process is targeted to dovetail into the construction process wherever practical by following the construction completion and readiness milestones. As project construction milestones and projected completion updates are made available to the Commissioning Team, the Commissioning Schedule will be updated and resubmitted accordingly.

The Commissioning Authority will update the Commissioning Schedule on regular intervals to show commissioning progress and whenever significant changes occur to the dates provided for commissioning activities. The Commissioning Schedules are sent to the Owner to be distributed.

- **Start-Up/Activation** – Following dates established in the commissioning schedule, the Commissioning Agents witness contractor start-up of selected equipment and review all Contractor start-up reports of all commissioned equipment.

- **Functional Performance Testing**– After notification from the Contractors that system adjustments and balancing have been completed, the Commissioning Agents will verify equipment and system performance. In many cases, hands-on functional performance testing can be completed with minimal assistance from the Contractors.

- **Post-Construction** – Commissioning Authority will complete a final schedule which is developed to ensure all seasonal performance verifications are completed prior to warranty end. The Commissioning Authority will provide a Final Commissioning Report to the Owner, certifying that commissioning has been completed.

6.3 INSTALLATION CHECKS

Prior to the startup of the equipment, all equipment shall be checked and correct installation shall be verified. This is done to reduce delays and damage to the equipment during startup.

Every piece of equipment is inspected by the Installing Contractor. There is to be no sampling at this step. The CxA does not need to be present during each installation, but should be present for startup of central pieces of equipment, and has the right to check a sample of additional equipment of his/her choosing.

The commissioning checksheets are to be supplied by the CxA, contractor or manufacturer for each piece of energy consuming equipment and when necessary, submitted to the CxA for inclusion into Appendix A.

All deficiencies are to be recorded and addressed before functional testing will begin.

6.4 COMMISSIONING CHECKSHEETS

The Commissioning Check Sheet Manual contains the Mechanical and Electrical checksheets that are specific to the Commissioning activities. Specified and shop drawing information for each major piece of equipment will be entered on a checksheet. The technical data (including specified, shop drawing and installed equipment data) will be completed by the Contractors and the Commissioning Agents. Functional or Dynamic checks will be completed by the Commissioning Agents in the field.

All commissioning checksheets must be completed and signed off by the Contractors. (Refer to Appendix B for sample check sheets.)

The commissioning checksheets are designed to act as a tool for the Contractor to ensure the installed equipment aligns with the approved shop drawings and that each installation is complete before start-up to reduce the number of deficiencies associated with system start-ups.

The project commissioning documentation status can be reviewed on-line by all project team members once a password is provided by the Commissioning Authority.

Technical Data	Specified Data Submitted Data Installed Data	Commissioning Agent Commissioning Agent Contractors
Installation Checks	Static Checks	Contractors
Functional Checks	Dynamic Checks	Completed by Commissioning Agent with the assistance of the contractors as field testing of the equipment progresses.
Date/Checked by		Automatically documented on to the commissioning checksheets within the StanCheck Program.

6.5 FINAL REPORT

The CxA will supply the Project Manager with a Final Commissioning Report. The contents of the report shall be as follows:

- Final Commissioning Plan
- Project Commissioning Specifications
- Verification of Installation (Construction Checklists)
- Factory Start-Up and Vendor Test Reports
- Functional Performance Testing Forms organized on a building system basis
- Outstanding Issues / Issue Resolution Reports
- Remediation / Retest Reports
- Records of Training

Appendix A SAMPLE COMMISSIONING CHECKSHEETS

Appendix B SAMPLE FUNCTIONAL TEST PROCEDURES

Appendix C COMMISSIONING TEAM ORGANIZATION CHART

MUA - Indirect Fired

PROJECT: ABC Corporate Headquaters Renovations and Upgrades
LOCATION: Calgary, AB
PROJECT #: 1153xxxxx
DATE: 5/4/2015
CONTACT:
AUTHOR:

SYSTEM/UNIT: MUA-01
AREA: North Mechanical Enclosure

Specified	
Manufacturer	ENGINEERED AIR
Model	DG200/0
Heating Capacity / Output	586 Kw kW
Air Flow	7765 L/S L/s
Static Pressure	249 pA Pa
Fan RPM Rating	933 RPM
Motor Horsepower	11 Hp
Motor Voltage Rating	575/3/60

Submittal Data	
Manufacturer (s)	INDUSTRIAL COMMERCIAL
Model (s)	GIDM 175
Heating Capacity / Input (s)	641.1 kW
Heating Capacity / Output (s)	512.9 kW
Air Flow (s)	7764.9 l/s
Static Pressure (s)	1" wc
Fan RPM Rating (s)	1460 rpm
Motor Horsepower (s)	15 Hp
Motor Voltage Rating (s)	575V/3Ph/60Hz
Motor Efficiency (s)	HI EFF/TEFC

Installed - MUA-01

	Verification	Response	Notes	By	Date/Time
1	Manufacturer (i)				
2	Model (i)				
3	Heating Capacity / Input (i)				
4	Heating Capacity / Output (i)				
5	Air Flow (i)				
6	Static Pressure (i)				
7	Fan RPM Rating (i)				
8	Motor Horsepower (i)				
9	Motor Voltage Rating (i)				
10	Emergency Power (i)				
11	Motor Manufacturer (i)				
12	Motor Nameplate FL Amps (i)				
13	Service Factor (i)				
14	Motor Efficiency (i)				

Maintenance Data - MUA-01

	Verification	Response	Notes	By	Date/Time
1	Serial #				

Static Checks - MUA-01

	Verification	Response	Notes	By	Date/Time
1	Belt Tension/ Alignment				
2	Duct Connections				
3	Fan Rotation				
4	Filter(s) Condition				
5	Motorized Dampers				
6	Vibration Isolation				
7	Service Space				
8	Belt Guard				
9	Shipping Restraints Removed				
10	MCC Panel				
11	Access Doors				

MUA - Indirect Fired

PROJECT: ABC Corporate Headquaters Renovations and Upgrades **DATE:** 5/4/2015
LOCATION: Calgary, AB **CONTACT:**
PROJECT #: 1153xxxx **AUTHOR:**

SYSTEM/UNIT: MUA-01
AREA: North Mechanical Enclosure

Dynamic Checks - ED-MUA-01

	Verification	Response	Notes	By	Date/Time
1	Damper(s) Operation				
2	Fan RPM				
3	Low Limit Switch				
4	Temperature Control				
5	Interlocks Functional				
6	Vibration Noise				

Functional Performance Tests

PROJECT: ABC Corporate Headquarters Renovations and Upgrades **DATE:** 5/4/2015
LOCATION: Calgary, AB **CONTACT:**
PROJECT #: 1153xxxxx **AUTHOR:**

SYSTEM/UNIT: Air System - MUA-3

General
System Name

00-System Description - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	Make-up air unit 3 system consists of: supply fan, indirect fired gas heater with BMS reset and exhaust fans EF-3, EF-21, EF-22 and EF-23.	INFO		EH	4/20/15 14:55
2	MUA-3 and EF-3 run continuously and MUA-3 is the primary air heating and fresh air supply unit for the building. MUA's 1,2 and 4 will provide fresh air and heat if required when activated through the gas detection system.	INFO		EH	4/20/15 14:55
3	EF-23 serves the washroom and runs continuously.	INFO		EH	4/20/15 14:55
4	EF-21 and EF-22 serve the truck wash bay and also run	INFO		EH	4/20/15 14:55

01-System Off. - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	Disable MUA-3 in order to confirm unit components go to their proper condition when unit is not operational.				
2	When MUA-3 is disabled the following conditions will apply:	INFO		EH	4/20/15 14:55
3	MUA-3 Supply fan is OFF.	INFO		EH	4/20/15 14:55
4	MUA-3 Burner is OFF.	INFO		EH	4/20/15 14:55
5	MUA-3 Outside air damper is CLOSED.	INFO		EH	4/20/15 14:55
6	Confirm MUA-3 supply fan and gas fired burner are OFF and the outside air damper is CLOSED.				
7	EF-3 shall be OFF.	INFO		EH	4/20/15 14:55
8	Confirm EF-3 is OFF.				
9	EF-21, EF-22 and EF-23 continue to run.	INFO		EH	4/20/15 14:55
10	Confirm EF-21, EF-22 and EF-23 remain running.				

02-MUA Start-up. - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	Enable MUA-3 and confirm the following:	INFO		EH	4/20/15 14:55
2	Outside air damper OPENS.				
3	Supply fan and EF-3 start.				
4	MUA-3 heating control will be tested in the later stages of this test.	INFO		EH	4/20/15 14:55

Functional Performance Tests

PROJECT: ABC Corporate Headquarters Renovations and Upgrades **DATE:** 5/4/2015
LOCATION: Calgary, AB **CONTACT:**
PROJECT #: 1153xxxxx **AUTHOR:**

SYSTEM/UNIT: Air System - MUA-3

03-CO Sensor System Activation. - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	For the purposes of this test and prior to test beginning, set the minimum runtime after gas levels have cleared from 20 minutes to 1 minute.				
2	When any of the CO sensors reach alarm status the MUA and all exhaust fans associated with that sensor shall be activated. MUA-3, EF-3, EF-21, EF-22 and EF-23 shall continue to run.	INFO		EH	4/20/15 14:55
3	As each of the CO sensors are tested and reach alarm status, confirm on the test matrix sheet that MUA-3, EF-3, EF-21, EF-22 and EF-23 continue to run.				

04-NO2 Sensor System Activation. - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	When any of the NO2 sensors reach alarm status the MUA and all exhaust fans associated with that sensor shall be activated. MUA-3, EF-3, EF-21, EF-22 and EF-23 shall continue to run.	INFO		EH	4/20/15 14:55
2	As each of the NO2 sensors are tested and reach alarm status, confirm on the test matrix sheet that MUA-3, EF-3, EF-21, EF-22 and EF-23 continue to run.				
3	Prior to continuing testing, set the minimum runtime after gas levels have cleared back to 20 minutes.				

05-Heating Control - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	The MUA unit shall maintain a discharge air temperature of 18°C whenever it is enabled.	INFO		EH	4/20/15 14:55
2	If MUA burner section is not currently firing, raise the discharge setpoint to activate the burner.				
3	Confirm burner operation.				
4	Monitor discharge air temperature and confirm temperature is maintained at new setpoint of _____°C.				
5	If the burner was already firing raise the discharge setpoint to 25°C.				
6	Confirm MUA burner fire rate increases to meet new setpoint.				
7	Confirm new setpoint reached and maintained.				

Functional Performance Tests

PROJECT: ABC Corporate Headquarters Renovations and Upgrades **DATE:** 5/4/2015
LOCATION: Calgary, AB **CONTACT:**
PROJECT #: 1153xxxxx **AUTHOR:**

SYSTEM/UNIT: Air System - MUA-3

05-Heating Control - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
8	Return discharge setpoint to 18°C.				
9	Allow MUA-3 to continue running while next test section is performed.	INFO		EH	4/20/15 14:55

06-Safeties and Alarms. - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	The BMS uses a current switch to confirm the MUA fan and EF's 21, 22 and 23 are in their desired state and generates an alarm if status deviates from the start/stop control.	INFO		EH	4/20/15 14:55
2	With MUA-3 running, remove to power to the unit.				
3	Confirm unit failure alarm received at BMS frontend.				
4	Restore power to unit.				
5	With EF-21 running, remove to power to the unit.				
6	Confirm unit failure alarm received at BMS frontend.				
7	Restore power to unit.				
8	With EF-22 running, remove to power to the unit.				
9	Confirm unit failure alarm received at BMS frontend.				
10	Restore power to unit.				
11	With EF-23 running, remove to power to the unit.				
12	Confirm unit failure alarm received at BMS frontend.				
13	Restore power to unit.				
14	Return all overridden points to their original value or state.				
15	Each of the buildings exhaust fans uses a current switch to confirm the fan is in its desired state and generates and alarm if status deviates from BMS start/stop control.	INFO		EH	4/20/15 14:55
16	Throughout the testing the alarm for each exhaust fans will be checked and recorded on the "Exhaust Fan Alarm Matrix".	INFO		EH	4/20/15 14:55

07 - Acceptance Signatures - Air System - MUA-3

	Verification	Response	Notes	By	Date/Time
1	Date and Time of testing:				
2	Commissioning Agent:				
3	Controls Contractor:				

Functional Performance Tests

PROJECT: ABC Corporate Headquarters Renovations and Upgrades **DATE:** 5/4/2015
LOCATION: Calgary, AB **CONTACT:**
PROJECT #: 1153xxxxx **AUTHOR:**

SYSTEM/UNIT: Air System - MUA-3

07 - Acceptance Signatures - Air System - MUA-3

Verification		Response	Notes	By	Date/Time
4	Electrical Consultant:				
5	Mechanical Consultant:				
6	Mechanical Contractor:				
7	Owners Representative:				

1 General

1.1 SUMMARY

.1 Section Includes:
.1 This Section specifies roles and responsibilities of Commissioning Training.

.2 Related Requirements

.1 Section 01 79 00 - Demonstration and Training.

1.2 TRAINEES

.1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.

.2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.3 INSTRUCTORS

.1 Departmental Representative will provide:
.1 Descriptions of systems.
.2 Instruction on design philosophy, design criteria, and design intent.

.2 Contractor and certified factory-trained manufacturers' personnel: to provide instruction on the following:
.1 Start-Up, operation, shut-down of equipment, components and systems.
.2 Control features, reasons for, results of, implications on associated systems of, adjustment of set points of control and safety devices.
.3 Instructions on servicing, maintenance and adjustment of systems, equipment and components.

.3 Contractor and equipment manufacturer to provide instruction on:
.1 Start-up, operation, maintenance and shut-down of equipment they have certified installation, started up and carried out PV tests.

1.4 TRAINING OBJECTIVES

.1 Training to be detailed and duration to ensure:
.1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
.2 Effective on-going inspection, measurements of system performance.
.3 Proper preventive maintenance, diagnosis and trouble-shooting.
.4 Ability to update documentation.
.5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 TRAINING MATERIALS

.1 Instructors to be responsible for content and quality.

.2 Training materials to include:
- .1 "As-Built" Contract Documents.
- .2 Operating Manual.
- .3 Maintenance Manual.
- .4 Management Manual.
- .5 TAB and PV Reports.

.3 Project Manager, Commissioning Manager and Facility Manager will review training manuals.

.4 Training materials to be in a format that permits future training procedures to same degree of detail.

.5 Supplement training materials:
- .1 Transparencies for overhead projectors.
- .2 Multimedia presentations.
- .3 Manufacturer's training videos.
- .4 Equipment models.

1.6 SCHEDULING

.1 Include in Commissioning Schedule time for training.

.2 Deliver training during regular working hours, training sessions to be 3 hours in length.

.3 Training to be completed prior to acceptance of facility.

1.7 RESPONSIBILITIES

.1 Be responsible for:
- .1 Implementation of training activities,
- .2 Coordination among instructors,
- .3 Quality of training, training materials,

.2 Departmental Representative will evaluate training and materials.

.3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.8 TRAINING CONTENT

.1 Training to include demonstrations by Instructors using the installed equipment and systems.

.2 Content includes:
- .1 Review of facility and occupancy profile.

.2 Functional requirements.
.3 System philosophy, limitations of systems and emergency procedures.
.4 Review of system layout, equipment, components and controls.
.5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
.6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
.7 Maintenance and servicing.
.8 Trouble-shooting diagnosis.
.9 Inter-Action among systems during integrated operation.
.10 Review of O M documentation.

.3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.9 VIDEO-BASED TRAINING

.1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 3 months prior to commencement of scheduled training.

.2 On-Site training videos:
.1 Videotape training sessions for use during future training.
.2 To be performed after systems are fully commissioned.
.3 Organize into several short modules to permit incorporation of changes.

.3 Production methods to be high quality.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:
  .1 This section is limited to portions of the Building Management Manual (BMM) provided to Departmental Representative by Contractor.

.2 Acronyms:
  .1 BMM - Building Management Manual.
  .2 Cx - Commissioning.
  .3 HVAC - Heating, Ventilation and Air Conditioning.
  .4 PI - Product Information.
  .5 PV - Performance Verification.
  .6 TAB - Testing, Adjusting and Balancing.
  .7 WHMIS - Workplace Hazardous Materials Information System.

1.2 GENERAL REQUIREMENTS

.1 Standard letter size paper 216 mm x 279 mm.

.2 Methodology used to facilitate updating.

.3 Drawings, diagrams and schematics to be professionally developed.

.4 Electronic copy of data to be in a format accepted and approved by Departmental Representative.

1.3 APPROVALS

.1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative.

1.4 GENERAL INFORMATION

.1 Provide Departmental Representative the following for insertion into appropriate Part and Section of BMM:
  .1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.
  .2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.
    .1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.
  .3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.
  .4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM..

.5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.
.6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of BMM.
.7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.
.8 Operating and maintenance manual - Section 3.2 of BMM.
.9 Final commissioning plan as actually implemented.
.10 Completed commissioning checklists.
.11 Commissioning test procedures employed.
.12 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Departmental Representative.
.13 Commissioning reports.

1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL

.1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.

.2 Departmental Representative to review and approve format and organization within 12 weeks of award of contract.

.3 Include original manufactures brochures and written information on products and equipment installed on this project.

.4 Record and organize for easy access and retrieval of information contained in BMM.

.5 Include completed PI report forms, data and information from other sources as required.

.6 Inventory directory relating to information on installed systems, equipment and components.

.7 Approved project shop-drawings, product and maintenance data.

.8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O M, shutdown and training materials.

.9 Inventory and location of spare parts, special tools and maintenance materials.

.10 Warranty information.

.11 Inspection certificates with expiration dates, which require on-going re-certification inspections.

.12 Maintenance program supporting information including:
.1 Recommended maintenance procedures and schedule.
.2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

1.6 LIFE SAFETY COMPLIANCE (LSC) MANUAL

.1 Samples of LSC Manual will be available from Departmental Representative.

.2 Content of Manual:
- .1 All possible Emergency situations modes including: presence of fire and smoke, power failure, lose of water or pressure, chemical spills and refrigerant release.
- .2 Failure of elevators and escalators.
- .3 HVAC emergencies and fuel supply failures.
- .4 Intrusion and security breach.
- .5 Emergency provisions for natural disasters, bomb threats and other disruptive situations.
- .6 Dedicated emergency generators for high security projects, medical facilities and computer systems.
- .7 Emergency control procedures for fire, power and major equipment failure.
- .8 Emergency contacts and numbers.
- .9 Manual to be readily available and comprehensible to non- technical readers.

1.7 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES

.1 Provide Departmental Representative supporting documentation relating to installed equipment and system, including:
- .1 General:
  - .1 Finalized commissioning plan.
  - .2 WHMIS information manual.
  - .3 Approved "as-built" drawings and specifications.
  - .4 Procedures used during commissioning.
  - .5 Cross-Reference to specification sections.
- .2 Architectural and structural:
  - .1 Inspection certificates, construction permits.
  - .2 Roof anchor log books.
  - .3 PV reports.
- .3 Fire prevention, suppression and protection:
  - .1 Test reports.
  - .2 Smoke test reports.
  - .3 PV reports.
- .4 Mechanical:
  - .1 Installation permits, inspection certificates.
  - .2 Piping pressure test certificates.
  - .3 Ducting leakage test reports.
  - .4 TAB and PV reports.
  - .5 Charts of valves and steam traps.
  - .6 Copies of posted instructions.
- .5 Electrical:
  - .1 Installation permits, inspection certificates.
  - .2 TAB and PV reports.
  - .3 Electrical work log book.
  - .4 Charts and schedules.
  - .5 Locations of cables and components.
  - .6 Copies of posted instructions.

1.8 LANGUAGE

.1 English and French Language to be in separate binders.

1.9 IDENTIFICATION OF FACILITY

.1 When submitting information to Departmental Representative for incorporation into BMM, use following system for identification of documentation:
.1 Government of Canada, New Building, Elk Point, Alberta.

1.10 USE OF CURRENT TECHNOLOGY

.1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.

.2 Obtain Departmental Representative's approval before starting Work.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1	Concrete Reinforcing	Section 03 20 00
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Concrete Finishing	Section 03 35 00
.4	Unit Masonry	Section 04 05 19
.5	Rough Carpentry	Section 06 10 00
.6	Earthwork	Section 31 00 00
.7	Bored Concrete Piles	Section 31 63 23

1.2 WORK INSTALLED BUT SUPPLIED UNDER OTHER SECTIONS

.1 Install materials specified to be supplied under other sections of these project specifications. Materials include but are not limited to:

.1 Fabricated components, anchor bolts, bearing plates, sleeves and other inserts to be built into concrete.

.2 Ensure installation is to the satisfaction of trades concerned and of the Engineer prior to placing concrete.

1.3 REFERENCE STANDARDS

.1 Perform all work in accordance with the following standards, except where specified otherwise. All standards to be latest issue at time of tender.

.1 NBC 2010, “National Building Code”.

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1-10/CSA-A23.2-10, “Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete”.

.2 CSA-A23.3-10, “Design of Concrete Structures”.

.3 CSA B111-1974 (R2003), “Wire Nails, Spikes and Staples”.

.4 CAN/CSA-O86-09, “Engineering Design in Wood (Limit States Design)”.

.5 CSA-O121-08(R2013), “Douglas Fir Plywood”.

.6 CAN/CSA-O141-05(R2014), “Softwood Lumber”.

.7 CSA-O151-09(R2014), “Canadian Softwood Plywood”.

.8 CSA-O153-M1980 (R2008), “Poplar Plywood”.

.9 CSA-O325-07(R2012), “Construction Sheathing”.

.10 CSA-O437 Series-93 (R2011), “Standards on OSB and Waferboard”.

.11 CSA-S269.1-1975 (R2003), “Falsework for Construction Purposes”.

.12 CAN/CSA-S269.2-M87 (2003), “Access Scaffolding for Construction Purposes”.

.13 CAN/CSA-S269.3-M92 (R2013), “Concrete Formwork, National Standard of Canada”.

.3 Underwriters’ Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, “Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering”.

.4 Provincial safety standards where applicable.

.5 Conform to applicable safety regulations for erection, maintenance and removal of formwork.

1.4 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers’ Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.5 SAFETY

.1 Carry out work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.6 QUALIFICATIONS

.1 Engage a professional structural engineer registered in the Province of Alberta, fully qualified and experienced in the design of formwork and shoring, to be responsible for

the design of formwork, scaffolding, shoring, re-shoring and all other components required for formwork erection.

1.7 SUBMITTALS

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

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

.3 Indicate sequence of erection and removal of formwork/falsework as directed by Consultant.

.4 Submit all proposed joint details, locations and construction procedures. Include waterstop, crack inducer, reglet, sealant and joint filler products as required.

.5 Review of the shop drawings by the Engineer is intended to assist the Contractor and does not relieve the Contractor of responsibility for the completeness and accuracy of the work and its conformance with the contract drawings and specifications.

.6 Fabrication that commences prior to shop drawing review by the Engineer is at the risk of the Contractor.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver all materials to the site in bundles easily identified and properly marked.

.2 Store and handle all material on site in a manner to prevent damage and contamination.

1.9 QUALITY CONTROL

.1 The Contractor’s professional engineer responsible for the design of formwork is to inspect the fabrication and erection of formwork.

.2 The Contractor is not to assign the responsibility of coordination of forming, placing reinforcing steel, placing other required material and placing concrete. Ensure a full-time qualified superintendent representing the Contractor is in attendance to inspect and check all phases of this work.

Part 2 Products

2.1 FORMWORK MATERIALS

.1 Plywood:

.1 Douglas fir conforming to CSA-O121 or softwood conforming to CSA-O151 or CSA-O153 as required to resist design loads imposed upon the forming system. Regular grade select tight face. Sound, undamaged sheets with clean, true finish.

.2 Lumber: SPF species, No. 2 Grade or better, conforming to CSA-O141 and to the design requirements of CAN/CSA-O86.1 to resist applied loads required of the forming system.

.3 Anchorage devices (including nails, bolts, spikes and lag screws): Sized to ensure all formwork loadings are adequately resisted. Nails, spikes and staples conforming to CSA-B111 galvanized or phosphatized.

.4 Steel forms: Minimum 1.6 mm well matched, tight fitting and adequately stiffened to support weight of concrete without deflection.

.5 Form ties for all concrete below grade or exposed to weather:

.1 Snap off metal ties with 40 mm length cone to resist all forces.

.2 Removable ties to resist all forces that will permit a recessed or flush finish.

.6 Form tie hole sealant: One-component polymeric sealant. Cementitious Non-Shrink Grout. Natural grey or colour to match concrete.

.7 Form release agent: Ecologo certified under the Environmental Choice Program (ECP) or, if not Ecologo certified, the Contractor shall:

.1 provide a product that conforms to the requirements for concrete release agents in accordance eith ECP Certification Criteria Document (CCD) 143 governing Asphalt and Concrete Release Agents, excluding the provisions under Conditions for Ecologo Use and,

.2 if requested, provide the Engineer with the same rights as the ECP under CCD 143 with regard to verification of product compliance.

.8 Fillets for chamfered corners: Minimum 12 mm x 12 mm wood.

.9 Void form: Closed celled expanded polystyrene complete with void spaces specifically designed to allow frost heave and swelling of soil under concrete without inducing uplift on the concrete. Structurally sufficient to support weight of wet concrete 100mm thick.

.10 Void forms: Moisture-resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete until initial set, 100mm thick. Use wax mat with minimum compressive strength of 0.12 MPa.

.11 Grade beam void form: Expanded polystyrene (EPS) configured to support a maximum load of 25 kPa. Use Geospan by Plastifab or approved alternate.

.12 Grade beam and wall void form protection: Provide polyethylene protection under biodegradable void form as required to protect the void form from moisture and premature failure prior to placing concrete

.13 Structural slab on grade void form protection: Provide plywood or hard board as required over void form to protect the form from crushing under construction activities and reinforcement chairing.

.14 Void protection: Wood preserved pressure treated plywood, 12 mm thick by 250 mm high each side of biodegradable void form to ensure void space.

.1 Wood cement composites:

.2 Rigid insulation board: to CAN/ULC-S701

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

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

Part 3 Execution

3.1 FABRICATION AND ERECTION

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

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

.3 Verify lines, levels and centres before proceeding with formwork. Ensure that dimensions agree with drawings.

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

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

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

.7 Ensure that supplied equipment, hardware, and items to be cast-in will fit concrete dimensions.

.8 Construct formwork, shoring and bracing accurately to meet design and code requirements so that resultant finished concrete conforms to shapes, lines, levels and dimensions indicated on drawings.

.9 Provide bracing to ensure stability of formwork as a whole. Prop or strengthen all previously constructed elements liable to be overstressed by construction loads.

.10 Arrange and assemble formwork so as to permit easy dismantling and stripping so that concrete is not damaged during its removal.

.11 Align joints and make watertight to prevent leakage of mortar and disfigured appearance of concrete. Keep form joints to a minimum. Obtain approval of Engineer for location of form joints in exposed work.

.12 Chamfer external corners and edges of beams and walls 12 mm when exposed or as noted.

.13 Provide 12 mm fillets at interior corners and joints unless specified otherwise.

.14 Construct formwork to maintain concrete tolerances in accordance with CSA-A23.1, Clause 10.

.15 Construct formwork to maintain the following minimum tolerances:

.1 Variation for cross sections and offsets:

.1 Up to 0.3 m ±8 mm.

.2 Up to 1.0 m ±12 mm.

.3 Maximum ±20 mm.

.2 Vertical alignment to be within 1:400 with a maximum 40 mm.

.3 Horizontal alignment to be within 1:400 with a maximum of 40 mm.

.16 Camber beams: 0.2% of span unless otherwise noted.

.17 Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices and embedded parts.

.18 Do not apply form release agent where concrete surfaces are to receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water and keep moist prior to placing concrete.

.19 Do not re-use formwork with surface defects that will impair the appearance of finished concrete. Do not patch formwork. Meet the requirements of Part 2 of this section when re-using formwork.

.20 Verify top of pile elevations. Cut down piles or increase lengths as required to the proper elevations. Ensure piles project into grade beams and pile caps as indicated on drawings.

.21 Remove all loose concrete from tops of piles. Ensure tops of piles are clean and of sound concrete.

.22 Provide sufficient space below grade beams and walls for void form and void protection. Place void form prior to reinforcement to ensure specified concrete cover.

.23 Prepare structural slab on grade subgrade to prevent moisture degradation of void form. Do not use polyethylene protection.

.24 Form construction joints in accordance with CSA-A23.1 at locations indicated on the drawings or with the written approval of the Engineer as follows:

.1 At centre of span of suspended slabs.

.2 In grade beams at midspan.

.3 In walls immediately above and below floor construction joints.

.25 Construction joints in walls and grade beams maximum 12 m or as detailed.

.26 Construction joints in slabs on grade maximum 24 m or as detailed.

.27 Proposed construction joint locations and details to be approved by the Engineer.

3.2 CLEANING FORMS

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

.2 Clean forms as erection proceeds to remove foreign matter. Remove cuttings, shavings and debris from within forms. Flush completely with water or compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports. Do not use water to clean forms where hydrophyllic type water stops are specified.

.3 During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out completed forms unless formwork and concrete construction proceed within a heated enclosure. Use compressed air or other means to remove foreign matter.

.4 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight-fitting panels, flush with inside of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

3.3 INSERTS/EMBEDDED PARTS/OPENINGS

.1 Provide formed openings/chases or slots where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

.2 Refer to architectural, mechanical and electrical drawings for sleeves and openings required through structural components. These are not to reduce the structural capacity. Locations and sizes not shown on the structural drawings are to be approved in writing by the Engineer.

.3 Maximum size of electrical conduit in structural slabs is 1/5 of solid portion of the slab thickness, and where more than two are adjacent to each other, they are to be spaced 100 mm apart. Conduit is to be placed in the middle third of the slab.

.4 Provide recesses in top of foundation walls at all doors and openings to allow slab to bear on walls.

.5 Accurately locate and set in place all items that are to be cast directly in concrete.

.6 Coordinate work of other sections and cooperate with the trade involved in forming and/or setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts. Do not perform work unless specifically indicated on drawings or approved prior to installation.

.7 Do not place anchor bolts, sleeves and inserts into freshly placed concrete. Tie firmly into place prior to placing concrete.

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

.9 Install all concrete accessories in accordance with drawings and manufacturer's recommendations, straight, level and plumb. Ensure adequate support to prevent movement during concrete placement.

3.4 FORM REMOVAL AND RESHORING

.1 Comply with CSA-S269.1 for dismantling all falsework.

.2 Leave formwork in placed for following minimum periods of time after placing concrete.

.1 3 days for walls.

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

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

.5 Do not remove forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, construction loads and the design loads that are liable to be imposed upon it. Verify strength of concrete by compression tests to the satisfaction of the Engineer.

.6 Remove forms not directly supporting weight of concrete as soon as stripping operations will not damage concrete but not before a minimum of three days from final concrete placement to prevent rapid loss of moisture from concrete.

.7 Arrange forms to allow removal without removal of principal shores where these are required to remain in place.

.8 Retain shores and forms under structural members for a minimum of 14 days or until the concrete has attained 75% of the required 28 day strength, whichever occurs later.

.9 Beams, slabs and joists are to remain shored, or re-shoring sequence is to be controlled, to prevent excessive dead load deflections.

.10 Verify strength by field cylinders or insert type tests in accordance with ASTM C900-T.

.11 Remove formwork progressively and in accordance with code requirements so that no shock loads or unbalanced loads are imposed on structure.

.12 Loosen forms carefully. Do not damage concrete by wedging pry bars, hammers or tools against concrete surfaces.

.13 Re-shore structural members as required for design or construction conditions. Construction is to be re-shored to carry all future anticipated construction loading unless otherwise approved in writing by the Engineer.

3.5 VOID FORM

.1 Ensure void form is in place and not damaged prior to placing concrete (top protection may be required – by contractor).

.2 Install void space protection prior to backfilling walls and grade beams (required for biodegradable void form only).

.3 Install void form top protection for structural slabs on grade.

3.6 CERTIFICATION

.1 At the completion of formwork and shoring, the Contractor’s professional engineer shall certify all formwork components fabricated and erected by the Contractor is in accordance with his design drawings.

.2 Certify that all formwork, shoring and components are capable of supporting all the construction loads and forces required to complete the cast-in-place concrete work.

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

.1	Concrete Forming and Accessories	Section 03 10 00
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Concrete Finishing	Section 03 35 00
.4	Unit Masonry	Section 04 05 19
.5	Earthwork	Section 31 00 00
.6	Bored Concrete Piles	Section 31 63 23

1.2 REFERENCE STANDARDS

.1 Perform all work in accordance with the following standards, except where specified otherwise. All standards to be latest issue at time of tender.

.1 NBC 2010, “National Building Code”.

.2 American Concrete Institute (ACI)

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

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

.2 ACI 315R-04, “Manual of Structural and Placing Drawings for Reinforced Concrete Structures”.

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

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

.2 ASTM A1064 / A1064M - 14, “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete”.

.3 ASTM A775/A775M-07b(2014), “Standard Specification for Epoxy-Coated Steel Reinforcing Bars”.

.4 Canadian Standards Association (CSA International)

.1 CSA-A23.1-10/CSA-A23.2-10, "Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete".

.2 CSA-A23.3-10, "Design of Concrete Structures"

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

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

.5 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing or Irregularly Shaped Articles, A National Standard of Canada.

.6 CSA-W186-M1990 (R2012), "Welding of Reinforcing Bards in Reinforced Concrete Construction".

.5 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC 2004, "Reinforcing Steel Manual of Standard Practice".

.6 Concrete Reinforcing Steel Institute (CRSI) where noted.

1.3 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to crossing and public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers' Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.4 SAFETY

.1 Carry out cast-in-place concrete work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.5 SUBMITTALS

.1 Prepare and submit reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.2 Quality Assurance:

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

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

.3 Submit results of ladle analysis of all reinforcement to be spliced by welding, and submit manufacturer's information and test reports for mechanical splices of all reinforcement to be mechanically spliced.

.4 Submit responses to all site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

1.6 SHOP DRAWINGS

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

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Engineer.

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

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

.1 Provide Type B tension lap splices, where indicated unless otherwise indicated.

.3 Use large scale details for areas of congested reinforcement.

.4 Review of the shop drawings by the Engineer is intended to assist the Contractor and does not relieve the Contractor of responsibility for the completeness and accuracy of the work and its conformance with the contract drawings and specifications.

.5 Fabrication that commences prior to shop drawing review by the Engineer is at the risk of the Contractor.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 47 15 – Sustainable Requirements: Construction.

.2 Deliver all materials to the site in bundles easily identified and properly marked.

.3 Store and handle all material on site in a manner to prevent damage and contamination.

.4 Do not straighten or re-bend any reinforcement.

.5 Do not use any reinforcement that has been kinked or bent on site.

1.8 PAYMENT

.1 Payment for the work of this section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials, and equipment necessary to complete the work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

Part 2 Products

2.1 MATERIALS

.1 Materials and resources in accordance with Section 01 47 15 – Sustainable Requirements: Construction.

.2 Do verification requirements in accordance with Section 01 47 17 – Sustainable Requirements: Contractor's Verification.

.3 Substitute different size bars only if permitted in writing by Engineer.

.4 Reinforcing steel for straight reinforcing bars only: To CAN/CSA-G30.18, 400MPa yield grade deformed billet steel bars.

.5 Reinforcing steel for welded and bent reinforcing bars: To CAN/CSA-G30.18, 400W MPa yield grade special low alloy deformed billet steel. The equivalent carbon content is not to exceed 0.5.

.6 Welded steel wire fabric: To CSA-G30.5, hot dip galvanized to CAN/CSA-G164 flat sheets.

.7 Welded deformed steel wire fabric: To CSA-G30.15, hot dip galvanized, to CAN/CSA-G164 flat sheets.

.8 Chairs, bolsters, bar supports, spacers to meet requirements of CSA-A23.1/A23.2: Adequate for strength and support of reinforcing. Where concrete is exposed to view, exposed to elements or where rust is possible; use plastic or non-corrosive material, or precast concrete made from concrete of equal strength and durability of concrete to be placed. Chairs used are not to result in voids or unacceptable appearance in exposed concrete surfaces.

.9 Slab on grade chairs and bar supports: Precast concrete, plastic chairs, or subject to approval concrete masonry block or brick of correct height. Metal pipe, stone or wood are not acceptable. Chairs shall be compatible with void form where applicable.

.10 Tie wire: Minimum 1.6 mm type or patented system approved by the Engineer.

.11 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 600 g/m^2.

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

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

.1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.

.3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.

.1 In this case, no restriction applies to temperature of solution.

.4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.

.1 Provide product description as described in Part 1 – SUBMITTALS.

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

2.2 FABRICATION

.1 Fabricate reinforcement hooks, bends, laps and similar details to CSA-A23.1, ACI Detailing Manual 315 and Metric Supplement of the Reinforcing Steel Institute of Canada (RISC) Manual of Standard Practice and in accordance with the drawings and specifications and the reviewed shop drawings.

.2 Verify dimensions of existing work prior to commencing fabrication.

.3 Verify all drawing dimensions and conditions prior to commencing fabrication.

.4 Bend all reinforcement cold unless otherwise approved by the Engineer.

.5 Provide wall dowels from foundations using same reinforcing as in walls unless noted otherwise on the drawings.

.6 Provide horizontal, L-shaped corner bars with legs minimum 600 mm of same cross section and spacing as horizontal bars to a maximum size of 20M or welded wire fabric around wall and grade beam corners unless otherwise detailed on the drawings.

.7 Provide all additional support bars as required to support all main reinforcement indicated.

.8 Provide stirrup support bars sized to match stirrup size in hooks or corners of beam stirrups unless noted otherwise on drawings.

.9 Provide 10M "U" spacers at 3 m on centre horizontally and 1.5 m on centre vertically to hold wall reinforcing mats in position.

.10 Locate reinforcing splices not indicated on drawings at points of minimum stress. Location of splices is to be approved by the Engineer.

.11 Refer to structural drawings for minimum splices. Splices to be Type B unless noted otherwise.

.12 Provide minimum reinforcing to slabs on grade unless otherwise noted: 100 mm slabs 305 x 305 x MW66.7 x MW66.7 "step through" mesh. An alternative using tied reinforcing steel providing the equivalent reinforcing value will be considered if approved in writing by the Engineer.

.13 Lap adjacent sheets of welded steel wire fabric to provide an overlap of at least one cross wire spacing plus 50 mm.

.14 Obtain Engineer's approval for locations of reinforcement splices other than those shown on placing drawings.

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

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

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

3.2 FIELD BENDING

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

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

.3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel in accordance with CSA-A23.1/A23.2.

.2 Place reinforcement within a tolerance of ±6 mm for slab steel and ±12 mm for other steel. Bends and end of bars to be within 50 mm of specified location. Adequately

support and secure reinforcement to prevent movement within the allowable tolerances before and during placing of concrete.

.3 Place and secure all reinforcement in its correct position prior to placing any concrete. Do not adjust or place reinforcement in freshly placed concrete.

.4 Reinforce around openings as noted on structural drawings.

.5 Supply and place all necessary support accessories, whether specifically detailed or not, to ensure proper placement of reinforcing steel.

.6 Use non-corrosive or non-stain supports for reinforcing when concrete is exposed.

.7 Support slab on grade, structural slab and pile cap reinforcement at 900 mm maximum on centre.

.8 Supply bar support chairs for top reinforcing bars in sufficient quantity to not exceed 900 mm average spacing in each direction.

.9 Supply chairs to support temperature reinforcing or mesh to maintain minimum covers specified.

.10 Ensure supports are such that they are not forced into the supporting formwork, void form or soil and do not break or collapse from the weight of reinforcement and other construction loads.

.11 Supply horizontal reinforcing spacers in walls to ensure reinforcing does not move during placement.

.12 Support reinforcement laterally in pairs on opposite faces of walls, columns and beams.

.13 Provide minimum concrete cover to reinforcing steel in accordance with CSA-A23.1, except where indicated on the drawings.

.14 Where a structural concrete member is required to have a fire-resistance rating as identified on the drawings or in the specifications, provide minimum concrete cover to reinforcing steel in accordance with the Supplement to the National Building Code, “Fire Performance Ratings”.

.15 Ensure reinforcing is clean, free of loose scale, dirt, oil, rust and other foreign coatings.

.16 Place reinforcement for interior and exterior slabs on grade as indicated on drawings. Place and support uniformly above centre line of the slab, and have a minimum concrete top cover of 40 mm interior, 50 mm exterior.

.17 Place reinforcing for slab on grade on precast concrete chairs or other approved supports at correct height.

.18 Obtain written approval from the Engineer prior to cutting of reinforcing to accommodate openings, or embedded items or to accommodate timber connections. Allow for additional splice material which may be required to reinforce these cut bars as directed by the Engineer.

.19 Prior to placing concrete, obtain Engineer's approval of reinforcing material and placement.

3.4 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

Part 1 General

1.1 RELATED WORK SPECIFIED IN OTHER SECTIONS

.1	Concrete Forming and Accessories	Section 03 10 00
.2	Concrete Reinforcing	Section 03 20 00
.3	Concrete Finishing	Section 03 35 00
.4	Unit Masonry	Section 04 05 19
.5	Earthwork	Section 31 00 00
.6	Bored Concrete Piles	Section 31 63 23

1.2 REFERENCE STANDARDS

.1 Perform cast-in-place concrete work in accordance with the following standards, except where specified otherwise. All standards to be latest issue at time of tender. Provide one copy on site of the first four standards listed below.

.1 NBC 2010, “National Building Code”.

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

.1 ASTM C260-10a, “Standard Specification for Air-Entraining Admixtures for Concrete”.

.2 ASTM C309-11, “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete”.

.3 ASTM C330-14, “Standard Specification for Lightweight Aggregates for Structural Concrete”.

.4 ASTM C494/C494M-13, “Standard Specification for Chemical Aggregates for Concrete”.

.5 ASTM C1017/C1017M-13, “Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete”.

.6 ASTM D412-06a(2013), “Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers- Tension”.

.7 ASTM D624-00 (2012), “Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer”.

.8 ASTM D1751-04(2013), "Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)".

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

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.2-M88, "Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings".

.2 CAN/CGSB-51.34-M86 (R1988), "Vapour Barrier, Polyethylene Sheet for Use in Building Construction".

.4 Canadian Standards Association (CSA International)

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

.2 CSA-A23.3-09, "Design of Concrete Structures".

.3 CAN3-A438-00(R2004), "Concrete Construction for Housing and Small Buildings".

.4 CSA-A23.4-09, "Precast Concrete – Materials and Construction".

.5 CSA-A371-04(R2014), "Masonry Construction for Buildings".

.6 CSA-A283-06(R2011), "Qualification Code for Concrete Testing Laboratories".

.7 CAN/CSA-A3000-13, "Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)".

.8 CAN/CSA-A3001-13, "Cementitious Materials or Use in Concrete".

1.3 ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb – where b denotes blended).

.1 Type GU or GUb – General use cement.

.2 Type MS or MSb – Moderate sulphate-resistant cement.

.3 Type MH or MHb – Moderate heat of hydration cement.

.4 Type HE or HEb – High early-strength cement.

.5 Type LH or LHb – Low heat of hydration cement.

.6 Type HS or HSb – High sulphate-resistant cement.

.2 Fly Ash:

.1 Type F – with CaO content less than 8%.

.2 Type CI – with CaO content ranging from 8 to 20%.

.3 Type CH – with CaO greater than 20%.

.3 GGBFS – Ground, granulated blast-furnace slag.

1.4 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers' Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.5 SAFETY

.1 Carry out cast-in-place concrete work in accordance with the current Occupational Health and Safety Act construction safety regulations.

1.6 CONCRETE MIX DESIGN REQUIREMENTS

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

1.7 SUBMITTALS

.1 Submit the proposed mix design for all concrete and grout mix types to the Engineer for approval two weeks prior to their initial use.

.2 Submit data sheets for all proposed pre-mixed grouts to the Engineer for review.

.3 Submit samples of fine and coarse aggregate and all admixtures proposed for concrete mixes to the testing firm's laboratory, if requested by the Engineer.

.4 Prior to conducting trial mixes, submit data on all specified or proposed concrete admixtures with the mix design to the Engineer for approval. Data is to confirm the compatibility of the water reducing admixture, the superplasticizer, the air entraining agent, the cement, the fly ash and the silica fume where used.

.5 Submit copies of mill certificate test reports of cement, silica fume and fly ash, if requested by the Engineer.

.6 Submit data on all concrete accessories specified or proposed.

.7 Submit responses to all site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

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

.9 Submit proposed quality control procedures.

.10 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.

.11 Concrete hauling time: submit for review by Engineer deviations exceeding maximum allowable time of 2 hours for concrete to be delivered to site of Work and discharged after batching.

1.8 QUALITY ASSURANCE

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

.2 Submit to Engineer, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials based in concrete mixture will meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Engineer on following items:

.1 Falsework erection.

.2 Hot weather concrete (air temperature above 25°C).

.3 Cold weather concrete (air temperature below 5°C).

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Floor topping.

1.9 INSPECTION AND TESTING OF CONCRETE

.1 Test all concrete by a testing firm certified in accordance with CSA-A283, retained and paid for by the Contractor and approved by the Engineer.

.2 Provide casual labour to the testing firm's field personnel for the purpose of obtaining, handling, and storing sample materials. Provide free access to all portions of the work, and cooperate with the testing firm.

.3 Advise testing firm 48 hours in advance of concrete placement.

.4 The Contractor is to provide properly designed temperature-controlled storage boxes for test cylinders, as specified in CSA-A23.2, for a period of at least 48 hours and further protection from adverse weather and mishandling until removed from the site. The Contractor is to provide a max-min thermometer for each storage box. Storage in a portable building that will be used by the Contractor's personnel or the Engineer during the first 24 hour storage period will not be permitted. Storage facilities are to be provided, installed, checked and approved before any concrete may be placed.

.5 Secure sufficient 3 and 7-day test cylinders for testing of concrete to ensure quality control and sufficient strength for application of construction loads and formwork stripping. Cost for these additional tests to be borne by the Contractor.

.6 Testing firm to conduct all tests in accordance with CSA-A23.2.

.7 Samples of concrete to be taken as close to the point of final deposit in the form as possible, at end of pipe when pumping is used.

.8 Testing firm to take a minimum of three (3) test cylinders for a strength test and not less than one strength test for each 50 m^3 of concrete, or portion thereof, for each type of concrete placed and not less than one (1) test for each type of concrete placed in any one day.

.9 Testing firm to moist cure and test one (1) cylinder in 7 days and to moist cure and test the remaining two (2) cylinders in 28 days or (1) in 7 days, (1) in 28 days and (2) in 56 days.

.10 Testing firm is to take one additional test cylinder during cold weather concreting and cure on job site under same conditions as the concrete it represents.

.11 Testing firm is to take at least one slump test and one entrained air test for each set of test cylinders taken.

.12 Testing firm is to report results of tests immediately to the Contractor. The Contractor is responsible for ensuring that the concrete meets the requirements of the specifications. Report adverse test results to the Engineer immediately.

.13 Testing firm is not authorized to revoke, relax, enlarge or release any requirements of the specification, nor to approve or disapprove any portion of the work.

.14 Testing firm is to advise placing crews to halt placing of adverse concrete immediately, and thereafter notify Contractor to reject the concrete. The execution, or lack of execution, of this request is to be recorded.

.15 Testing firm is to submit to the Engineer and Contractor certified copies of test results. Include the following information with the results:

.1 Name of the project.

.2 Date of sampling.

.3 Mix design, specified strength, slump and air content.

.4 Name of supplier, truck and ticket number.

.5 Time batched and time placed.

.6 Identification of sampling and testing technician.

.7 Cement type and admixtures used.

.8 Exact location in the structure of the concrete sampled, including floor, elevation, and grids where applicable.

.9 Ambient air and concrete temperatures.

.10 Nominal aggregate size.

.11 Water added and personnel authorizing additional water.

.12 Concrete density.

.16 Testing firm to certify, in writing, that all concrete meets the specified requirements.

.17 Reject and do not place concrete with slumps greater than maximum specified, air content lower than minimum specified and concrete over 2 hours from batch time.

1.10 INSPECTION AND TESTING OF UNIT MASONRY CORE FILL

.1 All clauses pertaining to inspection and testing of concrete contained in this specification are to apply to unit masonry grout unless noted otherwise.

.2 Testing firm to take a minimum of three (3) test cylinders, one slump test and one entrained air test for each 20 m^3 placed or portion thereof for a project having more than 20 m^3 of grout and for each 10 m^3 placed or portion thereof for a project having less than 20 m^3 and not less than one (1) test in any one day of grout placed.

.3 Reject and do not place job site-mixed grout over 1.5 hours from mixing time.

1.11 INSPECTION AND TESTING OF GROUT

.1 Test all grout by a testing firm certified in accordance with CSA-A283, retained and paid for by the Contractor and approved by the Engineer in accordance with Section 01400 of these specifications.

.2 In accordance with ASTM C109, provide at least two (2) cube tests on all types of non-shrink grout used. Provide at least 5 tests of cement grout but maximum one (1) test per day.

1.12 INSPECTION AND TESTING OF GUNITE

.1 Take a minimum of three cores for each day's operation or 200 m^3 of material placed, and test in accordance with ASTM C42.

1.13 PAYMENT

.1 Payment for the work of this section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials, and equipment necessary to complete the work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

1.14 PAY ADJUSTMENTS

.1 When the air content is tested with the prescribed procedure and falls outside the specified limits, concrete will not be accepted for payment at contract prices but will be subject to the following penalties:

.1 Concrete having an air content up to 0.2% beyond the specified limits will be subject to a contract deduction of \$5/m^3.

.2 Concrete having an air content greater than 0.2% up to 0.5% beyond the specified limits will be subject to a contract deduction of \$25/m^3.

.3 Concrete having an air content greater than 0.5% and up to 1.0% beyond the specified limits will be subject to a contract deduction of \$100/m^3.

.4 Concrete having an air content greater than 1.0% beyond the specified limit is to be removed and replaced at no additional cost to the contract.

.5 The volume of concrete used to adjust the contract amount will be based on the volume of concrete for which the defaulting test is representative, but in no case will the volume be less than one day's placement of 40 m^3, which is the specified testing frequency. Testing at a lesser frequency will result in larger volumes, calculated by direct ratios.

.2 When structural considerations do not govern and the results of strength test do not conform to CSA-A23.1 for the specified strength, the Engineer will review the durability and strength requirements and may require one or more of the following:

.1 For durability only, apply a protective surface treatment to the concrete in question at no additional cost to the contract.

.2 Removal and replacement of the concrete at no additional cost to the contract.

.3 Accept the concrete subject to a contract deduction of $\$100/m^3$.

.4 The volume of concrete used to adjust the contract amount will be based on the volume of concrete for which the defaulting test is representative, but in no case will the volume be less than one day's placement or 40 m^3, which is the specified testing frequency. Testing at a lesser frequency will result in larger volumes, calculated by direct ratios.

Part 2 Products

2.1 CEMENTING MATERIALS

.1 Portland silica fume blended cement: Type GUSF to CAN/CSA A3000. Cement and silica fume to meet the requirements identified in clause 2.2 of A362.

2.2 SUPPLEMENTARY CEMENTING MATERIAL

.1 Silica fume used in the work is to meet all the requirements for a Type U supplementary cementing material as specified in CSA-A3000, with a minimum SiO2 content of at least 85%, a maximum ignition loss of 6% and a maximum SO3 content of 1%.

2.3 AGGREGATES

.1 For all concrete mix types, the fine aggregate is to conform to the requirements identified in CSA-A23.1 for the specified exposure class.

.2 For all concrete mix types, the coarse aggregate is to conform to the requirements identified in CSA-A23.1 for the specified exposure class. The aggregate is to meet the Group 1 gradation requirements listed in Table II of CSA-A23.1.

.3 Aggregates are not to react with alkalies in the cement to an extent that results in excessive expansion of concrete.

.4 The source of the aggregate and the method of manufacture or production, including the type of equipment used, is not to be altered for the duration of the project following the acceptance of the aggregate.

2.4 WATER

.1 Water for use in concrete production and curing is to be clean and free from injurious amounts of oil, acid, alkali, soluble chlorides, organic matter, sediment or any other deleterious substances as per CSA-A23.1.

2.5 ADMIXTURES

.1 Air-entraining admixtures are to conform to the requirements of ASTM C260. The admixture is to be of uniform consistency and quality within each container and from shipment to shipment.

.2 Water-reducing admixtures are to conform to the requirements of ASTM C494, Type A or D. The admixture is to be of uniform consistency and quality within each container and from shipment to shipment.

2.6 CONCRETE ACCESSORIES

.1 Liquid membrane-forming curing compound: To ASTM C309. Must be compatible with dustproofing and hardening agents, floor hardeners and flooring adhesives and any

.2 Drilled anchors, where approved by the Engineer:

.1 Use Hilti HY200 grout for embedding all rebar. Use standard embedment depths per Hilti HY200 grouting system throughout.

.3 Precast concrete plugs: To fit cone holes formed by compatible form ties. Class of concrete, colour and texture to match surrounding concrete.

2.7 GUNITE

.1 Portland cement: To CAN/CSA-A3000, Normal, Type GU.

.2 Water and aggregates: To ACI 506.2.

2.8 MISCELLANEOUS MATERIALS

.1 Dampproof membrane:

.1 Kraft/polyethylene membrane:

.1 Plain: .05 mm thick polyethylene film bonded to asphalt treated creped kraft.

.2 Reinforced: two .05mm thick polyethylene films bonded each side of asphalt treated creped kraft paper, reinforced with 13 x 13 mm fibreglass scrim.

.3 Membrane adhesive: as recommended by membrane manufacturer.

.2 Dampproofing:

.1 Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2, and to Section 07 11 13 – Bituminous Dampproofing.

2.9 CONCRETE MIXES

Location	*Exp. Class*	*Min. Spec. Strength (MPa)*	*Max. w/cm Ratio*	*Air Cont. Cat.*	*% Air Content At the Point of Discharge Aggregate Size*			*% Fly Ash Cont.*	*Cement Type*
					28 to 40mm	*14 to 20mm*	*10mm*		
<u>Piles</u>									
Freezing & Thawing (with sulphate attack)									
F-S (moderate) - wet	*F-1/S-3*	*30@28 days*	*0.50*	*1*	*4 to 7*	*5 to 8*	*6 to 9*	*40*	*HS*
<u>Slab-on-Grade</u>									
No Exposure (no sulphate attack) Interior	*N*	*25@28 days*	*0.55*	*N/A*	*<3*	*<3*	*<3*	*40*	*GU*
<u>Structural</u>									
No Exposure Interior	*N*	*25@28 days*	*0.55*	*N/A*	*<3*	*<3*	*<3*	*40*	*GU GU*
Freezing & Thawing									
F – dry	*F-2*	*25@28 days*	*0.55*	*2*	*3 to 6*	*4 to 7*	*5 to 8*	*40*	*GU*
F – wet	*F-1*	*30@28 days*	*0.50*	*1*	*4 to 7*	*5 to 8*	*6 to 9*	*40*	*GU*
<u>Pavements, Sidewalks, Curb & Gutter</u>									
Freezing & Thawing									

with Chlorides F-C – wet	*C-2*	*32@28 days*	*0.45*	*1*	*4 to 7*	*5 to 8*	*6 to 9*	*25*	*GU or HS*
Masonry Core Fill									
No Exposure Interior	*-*	*15@28 days*	*-*	*1*	*12mm*	*<4*		*25*	*GU*
Freezing & Thawing	*F-2*	*15@28 days*	*-*	*1*	*12mm*	*5 to 8*		*25*	*GU*

.1 The Contractor is to design all concrete mixes and is to pay for all costs associated with the development of the mix designs.

.2 The Contractor is to supply concrete in accordance with CSA-A23.1, except that the additional requirements of this specification are also to apply.

.3 Only such materials or blends of materials that will result in a uniform colour of exposed surfaces are to be used.

.4 Concrete mixes that will be placed by concrete pump are to be designed for pumping.

.5 In the event that slump and/or air content are outside the specified tolerance range as determined by the inspection and testing firm appointed by the Contractor, the Engineer may, at his sole discretion, accept a proposal for one adjustment of the deficient condition as an alternate to rejection.

.6 The maximum placement temperature of 18°C is specified to ensure that concrete temperatures do not exceed 60°C during curing, that temperature gradients do not exceed 20°C total and temperature rise or drop do not exceed a maximum heating and cooling rate of 2°C/hour. The maximum placement temperature may be increased to 25°C provided the above temperature requirements are met.

.7 Supply “Controlled Concrete” in accordance with CSA-A23.1 with properties as noted on the drawings in the following table:

.8 Water-soluble chloride ion content in exposure class C-XL and C-1 concrete before exposure is not to exceed 0.06% by mass of cementing material.

.9 Aggregate size specified is maximum nominal allowance. Contractor may use smaller nominal size to ease placing. Air content may have to be increased for smaller aggregate to meet exposure class requirements.

.10 Minimum cement content:

.1 380 kg/m3 (total cementitious material) for Type A.

.11 Maximum fly ash content as a percentage of the total cementitious material:

.1 Concrete with exposure classes C-XL, C-1 and C-2: Maximum 25% fly ash.

.2 Concrete with exposure classes C-3, C-4 and F-1: Maximum 25% fly ash.

.3 Concrete with exposure classes F-2 and N: Maximum 40% fly ash.

.12 Slump: No slumps outside the range of maximum or minimum will be permitted without written permission of the Engineer. Supply slumps at 20 mm below maximum.

.13 Air Content: All mix types with exposure classifications to be air-entrained in accordance with the above table and CSA-A23.1.

.14 Use a water-reducing agent in all concrete.

.15 Use accelerating admixtures in cold weather only when approved by the Engineer. If approved, the use of admixtures will not relax cold weather placement requirements.

.16 Do not use calcium chloride or admixtures containing calcium chloride.

.17 Use set-retarding admixtures during hot weather with written approval of the Engineer

.18 Use all admixtures in strict accordance with the manufacturer's recommendations.

.19 Do not use non-specified admixtures unless approved in writing by the Engineer. Where superplasticizers are thus approved, ensure mix designs are correctly adjusted for placement, strength, durability and air content requirements.

.20 Documentation indicating the compatibility of the water reducing admixture, the air entraining admixture, the superplasticizing admixture (if any), the cement, the silica fume (if any) and the fly ash (if any) is to be submitted upon request with the mix design for review by the Engineer.

2.10 GROUT MIXES

.1 Epoxy grout: Non-shrink, high strength compound consisting of epoxy resins, hardeners and non-metallic aggregate for exterior use. Use for Pre-mixed in strict accordance with the manufacturer's instructions to obtain a minimum compressive strength of 50 MPa in 28 days.

.2 Dry pack grout: Non-shrink compound consisting of non-metallic aggregate and water. Mixed with sufficient water for the mixture to make a sound, solid pack and capable of developing compressive strength of 50 MPa at 28 days.

.3 Non-shrink grout: Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents. Pre-mixed in strict accordance with

manufacturer's instructions to obtain a minimum compressive strength of 16 MPa in 24 hours and 50 MPa in 28 days. Acceptable non-shrink grouts:

.1 Masterflow 713 Grout.

.2 Master Builders Set Non-Shrink Grout.

.3 Sika Grout 212.

.4 Sternson M-Bed Standard Grout.

.5 CPD Non-Shrink Grout.

.6 Sonogrout.

Part 3 Execution

3.1 GENERAL

.1 Perform cast-in-place concrete work in accordance with requirements of CSA-A23.1 unless indicated otherwise on the drawings.

.2 Verify top of pile elevations. Cut down piles or increase lengths as required to the proper elevations. Ensure piles project into grade beams and pile caps as indicated on drawings.

.3 Remove all loose concrete from tops of piles. Ensure tops of piles are clean and of sound concrete.

3.2 PLACING CONCRETE

.1 Notify Engineer and testing firm a minimum of 48 hours prior to commencement of any concrete placement. Allow time for corrective work for areas of unusual formwork and congested reinforcement.

.2 Notify geotechnical engineer to inspect and verify all soil conditions and bearing pressures of all foundations prior to placing concrete for mudslabs or foundations.

.3 Do not place concrete against frozen ground, frozen concrete or frosted forms.

.4 In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and set solidly with non-shrink grout or as specified on the drawings. The holes for the inserts are to be thoroughly cleaned.

.5 Ensure all hardware and all other items to be cast into concrete are placed securely and will not cause undue hardship in placing concrete.

.6 Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints and other critical items are not disturbed during concrete placement.

.7 Revise, re-seat and correct improperly positioned reinforcing hardware and other embedded items immediately before concrete placement.

.8 Ensure specified concrete cover around reinforcing is maintained.

.9 Place concrete reinforcing in accordance with Section 03 20 00 – Concrete Reinforcing.

.10 During concrete operations:

.1 Development of cold joints not allowed.

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

.11 Prior to placing of concrete, obtain Engineer's approval of proposed method for protection of concrete during placing and curing.

.12 Protect previous Work from staining.

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

3.3 CONSTRUCTION

.1 Do not place concrete older than 2 hours from batch time.

.2 Do not add water after batching unless in strict accordance with CSA-A23.1, and such that concrete conforms with the specified mix design parameters.

.3 Place concrete and screed in accordance with the lines and levels indicated on the drawings.

.4 Place concrete in approximate horizontal layers such that each lift can be vibrated into the previous lift.

.5 Maximum vertical free fall of concrete is not to exceed 1200 mm in unexposed work or 800 mm in exposed work. Confine concrete with a suitable vertical drop pipe to prevent segregation.

.6 Place concrete directly into its final position in forms. Do not spread concrete with vibrators.

.7 Compact concrete thoroughly by mechanical vibrators. Ensure concrete is worked around reinforcement, embedded items and into all areas and corners of forms.

.8 Use internal vibrators in all sections that are sufficiently large, and supplement with external type in the event that satisfactory surfaces can not be obtained.

.9 Check and re-adjust formwork to required lines and levels during placement of concrete.

.10 Place concrete as a continuous operation, stopping only at construction joints.

.11 Allow a minimum of three days between adjacent concrete placements.

.12 Use cold weather concreting methods in accordance with CSA-A23.1 when the mean daily temperature falls below 5°C, and use hot weather methods when the mean temperature rises above 25°C.

.13 Maintain accurate records of concrete placement. Record date, location of placement, quantity, air temperature and test samples taken.

.14 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Engineer.

.2 Where approved by Engineer set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Engineer.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.

.5 Check locations and sizes of sleeves and openings shown on drawings.

.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete. Anchor bolts:

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

.8 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.9 Set bolts and fill holes with epoxy grout.

.10 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

3.4 PLACING OF EXPOSED CONCRETE

.1 Do not place concrete from one end for full height of placement.

.2 Use sufficient vibration equipment and methods to ensure dense, smooth concrete lines and surfaces free from bugholes, honeycombs and cold joints.

.3 Ensure vibrator penetrates each layer of fresh concrete to prevent stratification.

.4 In hot weather, use set retarding agents to prevent cold joints with permission of the Engineer.

3.5 FINISHING FLATWORK

.1 Refer to Section 03 35 00 for concrete floor finishes.

3.6 DEFECTIVE CONCRETE

.1 Immediately after removing forms, all concrete surfaces are to be inspected, and any imperfect joints, voids, stone pockets or other defective areas as specified are to be reported to the Engineer at once and repaired before the concrete is thoroughly dry. Defective areas are to be chipped away to a depth of not less than 25 mm with the edges perpendicular to the surface. The area to be repaired and a space at least 150 mm wide entirely surrounding it is to be wetted to a saturated surface dry condition to prevent absorption of water from the repair material.

.2 The repair is to be made of the same material and of the same proportions as used for the concrete, except that the coarse aggregate is to be omitted and cement added to match the colour of the surrounding concrete. The amount of mixing water is to be as little as consistent with the requirements for handling and placing. The mortar is to be re-tempered without the addition of water by allowing it to stand for a period of one hour, during which time it is to be mixed with a trowel to prevent setting.

.3 The repair material is to be thoroughly compacted into place and screeded off to leave the repair slightly higher than the surrounding surface. It is then to be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished. The repair is then to be finished to match the adjoining surface and cured to the requirements noted in this specification.

.4 Watertight structures with honeycombing or embedded debris are not acceptable. Remove and replace concrete between construction joints.

.5 Report any shapes and lines outside the specified tolerances and repair or correct as directed by the Engineer.

3.7 EXTERNAL FASTENING AND CORING

.1 Do <u>not</u> core concrete without prior written approval of the Engineer.

.2 Do not drill inserts or drive power actuated fasteners into structural concrete without prior written approval of the Engineer.

3.8 CARBON MONOXIDE EQUIPMENT

.1 Do not place concrete for floor slabs if carbon monoxide producing equipment has been in operation in the building or temporary enclosure during the 12 hours preceding the start of concreting.

.2 Provide positive ventilation during the 12 hours preceding the start of concreting.

.3 Unless directly used for the concrete placing, do not operate carbon monoxide producing equipment in the building or temporary enclosure during or within 24 hours after completing the finishing of any floor slab section.

3.9 JOINT FILLERS

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

3.10 CLEANING

.1 Repair, remove and clean all drips and smears resulting from the work of this section on exposed, finished surfaces or surfaces to be subsequently finished.

.2 Hose down sandblasted surfaces. Brush thoroughly with a stiff broom to remove all dust and loose particles.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.
.1 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content in g/L.
.2 Include application instructions for concrete floor treatment.

1.3 ENVIRONMENTAL REQUIREMENTS

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

.2 Electrical power:
.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:
.1 Make work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:
.1 Maintain ambient temperature of not less than 10 degrees C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:
.1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.

.6 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.7 Ventilation:

.1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.2 Provide continuous ventilation during and after coating application.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

2.2 CHEMICAL HARDENERS

.1 Concrete floor hardener: non-metallic, premixed, dry shake, abrasion resistant surface hardener, Type 1 - Sodium silicate.

.2 Water: potable.

2.3 SEALING COMPOUNDS

.1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.

.2 Surface sealers are not manufactured or formulated with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium and their compounds.

2.4 CURING COMPOUNDS

.1 Select low VOC, water-based, curing compounds.

2.5 MIXES

.1 Mixing ratios in accordance with manufacturer's written instructions.

3 Execution

3.1 EXAMINATION

.1 Verify that slab surfaces are ready to receive work and elevations are as recommended by manufacturer's written instructions.

3.2 PREPARATION OF EXISTING SLAB

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges.

.2 Saw cut control joints to CAN/CSA-A23.1, 24 hours maximum after placing of concrete.

.3 Use mechanical stripping to remove chlorinated rubber or existing surface coatings.

.4 Use protective clothing, eye protection, and respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

.1 Apply sealers and hardeners to areas indicated on the drawings and in the Finish Schedule. Unless noted otherwise, apply sealers to all concrete slabs to be left exposed.

.2 Apply concrete finishing floor hardener in accordance with manufacturer's written instructions.

.3 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant. Refer to Section 07 92 00 - Joint Sealing.

.4 Apply floor treatment in accordance with Sealer manufacturer's written instructions.

.5 Clean over spray. Clean sealant from adjacent surfaces.

3.4 CLEANING

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

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

3.5 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 12 - Masonry Mortar.

.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Section 04 05 23 - Masonry Accessories.

.4 Section 04 21 13 - Brick Masonry.

.5 Section 04 22 00 - Concrete Unit Masonry.

.6 Section 04 23 00 - Glass Unit Masonry.

1.2 REFERENCES

.1 CSA Group
- .1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A82-14, Fired Masonry Brick Made from Clay or Shale.
- .3 CSA A165 Series-14, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
- .4 CSA A179-14, Mortar and Grout for Unit Masonry.
- .5 CSA-A370-14, Connectors for Masonry.
- .6 CSA-A371-14, Masonry Construction for Buildings.
- .7 CSA-A3000-13, Cementitious Materials Compendium.
- .8 CSA S304-14, Design of Masonry Structures.
- .9 CSA S304.1-04(R2010), Design of Masonry Structures.
- .10 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.

.2 International Masonry Industry All-Weather Council (IMIAC)
- .1 Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation meetings: comply with Section 01 31 19 - Project Meetings. Conduct pre-installation meeting one week prior to commencing work of this Section to:
- .1 Verify project requirements, including mock-up requirements.
- .2 Verify substrate conditions.
- .3 Co-ordinate products, installation methods and techniques.
- .4 Sequence work of related sections.
- .5 Co-ordinate with other building subtrades.
- .6 Review manufacturer's installation instructions.
- .7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.
- .8 Review warranty requirements.

.2 Sequencing: sequence with other work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM). Comply with manufacturer's written recommendations for sequencing construction operations.

.3 Scheduling: schedule with other work in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
- .2 Submit shop drawings detailing temporary bracing required, designed to resist wind pressure and lateral forces during installation.

.4 Samples:
- .1 Provide samples as follows:
  - .1 4 of each type of glass block, concrete block veneer and brick veneer masonry unit specified, including special shapes, supplemented with specific requirements in Sections.
  - .2 4 cured, samples of mortar to brick, concrete block veneer and glass block, illustrating mortar colour and colour range, supplemented with specific requirements in Section 04 05 12 - Masonry Mortar.
  - .3 Samples: used for testing and when accepted become standard for material used.

.5 Certificates: submit manufacturer's product certificates certifying materials comply with specified requirements.

.6 Test and Evaluation Reports:
- .1 Submit certified test reports in accordance with Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .2 Test reports to certify compliance of masonry units and mortar ingredients with specified performance characteristics and physical properties.
- .3 Submit data for masonry units, in addition to requirements set out in referenced CSA and ASTM Standards, indicating initial rates of absorption.

.7 Installer Instructions: provide manufacturer's installation instructions, including storage, handling, safety and cleaning.

.8 Manufacturer's Reports: provide written reports prepared by manufacturer's on-site personnel to include:
- .1 Verification of compliance of work with Contract.
- .2 Site visit reports providing detailed review of installation of work, and installed work.

1.5 CLOSEOUT SUBMITTALS

.1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 EXTRA MATERIALS

.1 Submit manufacturer's instructions in accordance with Section 01 78 00 - Closeout Submittals covering maintenance requirements and parts catalogue, with cuts and identifying numbers.

1.7 QUALITY ASSURANCE

.1 Mock-ups:
- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up panel of exterior brick and masonry veneer masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, pointing, coursing, mortar and quality of work.
- .3 Mock-up used:
  - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
  - .2 For testing to determine compliance with performance requirements. Perform following tests.
    - .1 For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating initial rate of absorption.
- .4 Construct mock-up where directed by Departmental Representative.
- .5 Allow minimum 5 days for inspection of mock-up by Departmental Representative before proceeding with work.
- .6 When accepted by Departmental Representative, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
- .7 Start work only upon receipt of written acceptance of mock-up by Departmental Representative.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect material from nicks, scratches, and blemishes.
.3 Keep materials dry until use except where wetting of bricks is specified.
.4 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.
.5 Replace defective or damaged materials with new.

1.9 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperatures are above 4 degrees C.

.2 Weather Requirements: to CAN/CSA-A371 and to IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 Cold weather requirements:
.1 To CAN/CSA-A371 with following requirements.
.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.
.2 Maintain ambient temperature of masonry work and it's constituent materials between 5 degrees C and 50 degrees C and protect site from windchill.
.3 Maintain temperature of masonry above 0 degrees C for minimum of 3 days, after mortar is installed.
.4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.
.2 Hot weather requirements:
.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
.3 Spray mortar surface at intervals and keep moist for maximum of 3 days after installation.

1.10 WARRANTY

.1 For Work in this Section, 12 months warranty period is extended to 24 months.

2 Products

2.1 MATERIALS

.1 Masonry materials are specified elsewhere in related Sections:
.1 Section 04 05 12 - Masonry Mortar.
.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Section 04 05 23 - Masonry Accessories.
.4 Section 04 21 13 - Brick Masonry.
.5 Section 04 22 00 - Concrete Unit Masonry.
.6 Section 04 23 00 - Glass Unit Masonry.

3 Execution

3.1 INSTALLERS

.1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.
.1 Co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

.3 Verification of Conditions:
.1 Verify that:
.1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of brick, concrete block and glass block.
.2 Field conditions are acceptable and are ready to receive work.
.3 Built-in items are in proper location, and ready for roughing into masonry work.
.2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

.1 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Establish and protect lines, levels, and coursing.

.3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.5 CONSTRUCTION

.1 Exposed masonry:
- .1 Remove chipped, cracked, and otherwise damaged units, in accordance with CAN/CSA-A165, in exposed masonry and replace with undamaged units.

.2 Jointing:

- .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.

- .2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.

- .3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Cutting:
- .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
- .2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In:
- .1 Build in items required to be built into masonry.
- .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks:
- .1 Except in cold weather, wet bricks having initial rate of absorption exceeding 1 g/minute/1000 mm^2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
- .2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.6 Support of loads:
- .1 Use 20 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units and to locations where concrete core fills are indicated.
- .2 Use concrete core fills to CAN/CSA-A179 where concrete core fills are used in lieu of solid units.
- .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

.7 Provision for movement:
- .1 Leave 3 mm space below shelf angles.
- .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
- .3 Built masonry to tie in with stabilizers, with provision for vertical movement.

.8 Loose steel lintels:
- .1 Install loose steel lintels. Center over opening width.

.9 Control joints:

- .1 Construct continuous control joints as indicated or as otherwise directed by the Departmental Representative.

.10 Movement joints:

- .1 Build-in continuous movement joints as indicated.

.11 Interface with other work:
- .1 Openings in walls: reviewed and accepted by Departmental Representative.

3.6 SITE TOLERANCES

.1 Tolerances in notes to CAN/CSA-A371 apply.

3.1 FIELD QUALITY CONTROL

.1 Site Tests, Inspection:
- .1 Perform field inspection and testing in accordance with Section 01 45 00 - Quality Control.
- .2 Notify inspection agency minimum of 72 hours in advance of requirement for tests.

.2 Manufacturer's Services:

- .1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, and protection of its products, and submit written reports in acceptable format to verify compliance of work with Contract.
- .2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
- .3 Schedule site visits to review work as installation is about to begin.
- .4 Schedule site visits to review work at stages listed:
  - .1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
  - .2 Twice during progress of work at 25% and 60% complete.
  - .3 Upon completion of work, after cleaning is carried out.
- .5 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.2 CLEANING

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

3.3 PROTECTION

.1 Temporary Bracing:
  .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
  .2 Bracing approved by Departmental Representative.
  .3 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.2 Moisture Protection:
  .1 Keep masonry dry using waterproof, non staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until completed and protected by flashing or other permanent construction.
  .2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.
  .3 Air Temperature Protection: protect completed masonry as recommended in 1.9, SITE CONDITIONS.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results for Masonry.

.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Section 04 05 23 - Masonry Accessories.

.4 Section 04 21 13 - Brick Masonry.

.5 Section 04 22 00 - Concrete Unit Masonry.

.6 Section 04 23 00 - Glass Unit Masonry.

1.2 REFERENCES

.1 CSA Group
- .1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA A179-14, Mortar and Grout for Unit Masonry.
- .3 CAN/CSA-A371-14, Masonry Construction for Buildings.
- .4 CSA-A3000-13, Cementitious Materials Compendium.

.2 International Masonry Industry All-Weather Council (IMIAC)
- .1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:

.1 Samples: submit unit samples in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:
- .1 Submit four 10 mm wide x 100 mm long size samples of each type of mortar to brick veneer, concrete block veneer and glass block masonry.
- .2 Submit samples and confirmation of source or product data sheet, prior to mixing or preparation of mortars, to Departmental Representative of:
  - .1 Aggregate: sand.

.2 Cement.
.3 Lime.
.4 Colour pigment samples.

.4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect masonry mortar from damage.
.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:
.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.
.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Weather Requirements: CAN/CSA-A371 and International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:
- .1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10).
- .2 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type N for brick and concrete block veneer, type S to all interior concrete block and concrete block backup walls.

.3 Aggregate: supplied by one supplier.
- .1 Fine Aggregate: to CAN/CSA-A179, natural sand.

.4 Water: clean and potable.

.5 Lime: to CAN/CSA-A179, Type N.

2.2 COLOUR ADDITIVES

.1 Use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample. Admixtures to be approved prior to use. Use in accordance with the specific manufacturer's recommendations.

.2 White mortar: use white Portland cement, and lime to produce mortar type specified.

.3 Powder: inorganic mineral oxide pigment; colour to match masonry unless noted otherwise.

2.3 MORTAR MIXES

.1 Mortar for exterior concrete block veneer masonry: type N based on property specifications.

.2 Mortar for interior concrete block and concrete block backup to exterior walls: type S based on proportion specifications.

.3 Mortar to brick: Type N bulk mortar based on property specification.

.4 Mortar to Glass Block: Mortar For Glass Block Masonry: CAN/CSA-A179, Type N, using the property specification.

.5 Pointing Mortar For Glass Block Masonry: CAN/CSA-A179, Type S, using the property specification; with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

2.4 MORTAR MIXING

.1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to be within 1% accuracy.

.2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.

.3 Maintain sand uniformly damp immediately before mixing process.

.4 Add mortar colour in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.

.5 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.

.6 Do not add air entraining admixture to mortar mix.

.7 Use a batch type mixer in accordance with CAN/CSA-A179.

.8 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.9 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 5 degrees C.

2.5 CONCRETE MIXES

.1 Bond Beams: concrete mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2.

.2 Lintels: concrete mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2.

2.6 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for mortar based on property specification or proportion specification. Test during construction for:

.1 Compressive strength.
.2 Consistency.
.3 Mortar aggregate ratio.
.4 Sand/cement ratio.
.5 Water content and water/cement ratio.
.6 Air content.
.7 Splitting tensile strength.

.2 Testing Concrete Mix:

.1 Test concrete to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for grout based on property specification. Test during construction for:
- .1 Compressive strength.
- .2 Sand/cement ratio.
- .3 Water content and water/cement ratio.
- .4 Slump.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Plug clean-out holes with brick and block masonry units. Brace masonry for wet grout pressure.

3.3 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.4 MIXING

.1 All pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.

.2 Clean all mixing boards and mechanical mixing machine between batches.

.3 Mortar must be weaker than the units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.5 MORTAR PLACEMENT

.1 Install mortar to manufacturer's instructions.

.2 Install mortar to requirements of CAN/CSA-A179.

.3 Remove excess mortar from grout spaces.

3.6 CONCRETE PLACEMENT

.1 Install concrete in accordance with manufacturer's instructions.

.2 Install concrete infill in accordance with CAN/CSA-A179.

.3 Work concrete into masonry cores and cavities to eliminate voids.

.4 Do not install concrete in lifts greater than 400 mm, without consolidating concrete by rodding.

.5 Do not displace reinforcement while placing grout.

3.7 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
- .1 Test and evaluate mortar during construction in accordance with CAN/CSA-A179.
- .2 Test and evaluate concrete infill during construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified.

.2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.8 CLEANING

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

.2 Remove droppings and splashings using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

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

3.9 PROTECTION

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
- .1 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A951/A951M-14: Standard Specification for Steel Wire for Masonry Joint Reinforcement.
- .3 ASTM A1011/A1011M-14: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

.2 CSA Group
- .1 CAN/CSA-A23.1-14/A23.2-14: Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
- .3 CAN/CSA-A370-14, Connectors for Masonry.
- .4 CAN/CSA-A371-14, Masonry Construction for Buildings.
- .5 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .8 CSA S304-14: Design of Masonry Structures.
- .9 CSA S304.1-04(R2010): Design of Masonry Structures.

.3 Reinforcing Steel Institute of Canada (RSIC)
- .1 Reinforcing Steel Manual of Standard Practice, 2004.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for anchorage and reinforcing materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
- .2 Submit drawings detailing bar bending details, anchorage details lists and placement drawings.
- .3 On placement drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

.3 Mock-ups:
- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.4 SITE MEASUREMENTS

.1 Make site measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect anchorage and reinforcing materials from damage.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Bar reinforcement:Steel to CAN/CSA-A371 and CSA G30.18, Grade 300.

.2 Connectors: to CAN/CSA-A370 and CSA S304.1.

.3 Corrosion protection: to CSA S304.1, galvanized to CSA S304.1 and CAN/CSA-A370.

.4 Fasteners: installed post-construction:
- .1 Screw Shields and Plugs: plastic or nylon, water-resistant install in mortar joints or placed directly into solid masonry units.
- .2 Bolts and Screws: size and type to suit application, locate where indicated.
- .3 Nails: case-hardened cut or spiral nails, size and type to suit fastening application.
- .4 Powder-Driven Fasteners: pin styles and lengths to suit fastening application in accordance with manufacturers use, load and hold recommendations.

.5 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.

.5 Ties: hot dip galvanized to CAN/CSA-A370 Table 5.2 steel finish.

.1 Brick and concrete block veneer ties cavity walls with insulated wood stud framed backup walls: conforming to CAN/CSA-A370, manufactured of 1.5 mm thick (16 gauge) sheet steel conforming to ASTM A1011/A1011M, with hot dipped galvanized finish, complete with Vee tie of 4.76 mm diameter wire conforming to ASTM A951/A951M with hot dipped galvanized or stainless steel, lengths to suit application.

.2 Shear Connector Brick and Masonry Veneer Ties (for concrete block backup): conforming to CAN/CSA-A370; shear connector plate component, 1.52 mm thick sheet metal conforming to ASTM A1011/A1011M, hot dipped galvanized finish. Length of shear connector plate to accommodate block width, insulation and air space. Provide shear keys and corrugated sections for adequate fixity within the concrete block wythe. Notch plate to ensure proper positioning within the concrete block wythe. Provide holes in plate within the insulation thickness to reduce thermal bridging. Provide a series of 5.5 mm diameter holes to accommodate Vee tie component. Provide a Vee tie component consisting of 4.76 mm diameter wire conforming to ASTM A951/A951M with hot dipped galvanized finish or stainless steel; lengths to suit brick and masonry veneer. Provide insulation supports manufactured from polyethylene, for each tie.

.3 Joint Reinforcement Ties: to CAN/CSA-A370:

.1 Single Wythe Joint Reinforcement: ladder type:

.1 Steel wire, hot dip galvanized: to ASTM A641, Class 3 after fabrication.

.2 Cold drawn steel wire conforming to ASTM A82.

.6 Anchors: to CAN/CSA-A370:

.1 Conventional Anchors: type steel bolts with bent bar anchors or plate anchors or through bolts, shape J or L, size and type to suit application.

.2 Wedge Anchors: expansion anchors type, sized to suit application.

.3 Sleeve Anchors: type sleeve and bolt, sized to suit application.

.7 Conventional Bolts:

.1 Bolts: to ASTM A36, bar stock shop threaded, bent bar anchors, J shaped.

.2 Plate anchors: steel to ASTM A36, weld square of circular steel plate perpendicular to axis of steel bar threaded on opposite end.

.3 Through bolt rods: to ASTM A307 threaded rod or threaded ASTM A36 bar stock.

2.2 FABRICATION

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

.2 Fabricate connectors in accordance with CAN/CSA-A370.

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

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

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.

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

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.3 INSTALLATION

.1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing concrete and mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.4 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA S304.1, CAN/CSA-A371 and as indicated.

.2 Tie masonry veneer to backing in accordance with NBC, CSA S304.1, CAN/CSA-A371 and as indicated.

.3 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371 and manufacturer's instructions.

.1 Bond walls of two or more wythes using metal connectors in accordance with CAN/CSA-A371 and as indicated.
.2 Install horizontal joint reinforcement 400 mm on centre.
.3 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.
.4 Place joint reinforcement continuous in first and second joint below top of walls.
.5 Lap joint reinforcement ends minimum 150 mm.
.6 Connect joint corners and intersections with strap anchors 400 mm on centre.

3.5 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA-A371, and CAN/CSA-A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA-A371.

3.6 CONCRETE INFILL

.1 Install concrete infill into masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.7 ANCHORS

.1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371.

3.8 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.9 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.10 FIELD BENDING

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

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

.3 Replace bars and connectors which develop cracks or splits.

3.11 FIELD QUALITY CONTROL

.1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.

.2 Obtain Departmental Representative approval of placement of reinforcement and connectors, prior to placing concrete infill.

3.12 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.13 CLEANING

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

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

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
.1 ASTM D2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness.

.2 CSA Group
.1 CAN/CSA-A371-14, Masonry Construction for Buildings.
.2 CAN/CSA-ISO 14021-00(R2009), Environmental Labels and Declarations - Self Declared Environmental Claims (Type II Environmental Labelling).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
.2 Indicate on drawings:
.1 Flashing, installation details, sizes, spacing, location and quantities of fasteners.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

.3 Manufacturer's Instructions: submit manufacturer's instructions as follows:
.1 Submit installation instructions for fillers, reglets, brick vents, weeps, mortar net and flashings.

1.4 SITE MEASUREMENTS

.1 Make site measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect masonry accessories from damage.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Movement joint filler: purpose-made elastomer to ASTM D2240 of size and shape indicated.
- .1 Material type: rubber, vinyl or neoprene.

.2 Weep hole vents: purpose-made PVC.

.3 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements.

.4 Brick and masonry veneer vents and weeps: moulded P.V.C. grilles, insect proof; manufactured specifically for cavity vents/weepholes or Mortar Net weep vents, colour as selected by the Departmental Representative.

2.2 MOISTURE CONTROL

.1 Weep Hole Vents: as specified in item 2.1.4 of this Section.

.2 Mortar Net: Premanufactured drainage system, recycled polyester/polystyrene mesh, thickness to suit cavity.

.3 Grout Screens: 6 mm square monofilament screen is fabricated form high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.
- .1 Size: 100 mm wide x 30 m.

2.3 FLASHINGS

.1 Sheet metal: as specified in Section 07 60 00.

.2 Membrane Flashings:
- .1 Rubberized asphalt: 1 mm thick, self adhering.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry accessories installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION: MATERIALS

.1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.

.2 Lap adhesive: apply adhesive to flashing lap joints.

.3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.

.4 Reglets: install reglets at locations indicated on drawings.

.5 Brick and masonry veneer vents: install brick and masonry veneer vents at locations indicated on drawings.

3.3 INSTALLATION: MOISTURE CONTROL

.1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

.2 Mortar net: install purpose made mortar net at base of cavities where as directed, size and shape to suit purpose and function.

.3 Grout screens: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.4 INSTALLATION: FLASHINGS

.1 Build in flashings in masonry in accordance with CAN/CSA-A371.
  .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
  .2 In cavity walls and veneered walls, carry flashings from front edge of exterior masonry, under outer wythe, then up backing not less than 150 mm, and as follows:
    .1 For masonry backing embed or bond flashing 25 mm in joint.
    .2 For concrete backing, insert or bond flashing into reglets.

.3 For wood frame backing, staple flashing to walls behind water resistive paper, and lap joints.

.4 For gypsum board and glass fibre faced sheathing backing, bond to wall using manufacturer's recommended adhesive.

.3 Lap joints 150 mm and seal with adhesive.

.2 Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.

.3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
.1 ASTM C216-15, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).

.2 Brick Industry Association (BIA)
.1 Technical Note No. 20-2006, Cleaning Brick Work.

.3 CSA Group
.1 CAN/CSA-A82-14, Fired Masonry Brick Made From Clay or Shale.
.2 CAN/CSA-A371-14, Masonry Construction for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for brick masonry and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

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

.2 Store and protect brick masonry from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components only when temperature is above 5 degrees C.

2 Products

2.1 MANUFACTURED UNITS

.1 Face brick:
.1 Fired clay brick: to CAN/CSA-A82. 90 mm x 57 mm x 190 mm, type, colour and manufacturer as indicated on the drawings.

.2 Reinforcement:
.1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Connectors:
.1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Flashings:
.1 Flashing: in accordance with Section 04 05 23 - Masonry Accessories.

.5 Mortar Mixes:
.1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar.

.6 Cleaning Compounds:
.1 Use low VOC products.
.2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
.3 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for brick masonry installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

.1 Construction to conform to CAN/CSA-A371.

.2 Bond: running bond.

.3 Coursing height: brick height plus 10 mm.

.4 Jointing: concave.

.1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
.2 Clean unglazed clay masonry as work progresses.
.3 Reinforcement:
.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Connectors:
.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

.5 Flashings:
.1 Install flashings in accordance with Section 04 05 23 - Masonry Accessories.

.6 Mortar Placement:
.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar.

.7 Repair/Restoration:
.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.
.8 Field Quality Control:
.1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry.
.2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.
.9 Tolerances:
.1 To CAN/CSA-A371.

3.4 CLEANING

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

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Clean unglazed clay masonry: 10 m^2 area of wall designated by Departmental Representative mock up panel specified in Section 04 05 00 - Common Work Results for Masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.

.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.2 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.

.3 Repeat cleaning process as often as necessary to remove mortar and other stains.

.4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.

.4 Clean concrete brick masonry as work progresses.

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.

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

3.5 PROTECTION

.1 Brace and protect brick masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
.1 ASTM E336-11, Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings.

.2 CSA Group
.1 CAN/CSA-A165 Series-14, CSA Standards on Concrete Masonry Units consists: A165.1, A165.2, A165.3.
.2 CAN/CSA-A371-14, Masonry Construction for Buildings.
.3 CSA S304.1-04(R2010), Design of Masonry Structures.

.3 South Coast Air Quality Management District (SCAQMD)
.1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications.

.4 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete masonry units and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.
- .2 Do not use brick tongs to move or handle masonry.

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Do not double stack cubes of concrete unit masonry.
- .3 Cover masonry units with non-staining waterproof membrane covering.
- .4 Allow air circulation around units.
- .5 Installation of wet or stained masonry units is prohibited.
- .6 Keep concrete unit masonry in individual cardboard packaging provided by manufacturer until units are ready to be installed.
- .7 Store and protect concrete unit masonry from nicks, scratches, and blemishes.
- .8 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1) .

- .1 Facet Designation:
  - .1 Concrete Block Veneer and exposed block:Hollow concrete blocks to have a facet designation H/15/C/M. Solid concrete block to have facet designation S/15/C/M.
  - .2 Units unexposed to view: Hollow concrete blocks to have a facet designation H/15/C/O. Solid concrete block to have facet designation S/15/C/O.
- .2 Dimensions Nominal:
  - .1 Block veneer: 100 mm wide x 200 mm high x 400 mm long.
  - .2 All other concrete block: 200 mm wide (unless noted otherwise) x 200 mm high x 400 mm long.
- .3 Special shapes: provide square edge except to exposed corner use bull-nosed block and to wall ends, door openings and the like, use double bull-nosed units. Provide purpose-made shapes for lintels, beams and bond beams. Provide additional special shapes as indicated.
- .4 Profile/Texture for Architectural Concrete Unit Masonry:
  - .1 Split faced: full split faced units.
- .5 Colour:
  - .1 Integrally coloured pre-finished architectural concrete block with one or more faces ground to expose variegated colours of natural aggregates; with factory-applied clear satin gloss acrylic finish. For concrete block veneer, colour as selected by the Departmental Representative.
  - .2 Unit faces filled with cementitious grout, polished with factory applied clear satin gloss acrylic finish.

.2 Fire rated concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1) as modified below.
.1 Classification: H/15/B/M except as modified by fire resistance requirements specified below.
.2 Fire resistant characteristics: aggregate used in units and equivalent thickness of units to the National Building Code of Canada 2010, and in accordance with CAN/ULC-S101, for fire-resistance ratings indicated.
.3 Size: modular.
.4 Special shapes: provide square to all locations except bull- nosed units for exposed corners and double bullnosed to door openings. Provide purpose-made shapes for lintels and bond beams and provide additional shapes as indicated.

2.2 REINFORCEMENT

.1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

2.3 CONNECTORS

.1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

2.4 FLASHING

.1 Flashing: in accordance with Section 04 05 23 - Masonry Accessories.

2.5 MORTAR MIXES

.1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar.

2.6 CONCRETE INFILL MIXES

.1 Concrete infill mixes in accordance with Section 04 05 12 - Masonry Mortar.

2.7 CLEANING COMPOUNDS

.1 Use low VOC products.

.2 Compatible with substrate and acceptable to masonry manufacturer for use on products.

.3 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.8 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA-A165.1, supplemented as follows:
.1 Maximum variation between units within specific job lot not to exceed 2 mm.
.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
.3 Out of square tolerance not to exceed 2 mm.

.2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA-A165.1, supplemented as follows:
- .1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.
- .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
- .3 Out of square tolerance not to exceed 2 mm.
- .4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete unit masonry installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

.1 Concrete block units:
- .1 Bond: running.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: concave where exposed or where paint or other finish coating is specified.

.2 Architectural concrete unit masonry:
- .1 Bond: running to horizontal accent bands, stack bond to vertical accents as indicated.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: concave where exposed.

- .4 Clean block faces using soft cloths before mortar hardens rake to 10 mm depth. After completion of block laying fill joints with pointing mortar then point to provide concave joints. Repeat cleaning of faces.

.3 Special Shapes:
- .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.

.2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
.3 End bearing: not less than 200 mm.
.4 Install special shaped units including site cut units.

.4 Install concrete block to cell bunks as detailed on the drawings.

3.4 REINFORCEMENT

.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing .

3.5 CONNECTORS

.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.6 FLASHING

.1 Install flashings: in accordance with Section 04 05 23 - Masonry Accessories.

3.7 MORTAR PLACEMENT

.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar.

3.8 CONCRETE INFILL PLACEMENT

.1 Place concrete infill in accordance with Section 04 05 12 - Masonry Mortar.

3.9 CONSTRUCTION

.1 Cull out masonry units, in accordance with CAN/CSA-A165 and reviewed and accepted range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.

.2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.

.3 Construct masonry walls using running bond unless otherwise noted.

.4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.

.6 Install movement joints and keep free of mortar where indicated.

.7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.8 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.

.9 Ensure compacted head joints. Use full or face-shell joint as indicated.

.10 Tamp units firmly into place.

.11 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.

.12 Tool exposed joints concave; strike concealed joints flush.

.13 After mortar has achieved initial set up, tool joints.

.14 Do not interrupt bond below or above openings.

3.10 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.11 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section Section 04 05 00 - Common Work Results for Masonry supplemented as follows:

.1 Concrete masonry units will be sampled and tested by independent testing agency in accordance with Section 01 29 83 - Payment Procedures for Testing Laboratory Services, and in accordance with CSA S304.1.
.2 Noise reduction between two rooms will be tested by independent testing agency appointed and paid by Departmental Representative in accordance with ASTM E336.
.3 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

.2 Manufacturer's Field Services: in accordance with Section 04 05 00 - Common Work Results for Masonry.

3.12 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Standard Concrete Unit Masonry:
.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

.3 Architectural Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

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

3.13 PROTECTION

.1 Brace and protect concrete unit masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-13, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- .3 ASTM D1187/D1187M-97(2011)e1, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
- .4 ASTM D1227-13, Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

.2 CSA Group
- .1 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
- .2 CAN/CSA-A371-14, Masonry Construction for Buildings.
- .3 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 National Fire Protection Association (NFPA)
- .1 NFPA 80-13, Standard for Fire Doors and Other Opening Protectives.

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN4-S106-M80(R1985), Standard Method For Fire Test of Window and Glass Block Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for glass unit masonry and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.

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

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect glass unit masonry from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperature is above 5 degrees C.

.2 Field Measurements:
- .1 Make field measurements necessary to ensure proper fit of all members.

1.6 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire rated installations.

2 Products

2.1 SYSTEM DESCRIPTION

.1 Glass block panels not to be designed to support structural loads.

.2 Provide for expansion and movement at jambs and heads of panels. Do not bridge expansion spaces with mortar.

.3 Design and install glass block projects by whole units since cutting glass block is not recommended.

2.2 MANUFACTURED UNITS

.1 Solid glass block: standard, with joint key for mortar bond.
- .1 Pattern and design:
  - .1 Transparent.
  - .2 Surfaces: smooth.
  - .3 Colour: clear glass.
  - .4 Edge coating colour: manufacturer's standard.
- .2 Nominal sizes:
  - .1 Square units: 197.3 mm square x 76 mm thick.

2.3 ACCESSORIES

.1 Mortar: as specified in Section 04 05 12 - Masonry Mortar and Grout.

.2 Expansion strips: 75 mm wide x 10 mm thick, continuous semi-rigid glass fibre, mineral wool or white flexible polyethylene material, in accordance with recommendations of glass unit manufacturer.

.3 Panel anchors: 10 mm thick x 44 mm wide x 610 mm long steel strips, punched with three rows of elongated holes, pattern staggered, hot-dip galvanized after fabrication to ASTM A123/A123M.

.4 Panel reinforcing: two parallel 3.8 mm thick wire 50 mm on centre, with electrically butt welded cross-wired spaced at regular intervals, and hot-dip galvanized after fabrication to ASTM A123/A123M.

.5 Sealant: non-staining, waterproof mastic, silicone, apply sealant 24 hours after glass unit masonry installation.

.6 Sealant backing: polyethylene foam or equal as approved by sealant manufacturer.

.7 Sealant primer: non-staining type recommended by sealant manufacturer.

.8 Fasteners: steel, 6 mm minimum diameter, galvanized to ASTM A153/A153M, and as follows:
- .1 To metal: self-drilling, self-tapping screws.
- .2 To concrete and masonry: self-drilling, compression type insert, or self-tapping type screws for pre-drilled holes.
- .3 To wood: wood screws.

.9 Spacers: plastic, concealed type, allowing pointing mortar and placing reinforcing and panel anchors without obstruction, of size to provide horizontal and vertical joint width indicated, capable of supporting glass units until mortar set, incorporated into structural design of glass unit masonry.

2.4 SOURCE QUALITY CONTROL

.1 Ensure glass block, components and materials are from single manufacturer.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for glass unit masonry installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Examine openings to receive glass unit masonry. Verify correct size, location, squared and plumb and readiness to receive work of this Section.
  - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

.3 Beginning of installation means acceptance of conditions.

3.2 PREPARATION

.1 Ensure structure or substrate is adequate to support glass block.

.2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.

.3 Clean glass units of foreign substances.

.4 Establish and protect lines, levels, and coursing.

.5 Protect elements surrounding work of this Section from damage and disfiguration.

3.3 INSTALLATION

.1 Erect glass units and accessories in accordance with manufacturer's instructions.

.2 Install perimeter metal anchors.

.3 Secure panel anchors to jambs and head, with two fasteners per anchor at horizontal reinforced mortar joints, at vertical steel reinforcing at locations indicated. Bend across expansion joints and extend at least 300 mm over joint reinforcement.

.4 Install glass unit spacers to manufacturer's recommendations.

.5 Set glass units with full bond mortar joints. Furrowing not permitted. Remove excess mortar.

.6 Do not install glass unit when ambient temperature is below 5 degrees C. Maintain ambient temperature above 5 degrees C for 48 hours after installation.

.7 Place units to maintain uniform joint width of 6 mm.

.8 Install unit masonry to avoid contact of glass units with metal accessories or frames.

.9 Isolate panel from adjacent construction on sides and top with expansion strips concealed within perimeter trim. Keep expansion joint voids clear of mortar.

.10 Shore assembly until mortar will maintain panel in position without movement.

.11 Joint reinforcement:

.1 Install reinforcement in accordance with NBC and Section 04 05 19 - Masonry Anchorage and Reinforcing, and as follows.

.2 Install horizontal reinforcement:

.1 Above first course.

.2 Below top course.
.3 To glass unit manufacturer's recommendations but not less than 406 mm centres.
.4 Lap joints 150 mm.

.3 Provide horizontal joint reinforcement at first course above and below openings within glass unit panel.

.4 Install reinforcement continuously from end to end of panels without bridging expansion joints. Lap minimum 150 mm.

.5 Embed reinforcement between two layer application of mortar bed.

3.4 CONSTRUCTION

.1 Mortar Placement:
.1 Place pointing mortar in accordance with Section 04 05 12 - Masonry Mortar.
.2 Set glass with full bond mortar joints. Furrowing not permitted. Remove excess mortar.
.3 Place units to maintain uniform joint width of 6 mm.

.2 Jointing:
.1 Tool joints to concave profile, exposing shoulders of glass units.
.2 Rake out mortar joints to depth equal to joint width and not less than 13 mm, to receive pointing mortar.
.3 Rake out mortar joints to half of joint width but not less than 5 mm depth, to receive joint sealant.

.3 Application of pointing mortar.

.1 Neatly tool surface to a concave profile. Expose shoulders of glass units.
.2 Remove excess mortar while it is still plastic using a clean, wet sponge or a scrub brush with stiff bristles.
.3 Vacuum clean mortar joints.

.4 Application of Sealant:
.1 Install sealant in accordance with Section 07 92 00 - Joint Sealants.
.2 Apply sealant 24 hours after glass unit masonry installation.
.3 Form surfaces of sealant smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Tool surface to a slight concave profile. Edges of joints to expose shoulders of glass units.
.4 Remove excess sealant.

3.5 TOLERANCES

.1 Tolerance for glass block unit construction in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows.

.1 Variation from specified joint width: plus 2 mm and minimum 0 mm.
.2 Maximum variation from plane of unit to adjacent unit: 1 mm.
.3 Maximum variation from flat plane: 3 mm in 3 m, non-cumulative.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Remove mortar particles using clean wet sponge or cloth. Rinse sponge or cloth frequently in clean water to remove abrasive particles that could scratch glass surfaces. Allow any remaining film on block to dry to a powder.

.3 Remove excess caulking materials with commercial solvents such as mineral spirits and follow with normal wash and rinse. Do not damage caulking by overgenerous application of strong solvents. Comply with solvent manufacturers' printed data for toxicity and flammability warnings.

.4 When glass block panels are completely installed and are not exposed to direct sunlight, final cleaning may be carried out. Start at top of panel and wash with generous amounts of clean water. Dry all water from glass block surface. Change cloth frequently to eliminate dried mortar particles that could scratch glass surface. Use clean, dry, soft cloth to remove the dry powder from glass surfaces.

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

3.7 PROTECTION

.1 Brace and protect glass block unit construction in accordance with Section 04 05 00 - Common Work Results for Masonry.

.2 Make good damage to adjacent materials caused by glass block installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1	Cast-In Place Concrete	Section 03 30 00
.2	Unit Masonry	Section 04 20 00
.3	Open Web Steel Joist Framing	Section 05 21 19
.4	Metal Deck	Section 05 31 00
.5	Support Framing for Small Openings in Metal Deck	Section 05 31 00
.6	Metal Fabrications	Section 05 50 00
.7	Painting	Section 09 90 00

1.2 REFERENCE STANDARDS

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first two standards listed below.

.3 NBC 2010, “National Building Code”.

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

.1 ASTM A36/A36M-14, “Standard Specification for Carbon Structural Steel”.

.2 ASTM A193/A193M-14a, “Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service”.

.3 ASTM A307-14b, “Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength”.

.4 ASTM A325-14a, “Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength”.

.5 ASTM A325M-14, “Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric)”.

.6 ASTM A490M-14a, “Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)”.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-85.10-99, “Protective Coatings for Metals”.

.2 CGSB 1-GP-171M, “Coating Inorganic Zinc”.

.6 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer’s Association (CPMA)

.1 CISC/CPMA 1-73a, “Quick–Drying, One-Coat Paint for Use on Structural Steel”.

.7 Canadian Standards Association (CSA)

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

.2 CAN/CSA-G164-M92 (R2003), “Hot Dip Galvanizing of Irregularly Shaped Articles”.

.3 CAN/CSA-S16-09, “Limit States Design of Steel Structures”.

.4 CAN/CSA-S136-12, “North American Specifications for the Design of Cold-Formed Steel Structural Members”.

.5 CSA-W47.1-09(R2014), “Certification of Companies for Fusion Welding of Steel”.

.6 CSA-W48-14, “Filler Metals and Allied Materials for Metal Arc Welding”.

.7 CSA-W55.3-08 (R2013), “Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings”.

.8 CSA-W59-13, “Welded Steel Construction (Metal Arc Welding)”.

.9 CSA-W178.1-14, “Certification of Welding Inspection Organizations”.

.10 CSA-W178.2-14, “Certification of Welding Inspectors”.

.11 CSA-W186-M1990 (R2012), “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.8 Master Painters Institute

.1 MPI-INT 5.1-10, “Structural Steel and Metal Fabrications”.

.2 MPI-EXT 5.1-10, “Structural Steel and Metal Fabrications”.

.9 The Society of Protective Coatings - Steel Structures Painting Council (SSPC), Surface Preparation Standards.

.1 SSPC SP2, “Hand Tool Cleaning”.

.2 SSPC SP3, “Power Tool Cleaning”.

.3 SSPC SP6, “Commercial Blast Cleaning”.

1.3 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers’ Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.4 SAFETY

.1 Carry out work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.5 QUALIFICATIONS

.1 The organization undertaking to weld under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W47.1, Division 1 or 2 only. Division 3 qualification is not sufficient.

.2 Weld Inspection: The organization undertaking to perform weld inspection under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W178.

.3 Engage a professional structural engineer registered in the Province of Alberta, fully qualified and experienced in the design of structural steel, connections and welded components to be responsible for the design of specified steel components, connections and welded components.

1.6 DESIGN

.1 Design components, connections, and other work not detailed on the drawings, but necessary for completion of the Work, in accordance with the requirements of CAN/CSA-S16 and CAN/CSA-S136 to resist all loads and forces shown on the drawings and as noted below.

.2 Design connections for wide flange beam and channel sections for a minimum force equal to 60% of the shear capacity of the web of the section with a minimum connection length of one-half the depth of the section.

.3 Verification of design capacities by calculation to be made available on request.

1.7 SUBMITTALS

.1 Submit in writing evidence of qualification for welding under CWB.

.2 Submit evidence of ability to weld reinforcing steel in accordance with CSA-W186.

.3 When requested, submit copies of mill test reports properly correlated to the materials used.

.4 Prior to commencing work, the Contractor's engineer is to submit documentation showing evidence of registration in the province, plus qualifications and experience. The Contractor's engineer is to further acknowledge in writing that he has reviewed the specifications and drawings and is aware that he is to inspect the fabrication and installation of work and certify the work at completion.

1.8 SHOP DRAWINGS

.1 Clearly indicate sizes, spacing and locations of all structural members, connections and cambers.

.2 Indicate welded connections using standard welding symbols. Clearly indicate net weld lengths.

.3 Clearly indicate all pre-tensioned high-strength bolted connections.

.4 On the shop drawings, clearly show method of torquing bolts.

.5 Specify primer with colours and number of coats to be used for each member that has a finish painted surface. Confirm compatibility between primer and paint.

.6 Specify one-coat paint to be used for each member that does not have a finish painted surface.

.7 Prepare shop drawings of all connections and components designed by the fabricator under the seal and signature of the Contractor's professional structural engineer responsible for this design.

.8 Review of the shop drawings by the Engineer is intended as an assistance to the Contractor and does not relieve the Contractor of his or her responsibility for the completeness and accuracy of his or her work and its conformance with the contract drawings and specifications.

.9 Fabrication that commences prior to shop drawing review by the Engineer is at the risk of the Contractor.

1.9 QUALITY CONTROL

.1 The Contractor's professional engineer responsible for the design of connections and other components is to inspect the fabrication and erection of these components in accordance with APEGGA "A Guideline - Responsibility for Structural Design on General Engineering and Building Projects" dated December 1987.

1.10 INSPECTION AND TESTING

.1 Materials and workmanship are to be subject to inspection and testing by an inspection and testing firm certified in accordance with CSA-W178.1, retained and paid for by the Owner and approved by the Engineer.

.2 Provide access for inspection to all places where work is being done or stockpiled prior to shipment.

.3 Inspection and testing firm to test 1 in 5 welds. Testing of welds to include visual examination of all welding procedures at the plant and in the field, plus magnetic particle, x-ray or other means deemed necessary by the testing agency to permit certification of welds.

.4 Inspection and testing firm to inspect all bolts for all snug-tightened high-strength bolted connections.

.5 Inspection and testing firm to visually inspect all bolts for all pre-tensioned high-strength bolted connections.

.6 Inspection and testing firm to inspect surface preparation and cleaning for painted and galvanized steel.

.7 Inspection and testing firm to inspect and verify one coat paint, primer, zinc coat and galvanizing thickness.

.8 The Engineer may request additional testing of welds and bolts to ascertain the full amount of defects if the tests noted above indicate excessive deficiencies. Additional costs for extra testing to be borne by the Contractor.

.9 Pay for all costs for re-testing and re-inspection as a result of defective workmanship.

.10 Pay for all costs of repairs to correct defective work.

.11 Inspection and testing firm to submit to the Engineer a final report certifying all welds and connections, including confirmation that required repairs have been completed. This report to be submitted under the seal and signature of a professional structural engineer registered in the Province of Alberta.

.12 Notify Engineer and inspection and testing firm 48 hours prior to commencement of shop work for all testing and inspection.

1.11 ACCEPTABILITY

.1 Failure to comply with the requirements of these specifications will result in the structure being considered potentially deficient.

.2 Additional testing, inspection and evaluation may be required where evidence points to a potentially deficient structure.

.3 Pay all costs for additional testing, inspection and analysis required to demonstrate the adequacy of a structure that does not meet the requirements of the contract documents.

.4 Reinforce by additional construction or replace as directed by the Engineer at Contractor's expense all structure or material judged inadequate by structural analysis or by testing and inspection.

1.12 PAYMENT

.1 Payment for the work in this section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials and equipment necessary to complete the work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

Part 2 Products

2.1 MATERIALS/COMPONENTS

.1 Structural steel members and plates: To CAN/CSA-G40.21 of Type W weldable steel. Minimum yield strength 350 MPa for hollow structural steel members and wide flange sections, 300 MPa for other rolled sections and plates.

.2 Structural steel angles with 80 mm legs or less: To CAN/CSA-G40.21 of Type W weldable steel. Minimum yield strength 300 MPa.

.3 Cold Rolled Sections: To CAN/CSA-S136 with yield strength of 380 MPa.

.4 Shear stud connections: Headed concrete anchors conforming to ASTM A108.

.5 Bolts and required nuts and washers: High strength type recommended for structural steel joints to ASTM A325, medium-carbon steel. Nuts for galvanized bolts to be A563 Grade DH or A194 Grade 2H.

.6 Anchor bolts: To ASTM A307 unless otherwise indicated on the drawings.

.7 One-coat paint: To conform to CISC/CPMA 1-73a, "Quick–Drying, One-Coat Paint for Use on Structural Steel". Colour to be Grey.

.8 Shop galvanizing: Hot dipped galvanizing with a minimum coating of 600 g/m^2 to CAN/CSA-G164.

2.2 FABRICATION

.1 Notify Engineer and inspection and testing firm a minimum of 48 hours prior to fabricating any steel to allow for inspection.

.2 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136, the drawings and specifications, and the reviewed shop drawings.

.3 Verify dimensions of existing work prior to commencing fabrication.

.4 Verify all drawing dimensions and conditions prior to commencing fabrication.

.5 Welding to conform to the requirements of CSA-W59. Do not splice materials without the written approval of the Engineer. Where granted, provide a complete non-destructive examination by a certified inspection and testing firm; method and firm to be approved by the Engineer. Contractor to pay for all inspection and testing. Show all approved splices on the shop drawings.

.6 Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding.

.7 Seal all hollow structural sections with suitable cap plates or by welding all around to adjoining members.

.8 Provide 10 mm plate stiffeners each side of beam where continuous over supports.

.9 Provide 10 mm plate stiffener one side of beam at all bearing connections.

.10 Grind all welds smooth and grind all groove welds flush on exposed structural steel.

.11 Do not place any holes or openings in structural steel members without the approval of the Engineer. Where approval is granted, provide reinforcing plates around all openings to maintain design strength.

.12 Weld reinforcement where indicated. Weld in accordance with applicable requirements of CSA-W186. Do not weld reinforcing at any location without written approval of the Engineer.

.13 Weld all anchors required to restrain concrete masonry walls.

.14 Weld shear stud connectors in strict accordance with manufacturer’s instructions by electrical resistance only.

.15 Galvanize all structural steel components noted or specified to CAN/CSA-G164.

.16 Apply one coat of paint where required.

2.3 CLEANING

.1 Clean all interior structural steel not to be finish painted and not exposed to industrial, corrosive or humid conditions by wire brushing and removing all rust, dirt, mill scale, weld splatter and all other extraneous material in accordance with SSPC Specifications SP2 before applying one-coat paint to all surfaces except those to be in contact with concrete or to be fire-spray protected. Refer to architectural room finish schedules for extent.

.2 Clean all exterior structural steel that is to be finish painted and not exposed to industrial, corrosive or continuously wet conditions by commercial blast in accordance with SSPC Specification SP3 to ensure base steel is thoroughly cleaned of all rust, dirt, mill scale, weld splatter and all other extraneous material followed by solvent cleaning before applying primer. Refer to architectural room finish schedule for extent. Arrange for inspections of both cleaning and priming by the Engineer. Confirm compatibility between paint and primer.

.3 Clean, prepare, shop prime, and apply shop paint primer to surfaces of steel in accordance with CAN/CSA-S16, manufacturer's instructions to a dry film thickness of 65 to 80 micrometers.

.4 Strip paint from bolts, nuts, sharp edges, and corners before prime coat is dry.

.5 Clean all structural steel surfaces sufficiently to accept hot dip zinc galvanizing. Use the following abrasive cleaning and/or chemical methods as required.

.1 Clean all structural steel surfaces of all material which can not be cleaned by chemical methods. Use necessary blast methods in accordance with SSPC specifications to ensure base steel is thoroughly cleaned.

.2 Caustic Cleaning: Use a hot alkali solution to remove organic contaminants such as dirt, paint markings, grease and oil from the metal surface.

.3 Pickling: Remove scale and rust from the steel surface by pickling in a dilute solution of hot sulfuric acid or ambient temperature hydrochloric acid.

.4 Fluxing: Use a fluxing method suitable for the galvanizing process to remove oxides and prevent further oxides from forming on the surface of the metal prior to galvanizing.

.5 Arrange for inspection of both cleaning and galvanizing.

Part 3 Execution

3.1 ERECTION

.1 Notify Engineer and inspection firm a minimum of 48 hours prior to erecting any structural steel to allow for inspection.

.2 Erect structural steel, as indicated and in accordance CAN/CSA-S16, CAN/CSA-S136, and in accordance with reviewed shop drawings.

.3 Make adequate provision for all erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.

.4 Do not field cut or alter structural members without the written approval of the Engineer. Report to the Engineer every failure of material to fit together properly. Corrective measures must be approved by the Engineer.

.5 Paint or prime all welds, abrasions and surfaces not shop painted or primed except surfaces to be in contact with concrete or fire-spray protected after erection. Thoroughly clean all areas, in accordance with standards noted under cleaning specification clauses, requiring field touch-up of paint or primer to remove oil, dirt, grease, weld flux and blistered or non-adhering shop paint or primer. Use the same paint or primer as used in the shop.

.6 Set column base plates on steel wedges or shims to accurate elevations. Wooden wedges are not permitted.

.7 Ensure all pre-tensioned high-strength bolted connections are identified and tightened in accordance with CAN/CSA-S16, Clause 23.

.8 Repair damaged galvanizing in accordance with ASTM A780 with zinc-rich paint such as Galvacon applied in multiple coats to a dry film thickness of 0.20 mm.

3.2 CERTIFICATION

.1 Certify at the completion of work, under the seal and signature of the Contractor’s professional engineer responsible for this work, that all connections and components designed by the Contractor are capable of supporting the loads and forces indicated in the contract specifications and on the contract drawings and that all connections and components are fabricated and installed in accordance with the reviewed shop drawings.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1	Cast-In Place Concrete	Section 03 30 00
.2	Unit Masonry	Section 04 20 00
.3	Structural Steel for Buildings	Section 05 12 23
.4	Metal Deck	Section 05 31 00
.5	Support Framing for Small Openings in Metal Deck	Section 05 31 00
.6	Metal Fabrications	Section 05 50 00
.7	Painting	Section 09 90 00

1.2 REFERENCE STANDARDS

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first two standards listed below.

.3 NBC 2010, “National Building Code”.

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

.1 ASTM A307-14b, “Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength”.

.2 ASTM A325-14a, “Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength”.

.3 ASTM A325M-14, “Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric)”.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, “Anticorrosive Structural Steel Alkyd Primer”.

.2 CAN/CGSB-1.105-M91, “Quick Drying Primer”.

.3 CAN/CGSB-85.10-99, “Protective Coatings for Metals”.

.4 CAN/CGSB-85.100-93, “Painting”.

.6 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)

.1 CISC/CPMA 1-73a, "Quick–Drying, One-Coat Paint for Use on Structural Steel".

.7 Canadian Standards Association (CSA)

.1 CAN/CSA-G40.20/G40.21-14, "General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel".

.2 CAN/CSA-G164-M92 (R2003), "Hot Dip Galvanizing of Irregularly Shaped Articles".

.3 CAN/CSA-S16-01, "Limit States Design of Steel Structures".

.4 CAN/CSA-S16S1-05, "Supplement No.1 to CAN/CSA-S16-01, Limit States Design of Steel Structures".

.5 CSA-W47.1-09(R2014), "Certification of Companies for Fusion Welding of Steel".

.6 CSA-W48-14, "Filler Metals and Allied Materials for Metal Arc Welding".

.7 CSA-W55.3-1965 (R2013), "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings".

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

.9 CSA-W178.1-14, "Certification of Welding Inspection Organizations".

.10 CSA-W178.2-14, "Certification of Welding Inspectors".

.8 Master Painters Institute

.1 MPI-INT 5.1-10, "Structural Steel and Metal Fabrications".

.2 MPI-EXT 5.1-10, "Structural Steel and Metal Fabrications".

.9 The Society of Protective Coatings - Steel Structures Painting Council (SSPC), Surface Preparation Standards.

.1 SSPC SP2, "Hand Tool Cleaning".

.2 SSPC SP3, "Power Tool Cleaning".

.3 SSPC SP6, "Commercial Blast Cleaning".

1.3 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers' Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.4 SAFETY

.1 Carry out work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.5 QUALIFICATIONS

.1 The organization undertaking to weld under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W47.1 Division 1 or 2 only. Division 3 qualification is not sufficient.

.2 The organization undertaking to perform weld inspection under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W178.

.3 Engage a professional structural engineer registered in the Province of Alberta fully qualified and experienced in the design of open web steel joists to be responsible for the design of these joists.

1.6 DESIGN

.1 Design components, connections, and other work not detailed on the drawings, but necessary for completion of the Work, in accordance with the requirements of CAN/CSA-S16 to resist all loads and forces shown on the drawings and as noted below.

.2 Review and include for design all the suspended loads and all the roof loads imposed, including all loads from mechanical and other equipment. Ensure that all revised loads, mechanical and equipment loads not specifically noted on the drawings are included. The Contractor is to confirm in writing all loadings on the shop drawings, including the maximum panel point loads.

.3 Design top and bottom chords of joists to support a minimum 4.5 kN specified live load at any point along the joist.

.4 Unless otherwise noted or detailed, joist reactions are to be applied to the centre lines of supporting beams or walls.

.5 Joist seats that terminate outside of a steel beam centre line as per drawing details are to have centre line of bearing within the middle third of the beam flange width.

.6 Design joist seats and top chords for any eccentricities developed between specified reaction line and the intersection of the axis of the top chord and the end diagonal.

.7 Maximum allowable deflection under live load not to exceed L/300 of the span for roof joists and L/360 of the span for floor joists.

.8 Verification of design capacities by calculation to be made available upon request.

.9 Attachments for mechanical, electrical, and other services should be made by using approved clamping devices or U-bolt type connections.

1.7 SUBMITTALS

.1 Submit in writing evidence of qualification for welding under CWB.

.2 When requested, submit copies of mill test reports properly correlated to the materials used.

.3 Prior to commencing work, the Contractor's engineer is to submit documentation showing evidence of registration in the province, plus qualifications and experience. The Contractor's engineer is to further acknowledge in writing that he has reviewed the specifications and drawings and is aware that he is to inspect the fabrication and installation of work and certify the work at completion.

1.8 SHOP DRAWINGS

.1 Clearly indicate joist framing plans, sizes, spacing and locations of joist members, connections, bridging, anchorages, cambers, design loads and material specification.

.2 Indicate welded connections using standard welding symbols. Clearly indicate net weld lengths.

.3 Specify primer with colours and number of coats to be used for each member that has a finish painted surface. Confirm compatibility between primer and paint.

.4 Specify one-coat paint to be used for each member that does not have a finish painted surface.

.5 Prepare shop drawings of open web steel joists under the seal and signature of the Contractor's professional structural engineer responsible for this design.

.6 Review of the shop drawings by the Engineer is intended as an assistance to the Contractor and does not relieve the Contractor of his or her responsibility for the completeness and accuracy of his or her work and its conformance with the contract drawings and specifications.

.7 Fabrication that commences prior to shop drawing review by the Engineer is at the risk of the Contractor.

1.9 QUALITY CONTROL

.1 The Contractor's professional engineer responsible for the design of connections and other components is to inspect the fabrication and erection of these components in accordance with APEGGA "A Guideline - Responsibility for Structural Design on General Engineering and Building Projects" dated December 1987.

1.10 INSPECTION AND TESTING

.1 Materials and workmanship are to be subject to inspection and testing by an inspection and testing firm certified in accordance with CSA-W178.1, retained and paid for by the Owner and approved by the Engineer.

.2 Provide access for inspection to all places where work is being done or stockpiled prior to shipment.

.3 Inspection and testing firm to test 1 in 5 welds. Testing of welds to include visual examination of all welding procedures at the plant and in the field, plus magnetic particle, x-ray or other means deemed necessary by the testing agency to permit certification of welds.

.4 Inspection and testing firm to test 1 in 5 bolts.

.5 The Engineer may request additional testing of welds and bolts to ascertain the full amount of defects if the tests noted above indicate excessive deficiencies. Additional costs for extra testing to be borne by the Contractor.

.6 Pay for all costs for re-testing and re-inspection as a result of defective workmanship.

.7 Pay for all costs of repairs to correct defective work.

.8 Inspection and testing firm to submit to the Engineer a final report certifying all welds and connections, including confirmation that required repairs have been completed. This report to be submitted under the seal and signature of a professional structural engineer registered in the Province of Alberta.

.9 Notify Engineer and inspection and testing firm 48 hours prior to commencement of shop work for all testing and inspection.

1.11 ACCEPTABILITY

.1 Failure to comply with the requirements of these specifications will result in the structure being considered potentially deficient.

.2 Additional testing, inspection and evaluation may be required where evidence points to a potentially deficient structure.

.3 Pay all costs for additional testing, inspection and analysis required to demonstrate the adequacy of a structure that does not meet the requirements of the contract documents.

.4 Reinforce by additional construction or replace as directed by the Engineer at Contractor's expense all structure or material judged inadequate by structural analysis or by testing and inspection.

1.12 PAYMENT

.1 Payment for the work in this section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials and equipment necessary to complete the work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

Part 2 Products

2.1 MATERIALS

.1 Structural steel: To CAN/CSA-G40.21 for General Requirements.

.2 Joist members: To CAN/CSA-G40.21, Type W weldable steel. Supplier to show material specifications used on shop drawings.

.3 Bridging/bearing plates/angles: To CAN/CSA-G40.21, Type W weldable steel, minimum yield strength 300 MPa, painted or primed to match structural steel or joists.

.4 Bolts and required nuts and washers: High strength type recommended for structural steel joints, conforming to requirements of ASTM A325. Nuts for galvanized bolts to be A563 DH or A194 Grade 2H.

.5 Anchor bolts: To ASTM A307 unless otherwise indicated on the drawings.

.6 One-coat paint: To conform to CISC/CPMA 1-73a, "Quick–Drying, One-Coat Paint for Use on Structural Steel". Colour to be Grey.

.7 Primers to be different and distinctive colour for each coat used.

2.2 FABRICATION

.1 Notify Engineer and inspection and testing firm a minimum of 48 hours prior to fabricating any joists to allow for inspection.

.2 Fabricate steel joists and accessories in accordance with CAN/CSA-S16, the drawings and specifications and the reviewed shop drawings.

.3 Verify dimensions of existing work prior to commencing fabrication.

.4 Verify all drawing dimensions and conditions prior to commencing fabrication.

.5 Fabricate joists of straight members arranged to form a triangular truss type structure without joint eccentricities.

.6 Provide bottom and top chord extensions where indicated.

.7 Welding to conform to the requirements of CSA-W59. Do not splice materials without the written approval of the Engineer. Where granted, provide a complete non-destructive examination by a certified inspection and testing firm; method and firm to be approved by the Engineer. Contractor to pay for all inspection and testing. Show all approved splices on the shop drawings.

.8 Camber joists to compensate for dead load deflection.

.9 Seal all hollow structural sections with suitable cap plates or by welding all around to adjoining members.

.10 Apply one coat paint where required.

2.3 CLEANING

.1 Clean all interior structural steel not to be finish painted and not exposed to industrial, corrosive or humid conditions by wire brushing and removing all rust, dirt, mill scale, weld splatter and all other extraneous material in accordance with SSPC Specifications SP2 before applying one-coat paint to all surfaces except those to be in contact with concrete or to be fire-spray protected. Refer to architectural room finish schedules for extent.

Part 3 Execution

3.1 ERECTION

.1 Notify Engineer and inspection firm a minimum of 48 hours prior to erecting any structural steel to allow for inspection.

.2 Erect joists and bridging, as indicated and in accordance CAN/CSA-S16 and in accordance with reviewed shop drawings.

.3 Complete installation of all bridging and anchorages before placing construction loads on joists.

.4 Allow minimum 100 mm bearing when supported by masonry. Allow minimum 65 mm bearing when supported by structural steel.

.5 Extend joist legs minimum 25 mm past the centre line of supporting beams or walls unless noted otherwise on the drawings.

.6 Provide all temporary bracing required as a result of induced loads and stresses.

.7 Coordinate the proper placement of anchor bolts in concrete and masonry construction as required for the support of bearing plates/angles.

.8 Field weld joist seat to bearing plates/angles after alignment and position.

.9 Do not permit erection of decking until joists are sufficiently braced.

.10 Obtain written permission of Engineer prior to field cutting or altering of joists or bridging.

.11 Paint or prime all welds, abrasions and surfaces not shop painted or primed except surfaces to be in contact with concrete or fire-spray protected after erection. Thoroughly clean all areas, in accordance with standards noted under cleaning specification clauses, requiring field touch-up of paint or primer to remove oil, dirt, grease, weld flux and blistered or non-adhering shop paint or primer. Use the same paint or primer as used in the shop.

3.2 CERTIFICATION

.1 Certify at the completion of work, under the seal and signature of the Contractor's professional engineer responsible for this work, that all connections and components designed by the Contractor are capable of supporting the loads and forces indicated in the contract specifications and on the contract drawings and that all connections and components are fabricated and installed in accordance with the reviewed shop drawings.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1	Cast-In Place Concrete	Section 03 30 00
.2	Unit Masonry	Section 04 20 00
.3	Structural Steel	Section 05 12 23
.4	Open Web Steel Joist Framing	Section 05 21 19
.5	Support Framing for Small Openings in Metal Deck	Section 05 31 00
.6	Metal Fabrications	Section 05 50 00
.7	Painting	Section 09 90 00

1.2 REFERENCE STANDARDS

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first two standards listed below.

.3 NBC 2010, “National Building Code”.

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

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

.2 ASTM A792/A792M-10, “Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process”.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, “Ready-Mixed Organic Zinc-Rich Coating”.

.6 Canadian Standards Association (CSA)

.1 CSA C22.2 No.79-1978 (R2013), “Cellular Metal and Cellular Concrete Floor Raceways and Fittings”.

.2 CAN/CSA-G40.21-04, “Structural Quality Steel”.

.3 CAN/CSA-S16-09, “Limit States Design of Steel Structures”.

.4 CAN/CSA-S136-12, “North American Specifications for the Design of Cold-Formed Steel Structural Members”.

.5 CSA-W47.1-09(R2014), “Certification of Companies for Fusion Welding of Steel”.

.6 CSA-W55.3-1965 (R2013), “Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings”.

.7 CSA-W59-13, “Welded Steel Construction (Metal Arc Welding)”.

.8 CSA-W178.1-14, “Certification of Welding Inspection Organizations”.

.9 CSA-W178.2-14, “Certification of Welding Inspectors”.

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

.1 Canadian Sheet Steel Building Institute (CSSBI), CSSBI 10M-08, “Standard for Steel Roof Deck”.

.2 Canadian Sheet Steel Building Institute (CSSBI), CSSBI 12M-08, “Standard for Composite Steel Floor Deck”.

.3 Canadian Sheet Steel Building Institute (CSSBI) 40.6, “Metric Zinc-Coated (Galvanized) Sheet Steel for Structural Building Products Technical Bulletin No. 6”.

.4 Canadian Sheet Steel Building Institute (CSSBI) 101M-84, “Zinc-Coated Structural Quality Steel Sheet for Roof and Floor Deck”.

1.3 REGULATIONS

.1 Abide by the current bylaws and regulations of the province and/or municipality in which the work is located, and abide by the current laws and regulations with regard to public safety.

.2 The regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers’ Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to the work of this section.

1.4 SAFETY

.1 Carry out work in accordance with the current Occupational Health and Safety Act and construction safety regulations.

1.5 QUALIFICATIONS

.1 The organization undertaking to weld under this section is to be fully approved by the Canadian Welding Bureau under the requirements of CSA-W47.1 Division 1 or 2 only. Part of the work may be sublet to a Division 3 firm, providing that the Division 1 or 2.1 firm retains the responsibility for the work.

.2 Welders of metal decking are to be approved for deck welding under procedure W610 by the Canadian Welding Bureau.

.3 Engage a professional structural engineer registered in the Province of Alberta fully qualified and experienced in the design of metal decking to be responsible for the design of the metal deck.

1.6 DESIGN

.1 Design metal deck in accordance with CSA-S136 at a maximum working stress of 138 MPa to support all loads and forces indicated on the drawings.

.2 Metal deck is to be rigid enough and connected sufficiently to provide lateral support for the top chord or flange of the supporting elements.

.3 Metal deck is used as a lateral load resisting diaphragm. Metal deck thickness and connections specified on the drawings are the minimum required to resist the lateral loads. Thicknesses and connections may be increased by the supplier if necessary to resist vertical loadings.

.4 Limit live load deflection for roof deck to L/300.

.5 Limit live load deflection for floor deck to L/360.

.6 Verification of design capacities by calculation to be made available on request.

1.7 SUBMITTALS

.1 Submit in writing evidence of qualification for welding under CWB.

.2 Prior to commencing work, the Contractor’s engineer is to submit documentation showing evidence of registration in the province, plus qualifications and experience. The Contractor’s engineer is to further acknowledge in writing that he has reviewed the specifications and drawings and is aware that he is to inspect the fabrication and installation of work and certify the work at completion.

1.8 SHOP DRAWINGS

.1 Clearly indicate metal deck plan, deck profile, sheet lengths and quantities, thicknesses, zinc coating designations, anchorage supports, projections, openings and reinforcement, applicable details and accessories.

.2 Clearly indicate position of temporary shoring of floor metal deck if required by the design.

.3 Prepare shop drawings of metal deck under the seal and signature of the Contractor's professional structural engineer responsible for this design.

.4 Review of the shop drawings by the Engineer is intended as an assistance to the Contractor and does not relieve the Contractor of his or her responsibility for the completeness and accuracy of his or her work and its conformance with the contract drawings and specifications.

.5 Fabrication that commences prior to shop drawing review by the Engineer is at the risk of the Contractor.

1.9 QUALITY CONTROL

.1 The Contractor's professional engineer responsible for the design of connections and other components is to inspect the fabrication and erection of these components in accordance with APEGGA "A Guideline - Responsibility for Structural Design on General Engineering and Building Projects" dated December 1987.

1.10 INSPECTION AND TESTING

.1 Materials and workmanship are to be subject to inspection and testing by an inspection and testing firm certified in accordance with CSA-W178.1, retained and paid for by the Owner and approved by the Engineer.

.2 Provide access for inspection to all places where work is being done or stockpiled prior to shipment.

1.11 PAYMENT

.1 Payment for the work in this section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials and equipment necessary to complete the work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

Part 2 Products

2.1 MATERIALS

.1 38 mm nominal depth roof deck: To CSSBI 101M, minimum Grade A with a minimum base steel nominal thickness of 0.76mm and a minimum zinc coating designation of ZF075 (wiped coat). Maximum flute spacing 150 mm.

.2 Bearing plates/angles: To CAN/CSA-G40.21, Type W weldable steel, minimum yield strength 300 MPa, painted to match structural steel or joists.

.3 Bolts and required nuts and washers: High strength type recommended for structural steel joints, conforming to requirements of ASTM A325. Nuts for galvanized bolts to be A563 Grade DH or A194 Grade 2H.

.4 Primer: Zinc-rich ready-mixed primer to CAN/CGSB-1.181.

.5 One-coat paint: To conform to CISC/CPMA 1-73a, "Quick–Drying, One-Coat Paint for Use on Structural Steel".

2.2 FABRICATION

.1 Fabricate metal deck in accordance with CSA-S136 and as recommended by the Canadian Sheet Steel Building Institute (CSSBI), the drawings and specifications and the reviewed shop drawings.

.2 Verify dimensions of existing work prior to commencing fabrication.

.3 Verify all drawing dimensions and conditions prior to commencing fabrication.

.4 Ensure the metal decking is continuous over three or more spans unless otherwise approved.

.5 Provide a male and female lip for each section of the metal decking.

Part 3 Execution

3.1 ERECTION

.1 Erect metal deck as indicated and in accordance with CAN/CSA-S136 and in accordance with reviewed shop drawings. Properly align and level on structural supports.

.2 Allow minimum bearing equal to the depth of metal deck when supported by structural steel and minimum 100 mm bearing when supported by masonry.

.3 Mechanically fasten button punch or screw side lips at maximum 300 mm on centre except where additional fastening is indicated on drawings.

.4 Fasten metal decking to steel framework at ends and intermediate supports with 20 mm fusion welds at every second valley unless additional fastening is indicated on the drawings. Fasten metal decking to perimeter members parallel to flutes with 20 mm diameter fusion welds at 300mm maximum centres or as indicated on the drawings. Weld through 20 mm diameter steel washers unless the Contractor has an approved Canadian Welding Bureau procedure for welding without washers. A minimum of ¾ of the perimeter of the weld is to be flush with or above deck.

.5 Form end laps over supports and not less than 50 mm.

.6 Provide suitable deck support for all top edges of unsupported flutes where deck is trimmed parallel to flutes.

.7 No reinforcement required for openings cut in deck which are smaller than 150 mm square.

.8 Reinforce openings up to 450 mm for roofs and 300 mm for floors in size with L76 x 76 x 6.4 steel angles. Place angles perpendicular to flutes, extended minimum three flutes each side of openings, and weld each flute to angle.

.9 Reinforce larger openings in accordance with structural framing details indicated on drawings.

.10 Install closure strips and angle flashing as required to close openings between metal decking and walls, columns, openings, etc.

.11 Install acoustical closures in locations above walls and partitions.

.12 Install closures at edges of slabs of full thickness of slab as required to contain the wet concrete. Ensure that closures are of sufficient strength to stay in place without distortion.

.13 Brush clean and touch up all welds, burned areas and damaged spots on the top and underside with primer immediately after installation.

.14 Prior to concrete placement, metal deck to be free of soil, debris, standing water, loose mill scale, and other foreign matter.

.15 Place and support reinforcing steel as indicated.

3.2 OTHER TRADES

.1 Cooperate with other trades.

.2 Erect metal deck as quickly as possible after the erection of the structural steel supports.

.3 Ensure that no holes are made through metal deck to suspend any loads, including loads from ceilings, fixtures, mechanical and other equipment. Suspend loads from joist panel points or approved locations on beams.

3.3 CLEANING

.1 Clean up and remove all debris and excess material from the site as work is in progress.

3.4 CERTIFICATION

.1 Certify at the completion of work, under the seal and signature of the Contractor’s professional engineer responsible for this work, that all connections and components

designed by the Contractor are capable of supporting the loads and forces indicated in the contract specifications and on the contract drawings and that all connections and components are fabricated and installed in accordance with the reviewed shop drawings.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 23 - Masonry Accessories

.2 Section 04 21 13 - Brick Masonry

.3 Section 04 22 00 - Concrete Unit Masonry

.4 Section 06 10 00 - Rough Carpentry

.5 Section 07 21 13 - Board Insulation

.6 Section 07 21 16 - Blanket Insulation

.7 Section 07 25 00 - Self Adhered Exterior Sheathing Membrane

.8 Section 07 27 00.01 - Air Barriers

.9 Section 07 42 46 - Solid Phenolic Panels

.10 Section 07 42 48 - Cementitious Composite Panels

.11 Section 08 11 00 - Metal Door and Frames

.12 Section 08 11 16 - Aluminum Doors and Frames

.13 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

.14 Section 09 21 16 - Gypsum Board Assemblies

1.2 REFERENCES

.1 AWCC: Association of Wall and Ceiling Contractors/Wall & Ceiling Institute, Specification Standards Manual, 2012 (5th Edition).

.2 AISC - LRFD Manual of Steel Construction.

.3 AISI Specifications and Standards:
- .1 AISI-S100 (2007): North American Specification for the Design of Cold Formed Steel Structural Members.
- .2 Supplement No. 1 of AISI S213: North American Cold-formed Steel Framing Standard–Lateral.
- .3 Standard for Cold-Formed Steel framing - General Provisions.

.4 ASTM International Standards:
- .1 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A780/A780M-09: Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
.3 ASTM A924/A924M-13: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
.4 ASTM A1003/A1003M-15: Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
.5 ASTM A1008/A1008M-15: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
.6 ASTM C955-15: Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
.7 ASTM C1002-07(2013): Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
.8 ASTM C1007-11a: Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
.9 ASTM C1513-13: Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.

.5 CGSB Standards:
.1 CAN/CGSB-1.181-99: Ready-Mixed Organic Zinc-Rich Coating.
.2 CAN/CGSB-7.1-98: Lightweight Steel Wall Framing Components.

.6 CSA Standards:
.1 CSA-S136-12 PACKAGE: Consists of S136.12 - North American Specification for the Design of Cold-Formed Steel Structural Members and S136.1-12 - Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.

.7 Canadian Sheet Steel Building Institute (CSSBI):
.1 Canadian Sheet Steel Building Institute: Code of Practice.
.2 CSSBI 50M-06: Lightweight Steel Framing Manual.
.3 CSSBI Standard 30M-06.
.4 CSSBI Fact Sheet #3 June 1994, Care and Maintenance of Prefinished Sheet Steel Building Products.
.5 CSSBI Technical Bulletin Vol. 7, No. 2 February 2004: Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
.6 CSSBI S5-08: Wind Bearing Steel Studs.

.8 LGSEA Research Note:
.1 Behaviour and Design of Self Drilling Screw Connections.

.9 ULC Standards:
.1 CAN/ULC-S101-14: Standard Methods of Fire Endurance Tests of Building Construction and Materials.
.2 ULC "List of Equipment and Materials, Volume II, Building Construction", (latest edition).

1.3 QUALITY ASSURANCE

.1 Engage a professional structural engineer registered in the Province of Alberta fully qualified and experienced in the design of cold formed structural steel framing systems to be responsible for the design of the cold formed structural steel framing systems, including structural steel studs and connection of the top and bottom track to the supporting structure, and to prepare, seal, and sign all shop drawings and to perform field reviews.

.2 The Contractor's Professional Engineer responsible for this work is to inspect the fabrication and erection of all cold formed structural steel framing systems and components in accordance with APEGA "Responsibilities for Engineering Services on Building Projects" - dated March 2009.

.3 Work of this Section must be performed by a company that specializes in the type of cold-formed structural steel framing work required for this project, with a minimum of 5 years of documented successful experience and work must be performed using skilled workers throughly experienced in the necessary crafts.

.4 Use a cold formed structural steel framing systems manufacturer who specializes in the manufacturing of the type of cold formed structural steel framing specified in this Section with a minimum of 5 years of documented successful experience, and have the facilities capable of meeting all requirements of the Contract Documents as a single-source responsibility and warranty.

.5 Use installers who are experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.

.6 Product Tests: mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductibility and metal coating thickness.

.7 Fire Test Response Characteristics: where indicated, provide cold formed structural steel framing identical to that of assemblies tested for fire resistance as per CAN/ULC-S101 by a testing and inspection agency acceptable to authorities having jurisdiction.

.8 Comply with ANSI “North American Specification for the Design of Cold-Formed Steel Structural Members” and “Standard for Cold Formed Steel Framing - General Provisions”.

.9 Comply with LGSEA Research Note “Behaviour and Design of Self-Drilling Screw Connections”.

.10 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 - Project Meetings.

1.4 DESIGN

.1 Design cold formed structural steel framing systems, including steel stud assemblies and Z girt assemblies in accordance with CAN/CGSB-7.1 and CSA-S136, limit states design

principles using factored loads and resistances, to support all loads and forces indicated on the drawings and as specified.

.2 Design cold formed structural steel framing systems to resist wind loads for the Elk Point area using building code climatic data: 1 in 50 year loads for strength and 1 in 10 year loads for deflection including lw = 1.25.

.3 Engineer all exterior studs, Z girts and assemblies, including where structural steel support is indicated in wall assemblies, such as at windows.

.4 Calculate loads and load factors in accordance with the Alberta Building Code 2014 and National Building Code of Canada 2010.

.5 Determine resistances and resistance factors in accordance with the Alberta Building Code 2014 and National Building Code of Canada 2010 and CSA-S136.

.6 Design system to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.

.7 Except where otherwise noted on the drawings, size components and design connections for bottom and top track to base structure to resist all design loads including lateral loads in accordance with the Alberta Building Code 2014 and National Building Code of Canada 2010.

.8 Design bridging to prevent rotation and translation and ensure structural integrity.

.9 Design cold formed structural steel framing systems, including exterior stud systems and Z girt systems to provide a maximum deflection of L/600 for cold formed structural steel framing systems supporting brick and concrete masonry veneer cladding and L/480 for cold formed structural steel framing systems everywhere else, in accordance with CSA-S136. Where walls are a combination of masonry veneer and other exterior cladding such as solid phenolic panels or cementitious composite panels, provide maximum deflection of L/600. Limit free play and movement in connections perpendicular to the plane of the framing to 2 mm relative to the building structure.

.10 Stud and Z girt widths are indicated on the drawings. Adjust stud and Z girt material thickness and stud spacing or both as required by design criteria. Use greater or less stud and Z girt widths only if accepted by the Departmental Representative.

.11 Design cold formed structural steel framing systems and attachments to accommodate the full range of tolerances permitted in adjoining materials.

.12 Design stud end connections to accommodate structural deflections, frame shortening, and vertical tolerances permitted in structure such that studs are not loaded axially. Provide for differential in floor to head height for all effects combined.

.13 Take into account local loadings due to anchorage of cladding and interior wall mounted fixtures where indicated.

.14 Design soffit framing to withstand all superimposed loading, including wind uplift, with a maximum deflection of 1/180.

.15 Design bridging to prevent member rotation and member translation perpendicular to the minor axis for lateral load bearing studs. Provide for secondary stress effects due to torsion between lines of bridging. Do not rely on cladding, sheathing, or insulation for lateral bracing. Provide metal bridging at 1500 mm o.c. maximum. Use closer spacing if required by structural design.

.16 Reinforce steel studs where flanges are cut out. Reinforcement to develop full capacity of stud section.

.17 Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to maximum ambient temperature change (range) of 67°C).

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for cold formed structural steel framing members, including steel studs and Z girts and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Alberta, Canada as specified in item 1.3.2 of this Section.
- .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
- .3 Indicate locations, dimensions, openings and requirements of related work.

.4 Samples:
- .1 Submit samples of framing components for review.
- .2 Submit duplicate 300 mm long samples of each type of framing member.

.5 Certificates: prior to beginning Work, submit: 2 certified copies of mill reports covering material properties.

.6 Manufacturer Reports:
- .1 Submit manufacturer's written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect cold formed structural steel framing members from [nicks, scratches, and blemishes.
- .3 Protect cold formed structural steel framing members during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
- .4 Handle and protect galvanized materials from damage to zinc coating.
- .5 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Steel: to CAN/CSA S136, fabricated from ASTM A653/A653M, Grade 33 or 50 steel.

.2 Zinc coated steel sheet: quality to ASTM A653/A653M, with Z275 designation coating.

.3 Bolts and Nuts: to ASTM A307, with large flat washers, hot dip galvanized steel to connect to steel structure.

.4 Screws: hex, pan or wafer head, self drilling, self-tapping sheet metal screws, 400 series stainless steel fasteners coated with zinc or cadmium and dichromate conversion coating. Select fasteners known not to strip with the combination of material thickness being fastened and tools to be used. Use flat headed screws to fasten sheet metal blocking to steel studs, and studs to lower top track of double top track installation to allow for unrestricted vertical movement to accommodate structural deflection from above.

.5 Concrete Anchors: threaded fasteners designed to screw into pre-drilled holes in concrete, or drilled adhesive-set stud anchors; with minimum shank diameter of 8 mm minimum or larger diameter as required to suit design, of 400 series stainless steel coated with zinc and diachromate conversion coating. Power actuated fasteners are not permitted.

.6 Touch up primer: zinc rich, to CAN/CGSB-1.181.

.7 Metal strip 'blocking': 1.092 mm base metal thickness galvanized steel sheet, 150 mm wide or wider as required to accommodate materials or equipment being fastened to the blocking. To locations where gypsum board partitions extend to underside of structure, use 1.092 mm base metal thickness galvanized sheet steel of sufficient width to span across three bottom flutes of underside of metal deck and continuous length of partition.

.8 Plywood and wood blocking and backing: as specified in Section 06 10 00.

.9 Fire safing filler: rock wool or mineral fibre; one of the following:

.1 'Firebarrier' distributed by A/D Distributors.
.2 'Firestop' distributed by Alberta Spray-On.
.3 Roxul 07840 Safe as manufactured by Roxul.
.4 Other preapproved product.

.10 Foam strip: continuous, closed cell self adhering foam tape, 6 mm thick x 25 mm width.

2.2 COLD FORMED STRUCTURAL STEEL FRAMING DESIGNATIONS

.1 Colour code: to CSSBI Technical Bulletin Vol.7, No. 2.

2.3 METAL FRAMING

.1 Steel studs and Z girts: to CAN/CSA S136, fabricated from metallic coated steel, depth as indicated.
.1 Minimum steel thickness of 1.09 mm.

.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.

.3 Floor and overhead tracks: cold-formed of same kind of steel sheet as studs, base metal thickness to match studs or greater thickness as determined by the Contractor's Engineer and as indicated on the reviewed shop drawings, identified or colour coded in same manner as studs, top and bottom track to structural studs at exterior walls, 32 mm flange height for bottom tracks, 50 mm flange height for top tracks.

.4 Channel retainer for double track at head of partitions: cold-formed of same kind of steel sheet as studs, base metal thickness to match studs or greater thickness as determined by the Contractor's Engineer and as indicated on the reviewed shop drawings identified or colour coded in same manner as studs, of same or greater thickness as studs; fabricated just wide enough to accept top track; in as long lengths as practical.

.5 Z girts: thermally broken minimum 1.092 mm base metal thickness, Z275 galvanized Z girts of sizes as indicated. Fabricate all horizontal Z girts with a 2% slope to the exterior to allow water to drain off the Z girt surfaces.

.6 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness.

.7 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.37 mm minimum thickness.

.8 Tension straps and accessories: as recommended by manufacturer.

2.4 SOURCE QUALITY CONTROL

.1 Ensure mill reports covering material properties are reviewed by Departmental Representative.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 GENERAL

.1 Do structural metal stud framing work to CSSBI S5.

3.3 ERECTION

.1 Erect components to requirements of reviewed shop drawings.

.2 Execute work neatly and accurately, plumb and true, co-ordinated with work of other trades to tolerances specified. Take actual built dimensions of previously constructed work into account and accommodate them by adjusting position of framing as may be required. Make all field measurements necessary to ensure fit of all members.

.3 Provide temporary bracing, if required for framing to sustain loads applied during erection and subsequent construction.

.4 Do not place studs extending to the underside of structural elements such as roof decks until all dead loading (ie. roofing materials, mechanical units and the like) has been placed on structure above.

.5 Erect load bearing studs one piece, full length. Splicing of studs is not permitted.

.6 Align walls correctly on approved lay-out.

.7 Use nested inner and outer track for attachment to overhead structures. Leave a minimum gap of 25 mm to accommodate structural movement.

.8 Floor and overhead tracks:
- .1 For exterior steel stud assemblies, secure overhead track to underside of steel deck or structure at maximum 600 mm o.c. using specified fasteners.
- .2 For steel stud assemblies extending to underside of structure and running parallel to flutes in metal deck, anchor 1.092 mm base metal thickness galvanized sheet metal blocking to underside of structure at 600 mm o.c. to each bottom flute; stagger fasteners minimum 300 mm and attach at 50 mm maximum from ends.
  - (1) For steel stud assemblies extending to underside of structure, anchor galvanized sheet metal channel retaining the top track (for deflection control) to sheet metal blocking or underside of structure using bolts at maximum 600 mm o.c. to metal deck or steel structure or shorter spacings as required to suit

design. Form the upper track 1.6 mm wider to nest with the lower. Screw studs to the lower track, near the bottom edge of the flange. DO NOT SCREW STUDS OR TOP CHANNEL THROUGH TO RETAINING CHANNEL.

.3 Install top and bottom track in continuous bead of sealant. Also, apply a continuous bead of sealant between studs and dissimilar adjacent materials.,

.4 Install fire safing insulation between double top track.

.5 Secure floor track in place to concrete slab, at 600 mm o.c. or shorter spacings as required to suit design, using drilled screw in anchors or other approved fasteners.

.6 Place one additional anchor within 100 mm of each end of each piece of bottom and top track.

.7 At parapets, coordinate installation of air/vapour barrier installed under bottom track of metal framing, with Section 07 27 00.01. Fasten base track through air/vapour barrier membrane, gypsum sheathing and into metal decking, with 2 rows of fasteners at 400 mm o.c., located immediately adjacent to flange and located at each stud location. Ensure fasteners penetrate steel deck minimum 25 mm.

.8 Secure floor and ceiling track to short walls, 150 mm in length or less before change in direction, using minimum 3 drilled anchors, to securely fasten in place.

.9 Do not fasten nested tracks together.

.10 Stagger joints.

.9 Erect studs plumb and in alignment, and attach to legs of top and bottom tracks with one No. 6 screw at each connection (4 per stud).

.10 Position studs vertically in the tracks, spaced not more than 400 mm o.c., unless indicated otherwise and not more than 50 mm from abutting walls, and at each side of openings and corners and terminations with dissimilar materials. Screw fix studs to both sides of top and bottom track to exterior stud partition locations. At door frames and other frames, double up jamb studs.

.11 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

.12 Brace steel studs with horizontal bracing channels through stud cutouts at 1220 mm maximum. vertical centres. Fasten bracing to each stud with bracing clips using four (4) No. 8 screws.

.13 Install bracing in longest practical lengths. Where splices are required make them more than one stud space long, with each end fastened at a bracing clip. Install all bracing as noted on the reviewed shop drawings, and as otherwise may be required to secure partitions and bulkheads in place and to provide lateral support.

.14 Reinforce cutouts which occur within 300 mm of the end of a stud. Align stud cut-outs horizontally. Do not allow additions cutouts to be made in field, except as approved by the Contractor’s Engineer responsible for the preparation of shop drawings.

.15 Frame all openings in stud walls, except openings less than 100 mm in any dimension, and provide framing at points of attachment of wall mounted fixtures to adequately carry loads by using additional framing members and bracing.

.16 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.17 Set door and similar frames into position, align and brace securely until properly anchored. Anchor bottom of door frames to floors with drilled inserts. Install temporary horizontal spreader at door mid-height to ensure maintenance of frame width until adjacent work is completed. After removing bottom (steel) spreader, grind frame smooth. Coordinate with Section 08 11 00.

.18 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.19 Install steel studs to parapets as detailed. Coordinate installation of air/vapour barrier under bottom channel of steel stud parapet framing, with Section 07 27 00.01. Ensure continuous air/vapour barrier membrane strip is installed under bottom track prior to installation of steel stud parapet framing.

.20 At openings, install cut-to-length sections of track with web flanges bent at each end and securely attached to jamb studs. Install infill studs above or below opening as applicable. Where directed, place end infill studs so that it is possible to have a control joint in line with a door jamb. Frame for all openings larger than 100 mm diameter or side.

.21 Use screws long enough to penetrate beyond joined materials by more than three (3) exposed threads. Use wafer-head fasteners where panel products will be installed against the attachment.

.22 Use screws with drilling and holding capabilities recommended by the manufacturer for the materials being fastened. Select different screws if initial selection fails to drill effectively or tends to strip out.

.23 Install header framing suspended from structure using screws only.

.24 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.25 Form control joints in long runs of wall. Place double studs so that control joints will be no more than 9 m apart.

3.4 Z GIRTS

.1 Install Z girt framing to locations indicated on the drawings, including behind solid phenolic panels and cementitious composite panels and the like. Coordinate with installation of air/vapour barrier membrane specified in Section 07 27 00.01 and board insulation specified in Section 07 21 13.

.2 Install Z girt framing horizontally at 600 mm o.c. unless indicated otherwise, and fasten through air/vapour barrier and gypsum sheathing, into steel stud framing or into concrete block backup, penetrating concrete block minimum 38 mm. Coordinate installation of insulation between Z girts with Section 07 21 13.

.3 Install Z girt framing to soffits as detailed.

.4 Fasten Z girts securely using corrosion resistant fasteners. Ensure that all ends of Z girts occur over firm bearing.

3.5 BLOCKING

.1 Install metal strip blocking for fixing of wall mounted items. Confirm blocking requirements before applying gypsum board. If this is not done, and blocking is required, remove and replace board at own expense. Screw to face of studs using self-tapping flat headed screws at 150 mm o.c. maximum along each stud, with a minimum of 2 screws per stud.

.2 Install metal blocking or 89 mm stud install on flat and horizontally between vertical studs, behind all wall mounted door stops. Screw fasten blocking or stud to adjacent studs.

.3 Coordinate installation of wood and plywood blocking with Section 06 10 00. Install wood blocking to all heavy wall mounted items as required to support all superimposed loading.

3.6 ERECTION TOLERANCES

.1 Plumb: not to exceed 1/500th of member length.

.2 Camber: not to exceed 1/1000th of member length.

.3 Spacing: not more than +/- 3 mm from design spacing.

.4 Gap between end of stud and track web: not more than 4 mm.

3.7 CUTOUTS

.1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

.2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

3.8 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer's verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work as follows.

.1 After delivery and storage of products, and when preparatory Work is complete but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

3.10 PROTECTION

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

.2 Repair damage to adjacent materials caused by structural metal stud installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 72 00 - Stainless Steel Fabrications

.2 Section 06 20 00 - Finish Carpentry

.3 Section 09 91 13 - Exterior Painting

.4 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM):
- .1 ANSI/NAAMM MBG 531-09: Metal Bar Grating Manual.
- .2 ANSI/NAAMM MBG 532-09: Heavy duty Metal Bar Grating Manual.
- .3 ANSI/NAAMM MBG 533-09: Welding Specifications for steel, Aluminum and Stainless steel Bar Gratings.
- .4 ANSI/NAAMM MBG 534-14: Metal Bar Grating Engineering Design Manual.

.2 ASME Standards:
- .1 ASME B18.6.3: Machine Screws and Machine Screw Nuts.
- .2 ASME B18.6.7M: Metric Machine Screws.
- .3 ASME B18.2.1: Square and Hex Bolts and Screws, Inch Series.
- .4 ASME B18.2.3.8M: Metric Hex Lag Screws.
- .5 ASME B18.6.1: Wood Screws, Inch Series.

.3 ASTM International:
- .1 ASTM A36/A36M-14: Standard Specification for Carbon Structural Steel.
- .2 ASTM A53/A53M-12: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .3 ASTM A108-13: Steel Bars, Carbon, Cold-Finished, Standard Quality.
- .4 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A242/A242M-13: Standard Specification for High-Strength Low-Alloy Structural Steel.
- .6 ASTM A283/A283M-13: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- .7 ASTM A307-14: Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .8 ASTM A325-14: Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .9 ASTM A325M-14: Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength [Metric].
- .10 ASTM A385/A385M-11e1: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

.11 ASTM A490-14a: Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
.12 ASTM A490M-14a: Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).
.13 ASTM A563M-15: Standard Specification for Carbon and Alloy Steel Nuts [Metric].
.14 ASTM A563-07(2013): Standard Specification for Carbon and Alloy Steel Nuts.
.15 ASTM A780/A780M-09(2015): Repair of Damaged Hot-Dipped Galvanized Coatings.
.16 ASTM A786/A786M-05(2009): Standard Specification for Rolled Steel Floor Plates.
.17 ASTM C645-14: Standard Specification for Nonstructural Steel Framing Members.
.18 ASTM D6386-10: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
.19 ASTM E488/E488M-10: Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
.20 ASTM F436-11: Standard Specification for Hardened Steel Washers.
.21 ASTM F436M-11: Standard Specification for Hardened Steel Washers [Metric].
.22 ASTM F959M-13: Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use With Structural Fasteners [Metric].
.23 ASTM F1554-07ae1: Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

.4 CGSB Standards:
.1 CAN/CGSB-1.40-97: Anticorrosive Structural Steel Alkyd Primer.
.2 CAN/CGSB-1.181-99: Ready-Mixed Organic Zinc-Rich Coating.

.5 CSA Standards:
.1 CAN/CSA-G40.20-13: General Requirements for Rolled or Welded Structural Quality Steel.
.2 CAN/CSA-G40.21-13: Structural Quality Steels.
.3 CAN/CSA-S16-14: Design of Steel Structures.
.4 CSA W47.1-09(R2014): Certification of Companies for Fusion Welding of Steel.
.5 CSA W48-14: Filler Metals and Allied Materials for Metal Arc Welding.
.6 CSA W55.3-08(R2013): Certification of companies for resistance welding of steel and aluminum.
.7 CSA W59-13: Welded Steel Construction (Metal-Arc Welding).
.8 CSA W178.1-14: Certification of Welding Inspection Organizations.
.9 CSA W178.2-14: Certification of Welding Inspectors (Developed in cooperation with the Canadian Welding Bureau).

.6 Steel Structures Painting Council (SSPC): Systems and Specifications Manual, Volume 2.

.7 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - [current edition].

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.

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

1.4 QUALITY ASSURANCE

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

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

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

2 Products

2.1 MATERIALS

.1 Miscellaneous steel: to ASTM A36/A36M or to CAN/CSA-G40.20 and CAN/CSA-G40.21, 300W yield strength.

.2 Hollow Structural Sections (HSS): to ASTM A36/A36M or to CAN/CSA-G40.20 and CAN/CSA-G40.21, 350W yield strength, Class C.

.3 Structural steel: to ASTM A36/A36M or to CAN/CSA-G40.20 and CAN/CSA-G40.21, 350W yield strength.

.4 Steel pipe: structural grade pipe, standard schedule 40 black pipe to interior locations, galvanized to exterior locations, conforming to ASTM A53/A53M, continuous or electric resistance welded; size as indicated on the drawings. Use standard weight generally and extra strong or double extra strong for bollards.

.5 Steel Checker Plate: to ASTM A786/A786M and ASTM A36/A36M or to CAN/CSA-G40.20 and CAN/CSA-G40.21, 300W yield strength; thickness as indicated on the drawings and reviewed shop drawings.

.6 Security Mesh to security screens in security ducts:
- .1 Standard Duty: to low risk areas (such as general offices, detachment garages and the like); 40 mm x 3.43 mm thick, Z275 galvanized expanded metal mesh; in one piece per location.
- .2 Heavy Duty: to high risk areas (such as secure storage areas); 20 mm x 3.43 mm thick, Z275 galvanized expanded metal mesh; in one piece per location.

.7 Grates: conforming to ANSI/NAAMM MBG 531 or 532; Sizes and types as indicated on the drawings and reviewed shop drawings.

.8 Welding materials: to CSA W59.

.9 Welding electrodes: to CSA W48 Series.

.10 Machine bolts: conforming to requirements of ASTM A307, Grade A.

.11 High tensile bolts for structural connections: conforming to the requirements of ASTM A325/A325M.

.12 Nuts: conforming to ASTM A194/A194M, Grade 2H nuts.

.13 Washers: conforming to ASTM F436 and ASTM F436M; type 1 washers.

.14 Inserts: Hilti HSL-3, Hilti Kwik Bolt 3 or Hilti Kwik Bolt TZ, as required to suit installation.

.15 Anchoring System: Hilti HIT system HIT H Y70 complete with mesh screen for brick or hollow concrete masonry, and HIT HY 200 for concrete and solid or concrete filled or grout filled masonry.

.16 Cast in place Anchors for concrete: anchors of types specified herein, fabricated from corrosion-resistant materials capable of sustaining, without failure, the loads imposed within a safety factor of 4, as determined by testing as per ASTM E488, conducted by a qualified independent testing agency.
- .1 Thread or wedge type: galvanized ferrous castings, either to malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M. Provide bolts, washers, and shims as required, hot dipped galvanized conforming to ASTM A153/A153M.

.17 Shear Connectors: Nelson stud.

.18 Anchor bolts: conforming to ASTM F1554, Grade 36.

.19 Machine screws: conforming to ASME B18.6.3 (ASME B18.6.7M).

.20 Lag bolts: conforming to ASME B18.2.1 (ASME B18.2.3.8M).

.21 Wood screws: flat head, carbon steel,, conforming to ASME B18.6.1.

.22 Fasteners for security mesh frames: high strength, square head lag bolts, 10 mm x 62 mm conforming to ASTM A490M. Use lag shields when attaching into masonry.

.23 Grout: non-shrink, non-metallic grout, factory packaged, non-staining, non-corrosive, non-gaseous, grout complying to ASTM C1107, capable of developing compressive strength of 50 MPa at 28 days. Provide grout specifically recommended by manufacturer for interior and exterior applications.

.24 Concrete fill: comply with the requirements of Section 03 30 00, for normal weight, air entrained, ready mix concrete with a minimum 28 day compressive strength of 20 MPa unless indicated otherwise.

2.2 FABRICATION

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

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

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

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

2.3 FINISHES

.1 Shop galvanizing: hot dipped galvanizing with a minimum zinc coating of 600 g/m^2 to ASTM A123/A123M.

.2 Galvanizing Repair paint: high zinc dust content paint for re-galvanizing welds on steel, complying with SSPC - Paint 20.

.3 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.

.4 Shop coat primer:
- .1 Exterior: MPI-EXT 5.1H, epoxy primer.
- .2 Interior: MPI- INT 5.1TT, Rust-Inhibitive Primer W.B.

.5 Zinc primer:
- .1 Exterior: zinc rich, ready mix to MPI-EXT 5.3L.
- .2 Interior: MPI-INT 5.3N, W.B. Galvanized Primer.

2.4 ISOLATION COATING

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

2.5 FABRICATION

.1 Perform work to the highest standard of modern shop and field practice, performed by personnel specializing in this work. Accurately fit joints and intersecting members and make in true planes, with adequate fastening. Fabricate work, plumb, true, square, straight, level, accurate to sizes detailed, free from distortion or defects.

.2 File or grind and sand exposed welds, sharp edges and burrs, smooth and flush. All welds must be ground smooth and flush with adjacent surfaces.

.3 Fabricate items in accordance with CAN/CSA-S16, of sizes and profiles indicated on drawings and reviewed shop drawings, of sufficient size and strength to perform function for which they are designed with joints neatly fitted and properly secured.

.4 Shop assemble in largest practical sections for delivery to site.

.5 Provide flush butt type hairline exposed joints where mechanically fastened.

.6 Ease exposed edges to a radius of approximately 1 mm, unless otherwise indicated. Form bent-metal corners to smallest radius possible without casing grain separation or otherwise impairing work.

.7 Provide flush countersunk screws or bolts to all exposed mechanical fastenings, located consistent with design.

.8 Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

.9 Supply all components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication.

.10 Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections or other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and night time sky heat loss.
- .1 Temperature change (range): 67°C ambient; 100°C, material surfaces.

.11 Where work of other Sections is to be attached to Work of this Section, prepare work by drilling and tapping holes as required to facilitate installation of such work.

.12 Verify all dimensions on site prior to fabrication.

.13 Supply all components in ample time for construction schedule as required, for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.

.14 Thoroughly clean all surfaces of rust, scale, grease and foreign matter prior to prime painting or galvanizing.

2.6 WELDING

.1 Perform welding in accordance with the requirements of CSA W59.

.2 Perform welding inspection in accordance with the requirements of CSA W178.1 and W178.2.

.3 Perform resistance welding to CSA W55.3.

.4 Weld joints to provide adequate strength and durability with jointing tight and flush. Where it is necessary to weld components already galvanized, remove galvanizing for 50 mm around weld.

.5 Weld corners and seams to comply with the following:
- .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base materials.
- .2 Obtain fusion without undercut or overlap.
- .3 Remove welding flux immediately.
- .4 At exposed connections, finish exposed welds and surfaces smooth and blend so no roughness shows after finishing and contour of welded surfaces matches that of adjacent surfaces.

.6 Weld bar grates to ANSI/NAAMM 534-94.

2.7 SURFACE PREPARATION

.1 Thoroughly clean and suitably pretreat steel prior to finishing.

.2 Remove loose mill scale, rust, oil, grease, dirt and other foreign matter using SSPC - SP No. 6, Commercial Blast Cleaning, followed by SSPC - SP No. 1, solvent cleaning. Shop prime all commercial blast cleaned surfaces immediately after cleaning operations.

.3 Grind and sand all sharp projections smooth.

2.8 FINISHES

.1 Shop paint items, all miscellaneous metal items with the exception of those which are to be galvanized or powder coated.

.2 Prepare galvanized steel surfaces to be painted, in accordance with ASTM D6386. Locate vent holes required by the galvanizing process, on bottom side of rails or in other unexposed locations.

.3 Do prime painting to CSA-S16.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale or grease. Do not paint when temperature is lower than 7°C.

.5 After fabrication, clean, remove rust, mill scale, grease or extraneous material. Unless specified otherwise, apply to all items, in shop, a full smooth coat of primer (see materials). Work paint into corners and open spaces.

.6 Apply two (2) coats of primer to parts inaccessible after assembly.

.7 Apply one (1) coat of primer to steel surfaces except where encased in concrete. Leave these surfaces clean and uncoated.

.8 Touch-up burnt or scratched surfaces. Touch up bare or worn areas on site after installation, and apply field painting also to field-installed bolts, welds, screws, etc.

.9 Make good corrosive protection after welding where burnt by welding operations and where removed to facilitate welding operations, using 2 coats of zinc rich touch-up primer conforming to CAN/CGSB-1.181-99.

.10 Back prime with bituminous paint all aluminum surfaces in contact with concrete or masonry.

.11 Provide hot dipped galvanized finish at all exterior metal fabrications and elsewhere indicated.

.12 Use primer unadulterated, as prepared by manufacturer.

2.9 LOOSE BEARING PLATES AND LEVELLING PLATES

.1 Fabricate loose bearing and levelling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts for grouting.

2.10 STEEL LEDGE ANGLE AND LINTELS

.1 Fabricate and install steel ledger angles and lintels as detailed on the drawings and reviewed shop drawings, complete with anchors or bolts, as indicated.

.2 Fabricate and install all loose structural steel angle lintels for steel angles and shapes of sizes as indicated, for openings and recesses in masonry walls and partitions at locations, indicated.

.3 Weld adjoining members to form a single unit where indicated.

.4 Size loose steel angle lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 200 mm, unless indicated otherwise.

.5 Fabricate and install steel ledger angles and lintels to withstand all superimposed loading.

.6 Fabricate and install steel shelf angles of sizes indicated and for attachment to adjacent structure. Provide horizontally slotted holes to receive 19 mm bolts, spaced at maximum 150 mm from ends and 600 mm o.c. unless indicated otherwise.

.7 For cavity walls, provide vertical channel brackets to support angles from backup concrete and masonry. Align expansion joints in angles with indicated control and expansion joints in cavity wall exterior wythe. Install angles supported from steel supports, so that insulation and air/vapour barrier extend behind angles as detailed. Coordinate with Sections 07 21 13 and 07 27 00.01. At locations where the back up wall is steel stud framing, fabricate and install steel support framing attached to structure, to support steel angles and all superimposed loading.

.8 Provide wedge type concrete inserts, complete with fasteners, to attach shelve angles to cast in place concrete.

.9 Install level and true to line.

2.11 STEEL LADDERS

.1 Fabricate and install all ladders as detailed on the drawings and reviewed shop drawings and to meet all Alberta Building Code 2014 and National Building Code of Canada 2010 requirements and to meet all current Occupational Health and Safety Act requirements, including all appendices and to ANSI 14.3. Ladders include, but are not limited to the following:

.1 Roof Access Ladder.

2.12 ANCHOR BOLTS, LAG SCREWS, AND FASTENERS

.1 Provide anchor bolts, bolts, bolt washers and nuts, lag screws, expansion shields, toggles, straps, sleeves, brackets and fasteners where required and where indicated. Where anchor bolts remain exposed, cut off bolts flush with top of nut once the anchoring is complete.

2.13 MISCELLANEOUS FRAMING AND SUPPORTS

.1 Fabricate and install all miscellaneous steel framing and supports that are not part of structural steel framework, as necessary to complete the Work.

.2 Fabricate units from structural steel shapes, plates, and bars of welded construction, unless noted otherwise. Fabricate to sizes, shapes and profiles indicated and as necessary to receive adjacent construction retained by framing supports. Cut, drill and tap units to receive hardware, hangers, and similar items.

.1 Fabricate units from slotted channel framing where indicated.

.2 Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 32 mm wide x 6 mm thick by 200 mm long, at 600 mm o.c. unless otherwise indicated.

.3 Furnish inserts if units must be installed after concrete is place.

2.14 BOLLARDS

.1 Fabricate and install Bollards to locations indicated, using extra heavy wall galvanized steel pipe, as detailed on the drawings. Set steel pipe bollards in concrete and fill with concrete plumb and true to line; round off tops of concrete in pipe and slope concrete at top of concrete piers, away from pipe.

2.15 PRISONER/VISITOR COUNTER/DIVIDER

.1 Fabricate and install prisoner/visitor counter/divider as detailed on the drawings and reviewed shop drawings.

.2 Fabricate and install divider of 2 - 100 mm x 62 mm x 6 mm steel angles to the top and sides of the opening as detailed and anchored to the wall. Mitre and fully weld all corners. To bottom of opening, fabricate and install 75 mm x 62 mm x 6 mm steel angles as detailed, anchored to the wall.

.3 Fabricate stops for glazing of 25 mm x 20 mm solid steel bar glazing stops to perimeter, fastened to perimeter steel framing. Provide 75 mm x 6 mm steel plate screwed through plywood top to bottom steel angle framing to opening, as detailed. Fasten 25 mm x 20 mm solid steel bars to bottom plate. Unless noted otherwise, fasten all framing at maximum 300 mm o.c. and at maximum 100 mm from corners. Fasten steel bar glazing stops at maximum 200 mm o.c. and maximum 50 mm from corners. Use tamper proof, counter sunk fasteners. Coordinate installation of glazing with Section 08 80 00.

.4 Fabricate and install framing for counter, with 62 mm x 50 mm x 6 mm steel angle framing as detailed. Install level and true to line, welded to steel angle framing to perimeter of opening. Coordinate installation of plywood and plastic laminate tops and wood framing, with Section 06 40 00.

2.16 SECURITY SCREENS TO SECURE DUCTS

.1 Fabricate security screens to secure duct openings using 3 mm x 50 mm steel plate frame, with expanded mesh.

.2 Fabricate screen frames with square corners, mitred and fully welded as detailed.

.3 Weld expanded steel mesh into frames, at each point of contact.

.4 Coordinate installation of security screens to secure duct openings, with Division 23.

2.17 SIGN SUPPORTS

.1 Fabricate and install exterior steel sign supports, as detailed on the drawings and reviewed shop drawings, and to withstand all superimposed loading. Install plumb and true to line.

.2 Attach sign posts to Concrete piers, complete with steel plates welded to the bottom of the post with holes drilled into plate for attachment to concrete piers, as detailed. Install non-shrink grout between base plate and top of concrete pier as required to ensure that the posts are plumb and true to line.

.3 Provide steel caps to top of sign posts as detailed.

.4 Coordinate installation of conduit into posts, with Division 26. Coordinate installation of signage with Section 10 14 00.

2.18 FRAMING TO GARBAGE ENCLOSURE

.1 Fabricate and install garbage enclosure as detailed on the drawings and reviewed shop drawings.

.2 Fabricate and install galvanized steel HSS posts to garbage enclosure, to locations indicated. Install plumb, level and true to line. Unless noted otherwise, weld to steel plates and fasten to concrete. Coordinate with installation of concrete pad. Provide steel cap to top of all posts.

.3 Fabricate and install galvanized steel framing, welded to posts, including horizontals at tops and bottoms of panels, and cross bracing as detailed on the drawings and reviewed shop drawings. Install vertical angles attached to each post. Fabricate garbage enclosure plumb, square and true to line.

.4 Fabricate and install steel guard rail to interior of garbage enclosure, fastened to each post, at 900 mm above the concrete pad. Install level and true to line. Securely fasten in place to withstand all superimposed loading.

.5 Fabricate and install gate frames consisting of steel angle framing as specified for the fixed panels of the garbage enclosure. Fabricate gates square and true to line. Install heavy duty hardware to gates, including cane bolts with sleeves into concrete pad, and adjust as required for smooth operation.

.1 Provide each gate leaf with 3 heavy duty, 180 degree opening T hinges, of size to suit gates.

.2 Provide Canropa padlock bolt heavy duty type model #168K at midpoint of gate.

.3 Provide galvanized steel cane bolts, complete with pipe sleeves. Recess pipe sleeves into slab to receive cane bolts as detailed on the drawings.

.6 Fabricate and install garbage enclosures gates plumb, level and true to line, securely fastened in place.

.7 Install metal cladding to framing; coordinate with Section 07 42 13.

.8 Fabricate and install concrete filled bollards to garbage enclosure, as detailed and as specified in this Section.

2.19 OVERHEAD DOOR FRAMES AND SUPPORTS

.1 Fabricate overhead door frames of 6 mm bent plate galvanized steel, as detailed on the drawings. Provide 300 mm x 50 mm x 6 mm steel straps at 800 mm o.c. complete with 50 mm hooks.

.2 Fabricate all support angles and framing for overhead doors and accessories as detailed on the drawings and as required for a complete installation.

2.20 LATERAL SUPPORT TO TOPS OF CONCRETE BLOCK WALLS EXTENDING TO UNDERSIDE OF STRUCTURE

.1 Coordinate installation of angle supports at tops of concrete block partitions with Section 04 22 00.

.2 Fabricate lateral support from 75 mm x 75 mm x 3 mm steel angle, galvanized with Z275 zinc coating, or specially shaped as indicated.

.3 Use screw type fasteners (minimum 2 per angle) for fixing into concrete structure above. Use bolt type fasteners at (minimum 2 per angle) for fixing into steel structure.

2.21 BENCH SUPPORTS

.1 Fabricate and install wall mounted steel angle bench supports as detailed on the drawings. Fabricate plumb, square and true to line. Co-ordinate wood slat seats with Section 06 20 00.

2.22 COUNTER SUPPORTS

.1 Fabricate and install wall mounted steel angle counter top supports as detailed on the drawings and reviewed shop drawings. Fabricate plumb, square and true to line. Securely fasten in place to with stand all superimposed loading. Coordinate with counter tops specified in Sections 06 40 00.

2.23 MISCELLANEOUS FRAMING

.1 Where applicable, fabricate and install steel angle lateral support framing to partial height gypsum board and steel stud partitions, to withstand all superimposed loading. Weld plate to bottom of angle for attachment to slab. Ensure plate is the width of the studs or less, so that it will be concealed within the wall after gypsum board is installed. Install plumb and true to line. Coordinate with Section 09 21 16.

.2 Fabricate and install minimum 6 mm thick galvanized steel checker plate sump pit covers and oil interceptor covers complete with steel angle framing cast into the concrete. Install so that top of steel angle frame and steel checker plate is flush with adjacent concrete.

.3 Refer to structural drawings for miscellaneous metal items which are to be fabricated, supplied and installed under this Section.

.4 Fabricate all other metal fabrication items or miscellaneous metal items required to complete the project.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

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

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

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

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

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

.6 Make field connections with bolts to CSA S16 or weld field connection as detailed on the drawings and reviewed shop drawings.

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

.8 Touch-up field welds, bolts and burnt or scratched surfaces with primer after completion.

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

3.3 CLEANING

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

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

3.4 PROTECTION

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

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

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 06 40 00 - Architectural Woodwork.

1.2 REFERENCES

.1 ASTM International:
- .1 ASTM A240/A240M-15a: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM A276/A276M-15: Standard Specification for Stainless Bars and Shapes.
- .3 ASTM A480/A480M-14b: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .4 ASTM A484/A484M-15: Standard Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings.
- .5 ASTM A494/A494M-14a: Standard Specification for Castings, Nickel and Nickel Alloy.
- .6 ASTM A666-10: Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- .7 ASTM F593-13a: Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- .8 ASTM F594-09e1: Standard Specification for Stainless Steel Nuts.

.2 CSA Standards:
- .1 CAN/CSA-G40.21-13: Structural Quality Steels.
- .2 CSA W47.1-09(2014): Certification of Companies for Fusion Welding of Steel.
- .3 CSA W59-13: Welded Steel Construction (Metal-Arc Welding).

1.3 SUBMITTALS

.1 Submit shop drawings, product data and samples in accordance with Section 01 33 00.

.2 Indicate all stainless steel fabrications, including counter tops and the like.

.3 Clearly indicate profiles, fittings, sizes, connection, components, core metal thicknesses, finishes, dimensions, fabrication details, installation details, attachments, anchorage, size and type of fasteners and accessories and finishes.

.4 Include erection drawings, elevations and details where applicable.

.5 Submit four (4), 300 mm x 300 mm sample of each type of stainless steel sheet, and one of each type of fitting and fastener illustrating the quality, material and finish, to the Departmental Representative for review.

1.4 QUALITY ASSURANCE

.1 Qualifications of Welders:
  .1 Perform welding of load supporting elements by companies certified by the Canadian Welding Bureau in accordance with CSA W47.1.
  .2 Use welders qualified by the Canadian Welding Bureau for classification of work being performed.

.2 Workmanship Standards:
  .1 Welding to CSA W59.

1.5 DELIVERY/STORAGE

.1 Schedule delivery of components to site to coincide with installation of this work.

.2 Install stainless steel components, immediately upon delivery without intermediate storage on site.

.3 Do not deliver material to site until all painting has been completed.

.4 Store all stainless steel items in a dry location, off and away from ground contact to ensure that staining does not occur.

.5 Protect by a suitable means until required for installation. Brace and stack to prevent wracking, bending, twisting and all other damage.

.6 Protect work of other trades, and work of this trade, from damage of any kind.

.7 Do not enclose in plastic without ventilation.

.8 Follow special storage and handling requirements of the manufacturer.

.9 Make good or replace Work that becomes dented, misaligned or otherwise damaged, as directed by the Departmental Representative.

1.6 MAINTENANCE DATA

.1 Submit maintenance data for maintenance, cleaning and care of stainless steel components in accordance with Section 01 78 00 - Closeout Submittals.

2 PRODUCTS

2.1 MATERIALS

.1 Stainless steel sheet: all stainless steel components to be type 304 stainless steel with No. 4 (brushed) finish, except where noted otherwise.

.2 Fasteners: to ASTM A666, type 304 stainless steel, of size and capacity as indicated on the reviewed shop drawings and as required to withstand all super imposed loading and to conform with all code requirements.

.3 Isolation Coating: Alkali resistant bituminous paint or epoxy resin solution.

.4 Welding Rods: of same analysis or high chromium nickel content than metal being welded.

.5 Adhesives: high pressure bonding type, suitable for materials being bonded. Contact adhesives not acceptable.

.6 Protective Film: treated paper or clear plastic, self adhesive release type, as recommended by the architectural metal fabrications, to protect finish metals. Film to be easily removable without damaging finished surfaces.

2.2 FABRICATION/GENERAL

.1 Refer to the drawings for extent of work, quantity of items and building structure or finishes to which fabrications will be secured.

.2 Provide highest grade of Workmanship using modern Architectural shop and field practices know to recognized manufacturers specializing in this Work.

.3 Fabricate accurate to detail, clean and straight with sharply defined profiles, free from waves, buckles, distortion or other defects detrimental to appearance and performance.

.4 To curved work, fabricate work true to radii, and unless noted otherwise, smooth finished surfaces.

.5 Field joint only where indicated on the reviewed shop drawings and where acceptable to the Departmental Representative.

.6 File or grind all exposed welds and brazing smooth and flush. Repair or fill all pits, cracks and holes. Grind and polish all work to a smooth flush and even surface. Smooth all inside corners and returns.

.7 Insulated when necessary to prevent electrolysis due to metal to metal contact or metal to masonry or concrete contact. Use bituminous paint or other approved method.

.8 All joints (except where welded) to be flush hair-line butt joints, with adjoining surfaces aligned to same plane.

.9 Use extreme care in handling sheet metal and metal sections so as not to stress material or mar finishes.

.10 Fabrications to be provided and installed complete with proper anchors, fastenings, trim, closures and accessories as required to provide a fully finished installation.

2.3 SCHEDULE OF COMPONENTS

.1 Stainless Steel Counter tops:

.1 Provide 1.52 mm (16 ga), type 304 stainless steel with No. 4 finish, laminated to plywood core, with marine edges, backsplash on back and edge as follows (refer to Section 06 40 00 for plywood backing):

.1 Form edges of exposed tops into a 25 mm thick channel shape with wood inserts on all four edges of underside of top to facility anchoring to the base units.

.2 Perform welding without discolouration and grind, polish and passivate to blend harmoniously with the work surface finish.

.3 Form mechanical or filed joints to tight butt joint to top surfaces, reinforced and held in alignment with steel reinforcements.

.4 Protect the surface of the tops with strippable plastic coating to protect the tops during shipment and installation.

.5 Coordinate installation of stainless steel tops with Cabinet work specified in Section 06 40 00.

2.4 PROTECTION

.1 Cover exposed metal surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating before shipping to job site.

.2 Leave protective covering in place until final cleaning.

3 Execution

3.1 PREPARATION

.1 Prior to installation of work of this Section, examine work done under other Sections and report all discrepancies to the Engineer.

.2 Commencement of work of this Section implies acceptance of the work done by others and of existing conditions.

3.2 INSTALLATION

.1 Install all stainless steel fabrications, as indicated on the drawings and in accordance with the reviewed shop drawings.

.2 Securely install items square and level, accurately fitted and free from distortion or defects detrimental to appearance and performance.

.3 Install stainless steel counter tops as indicated on the drawings and reviewed shop drawings. Use as long lengths as possible with as few joints as possible. Locate joints where indicated on the reviewed shop drawings.

.4 All joints in counter tops are to be welded and finished to match adjacent stainless steel and are to be rendered so that they are undistiguishable from adjacent stainless steel. Coordinate installation of stainless steel counter tops to cabinet work, with Section 06 40 00.

.5 Replace items damaged in course of installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 42 48 - Cementitious Composite Panels.

.2 Section 07 52 00 - Modified Bituminous Membrane Roofing.

.3 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A307-12: Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM A653/A653M-13: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
- .3 ASTM D1761-12: Standard Test Methods for Mechanical Fasteners in Wood.
- .4 ASTM D5456-14: Standard Specification for Evaluation of Structural Composite Lumber Products.
- .5 ASTM D5582-00(2006): Standard Test Method for Determining Formaldehyde Levels from Wood Products using Desiccator.
- .6 ASTM F1667-13: Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- .7 ASTM F2403-09: Standard Specification for Inch Series Machine Screws, Carbon Steel, 60 000 psi Tensile Strength.

.2 CSA Standards:
- .1 CAN/CSA O80-Series-08(R2012) CONSOLIDATED: Wood Preservation.
- .2 CSA O112.9-10(R2014): Evaluation of Adhesives for Structural Wood Product (Exterior Exposure).
- .3 CSA O112.10-08(R2013): Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .4 CSA O121-08(R2013): Douglas Fir Plywood.
- .5 CAN/CSA O141-05(R2014): Softwood Lumber.
- .6 CSA O151-09(R2014): Canadian Softwood Plywood.
- .7 CAN/CSA-O325-07(R2012): Construction Sheathing.

.3 Codes:
- .1 ABC: Alberta Building Code 2014.
- .2 NBCC: National Building Code of Canada 2010.

.4 NLGA Standard Grading Rules for Canadian Lumber, current edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, and wood based composite panels in accordance with CSA and ANSI standards.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood products from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
.1 Board sizes: "Standard" or better grade.
.2 Dimension sizes: "Standard" light framing or better grade.

.3 Plywood, OSB and wood based composite panels: to CSA O325.

.4 Douglas fir plywood (DFP): to CSA O121, standard construction; 19 mm thickness unless indicated otherwise.

.5 Canadian softwood plywood (CSP): to CSA O151, standard construction; 19 mm thickness unless indicated otherwise.

.6 Plywood to electrical backboards: G1S fir plywood conforming to CSA O121; 19 mm thick.

2.2 ACCESSORIES

.1 Nails, spikes and staples: to ASTM F1667, galvanized for exterior work and preservative treated lumber. To locations where ACQ pressure treated lumber is used, use corrosion resistant type fasteners which are specially manufactured for use with ACQ pressure treated lumber.

.2 Screw fasteners into metal framing: stainless steel or ceramic coated galvanized steel, self drilling screws of lengths to suit application. Ensure fasteners are compatible with ACQ pressure treated wood and plywood where applicable.

.3 Rough Hardware and proprietary fasteners: bolts, nuts, toggle bolts, expansion shields, washers, lag bolts, pins, screws (hot dip) galvanized to ASTM A123/A123M where exposed to corrosive conditions, and lead or inorganic fibre plugs; recommended for purpose by manufacturer. To locations where ACQ pressure treated lumber is used, use corrosion resistant type fasteners which are specially manufactured for use with ACQ pressure treated lumber.

.4 Wood preservative: to CSA O80, alkaline copper quaternary (ACQ) content, no chromium or arsenic allowed.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.3 WORKMANSHIP

.1 Produce joints which are tight, true and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.

.2 Select individual pieces so that knots and obvious defects will not interfere with placing of bolts, or proper nailing, and will allow making of proper connections.

.3 Cut out and discard defects which render a piece of wood unable to serve its intended function.

.4 Lumber may be rejected by the Departmental Representative, whether or not it has been installed, for excess warp, twist, bow, crook, mildew, fungus, our mould, as well as for improper cutting and fitting.

.5 Do not shim any framing components.

.6 Sequence work to minimize use of temporary HVAC to dry out building and to control humidity.

3.4 PRESERVATIVE TREATMENT

.1 Pressure preservative treat wood in the following locations:
- .1 Wood in or on exterior walls.
- .2 Wood in contact with the ground.
- .3 Where indicated on the drawings.
- .4 Note: do not pressure treat or preservative treat any wood in contact with roofing membranes, air/vapour barriers and other membranes.

.2 Treat components in accordance with CSA-O80 series, and as follows:
- .1 ACQ water borne preservative treatment to S-P-F materials.

.3 Following water borne preservative treatment, dry material to maximum moisture content of 19%.

.4 Treatment for site sawn ends and edges: two brushed coats, or three-minute immersion.

.5 Treat individually all cuts or holes made after general treatment, before installation of items.

3.5 FIRE RETARDANT TREATED WOOD

.1 Fire retardant treated wood: pressure treated to CSA-O80-Series, to provide flame spread rating and smoke developed ratio to meet all Alberta Building Code 2014 and National Building Code of Canada 2010 requirements, and to the satisfaction of the Authority Having Jurisdiction.

.2 Fire retardant treat all wood members where required by Code and to the satisfaction of the Authority Having Jurisdiction.

3.6 ATTACHMENT METHODS/DEVICES

.1 Unless otherwise required, fastening methods to conform to Section 9.23 Residential Standards (Table 23A and 23B) and/or Part 4 of the Alberta Building Code 2014 and

National Building Code of Canada 2010. Minimize splitting by staggering nails in the direction of the grain and by keeping them well away from edges.

.2 Adequately mechanically fasten all wood products used in connection with roofing.

.3 Do not use explosive actuated fastening devices as a method of attachment. Use Nails only when attaching wood to wood.

.4 Only use galvanized nails where nailing is an approved method of attachment, except where ACQ treated wood is used, use corrosion resistant type fasteners which are specially manufactured for use with ACQ pressure treated lumber.

.5 When fastening wood products to concrete, brick, concrete block and similar cementitious/masonry material, use only lag bolts or similar fastening system as approved by the Departmental Representative. Install fasteners at 450 mm o.c. each way. In no case use lag bolt less than 10 mm diameter.

.6 When fastening wood products to metal decks, use only screw fasteners in a size and quantity pattern to be determined by the Departmental Representative, but in no case to less than a 300 mm o.c. each way.

3.7 MISCELLANEOUS BLOCKING, BUCKS, AND PLATES

.1 Provide blocking and plates for roofing and related sheet metal work according to indicated details. Provide wood curbs around roof penetrations, unless metal is indicated.

.2 Place members true to lines and levels and secure rigidly in place.

.3 Notch wood blocking attached to metal studs as required to accommodate stud flange returns, so that blocking will be flush with stud faces.

.4 Install plywood blocking where indicated.

.5 All blocking in fire rated assemblies is to conform to Alberta Building Code 2014 and National Building Code of Canada 2010 requirements.

.6 Install other blocking where indicated.

3.8 FURRING AND STRAPPING

.1 Provide furring and strapping where indicated and where required.

.2 Install pressure treated wood strapping vertically, attached to horizontal Z girts, behind cementitious composite panels. Securely fasten to each Z girt using specified screws. Ensure all ends occur over firm bearing.

.3 Install pressure treated wood framing attached to steel framing for garbage enclosure and gates as detailed on the drawings. Use corrosion resistant stove bolts to attach wood framing members to steel frame. Coordinate with Section 05 50 00 - Metal Fabrications.

.4 Erect plumb and level and shim as required.

3.9 PLYWOOD SHEATHING

.1 Apply wall sheathing horizontally to studs and framing, including to back side of parapets, to garbage enclosure and the like, using corrosion resistant self taping self drilling screws to metal framing and corrosion resistant nails to wood strapping, of sufficient length to penetrate through sheathing and into framing minimum 25 mm. Fasten at 150 mm o/c along edges and 300 mm o/c in the middle of the sheet. Support all edges of wall sheathing with blocking or framing.

3.10 CARPENTRY IN CONNECTION WITH ROOFING

.1 Curb all roof penetrations (except drains). Construct wood curbs for roof mounted equipment and anchors, and for roof penetrations (except drains). Curb heights measured from highest point of roof adjacent to curb to be:
.1 200 mm for plumbing vents.
.2 250 mm for all other curbs.

.2 Mechanically fasten plywood facing to parapets, and walls at roof-wall junctions.

.3 Screw top 38 mm x 89 mm plates of building control joint box to plywood sides. For roofing control joint box use nails. Leave 25 mm gap between top plate ends every 2400 mm.

.4 Attach curbs, control joint boxes, blocking and framing directly to structure.

.5 Blocking to top of concrete block parapets to be ramset at 600 mm o.c.

3.11 CURBS/ROOF DIVIDERS/CONTROL JOINTS/SLEEPERS/RELATED DESIGN DETAILS

.1 Supply and install roof dividers or control joints and as may be detailed on the drawings, at each intersection of roof directional change, and as may be required for proper performance of the work in order to ensure the roofing systems installed are not unduly subjected to expansion and contraction forces by building movement.

.2 Arrange trades so as to ensure that work of this Section is not unduly delayed or hinders the progress of the work.

.3 Provide plywood and lumber nailer plates to walls and parapets.

3.12 ELECTRICAL AND TELEPHONE EQUIPMENT BACKBOARDS

.1 Install minimum three (3) sheets of plywood mounted vertically on wall as required to accommodate electrical, telephone and communications equipment. Install electrical backboards to other electrical equipment as required.

.2 Use 19 mm thick Canadian softwood plywood/S1S or Douglas Fir plywood/G1S on 19 mm x 38 mm furring around perimeter and at maximum 300 mm oc intermediate spacing

for vertical members. Fasten to wall using screws at 400 mm oc along each framing member.

.3 Install plywood plumb, square and true to line, with all edge joints occurring over framing members.

.4 Apply intumescent paint specified in Section 09 91 23, prior to installation of electrical and telephone equipment.

3.13 MISCELLANEOUS

.1 Install bracing to masonry during construction. Install support for masonry lintels.

.2 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.3 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

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

3.14 CLEANING

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

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

3.15 PROTECTION

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

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

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications

.2 Section 06 40 00 - Architectural Woodwork

.3 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 AWI/AWMAC/WI: Architectural Woodwork Institute / Architectural Woodwork Manufacturer's Association of Canada / Woodwork Institute
.1 Architectural Woodwork Standards (Edition 2 - 2014).

.2 ASTM International
.1 ASTM D1761-12: Standard Test Methods for Mechanical Fasteners in Wood.
.2 ASTM D2832-92(2011): Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
.3 ASTM D4442-07: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
.4 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.
.5 ASTM F1667-13: Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.3 CSA Standards:
.1 CAN/CSA O141-05(R2014): Softwood Lumber (contains hardwood provisions).

.4 International Organization for Standardization (ISO):
.1 ISO 14040-2006: Environmental Management-Life Cycle Assessment - Principles and Framework.
.2 ISO 14041-2000: Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

.5 National hardwood Lumber Association (NHLA):
.1 Rules for the Measurement and Inspection of Hardwood and Cypress, V1.1, 2011.

.6 National Lumber Grading Authority (NLGA):
.1 NLGA Standard Grading Rules for Canadian Lumber (2010 edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Indicate details of construction, profiles, jointing, fastening and other related details.
.2 Indicate materials, thicknesses, finishes and fasteners.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Submit four (4), 300 mm samples of wood slats to benches.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood products from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Hardwood lumber: moisture content 15% or less in accordance:
.1 National Hardwood Lumber Association (NHLA).
.2 AWMAC custom grade, moisture content as specified.
.3 Species: select white birch species.

2.2 ACCESSORIES

.1 Wood screws: plain steel, type and size to suit application.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Do finish carpentry to to AWI/AWMAC/WI custom grade and as detailed on the drawings and reviewed shop drawings.

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:
- .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .3 Fasten wood slats to steel bench frames, from underside, so that there are no visible fasteners on the seating surfaces.

.2 Fabricate fixed wood benches to AWI/AWMAC/WI custom grade, and reviewed shop drawings. Coordinate the installation of metal frames as specified in Section 05 50 00, with the installation of wood slats. Use one length pieces per location. Evenly space slats as indicated. Ease all edges. Finish wood slats as specified in Section 09 91 23 - Interior Painting.

3.4 CLEANING

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

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

3.5 PROTECTION

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

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

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 72 00 - Stainless Steel Fabrications

.2 Section 06 20 00 - Finish Carpentry

.3 Section 06 40 00 - Architectural Woodwork

.4 Section 08 70 05 - Cabinet and Miscellaneous Hardware

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.1-2009: Particleboard.
- .2 ANSI A208.2-2009: Medium Density Fibreboard (MDF).
- .3 ANSI/HPVA HP-1-2009: American National Standards Institute/Hardwood Plywood and Veneer Association - American National Standard for Hardwood and Decorative Plywood.

.2 ASTM International
- .1 ASTM D1037-12: Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
- .2 ASTM D1761-12: Standard Test Methods for Mechanical Fasteners in Wood.
- .3 ASTM D2832-92(2011): Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .4 ASTM D3043-00(2011): Standard Test Methods for Flexural Structural Panels in Flexure.
- .5 ASTM D3500-14: Standard Test Method for Structural Panels in Tension.
- .6 ASTM D4442-07: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
- .7 ASTM D5116-10: Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .8 ASTM D5582-14: Standard Test Method for Determining Formaldehyde Levels from Wood Products using Desiccator.
- .9 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.
- .10 ASTM E1333-14: Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
- .11 ASTM F1667-13: Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.3 Canadian Plywood Association (CanPly):
- .1 Canadian Plywood Association (CanPly).

.4 CGSB Standards:
- .1 CAN/CGSB-71.20-M88: Adhesive, Contact, Brushable.

.5 CSA Standards:
- .1 CSA O112.10-08(R2013): Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .2 CSA O121-08(R2013): Douglas Fir Plywood.
- .3 CAN/CSA O141-05(R2014): Softwood Lumber (contains hardwood provisions).
- .4 CSA O151-09(R2014): Canadian Softwood Plywood.

.6 International Organization for Standardization (ISO):
- .1 ISO 14040-2006: Environmental Management-Life Cycle Assessment - Principles and Framework.
- .2 ISO 14041-2000: Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

.7 National Lumber Grading Authority (NLGA):
- .1 NLGA Standard Grading Rules for Canadian Lumber (2010 edition).

.8 NEMA Standards:
- .1 ANSI/NEMA LD-3-2005: High Pressure Decorative Laminates.

.9 AWI/AWMAC/WI: Architectural Woodwork Institute / Architectural Woodwork Manufacturer's Association of Canada / Woodwork Institute
- .1 Architectural Woodwork Standards (Edition 2 - 2014).

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

1.3 DEFINITIONS

.1 Refer to the AWI/AWMAC/WI - Architectural Woodwork Standards (Edition 2 - 2014).

.2 Definitions for exposed, semi-exposed and concealed work:
- .1 Exposed Exterior Surfaces: all exterior surfaces including:
  - .1 All surfaces visible when doors or drawers are closed, including knee spaces.
  - .2 Underside of cabinet bottoms more than 1067 mm above floor are exposed, including behind light valances, and bottom edge of light valances. Cabinet tops under 2032 mm above finish floor.
  - .3 Visible front edges of stretchers, ends, divisions, tops, bottoms, shelves and nailers.
- .2 Exposed Interior Surfaces: interior surfaces exposed to view in open casework or behind transparent (glass) including:
  - .1 Shelves including edge banding.
  - .2 Division and partitions
  - .3 Interior faces of ends (sides), backs and bottoms (including pullouts). Also included are the interior surfaces of cabinet top members 914 mm or more above the finished floor.
  - .4 Interior face of doors and applied drawer fronts.

.3 Semi-Exposed Surfaces: interior surfaces only exposed to view when the doors or drawers are opened, including:
- .1 Shelves, including edge banding.
- .2 Divisions.
- .3 Interior face of ends (sides), backs, and bottoms (including a bank of drawers). Also included are the interior faces of cabinet top members 914 mm or more above the finish floor.

.4 Concealed Surfaces: exterior or interior surfaces that are covered or not normally exposed to view, including:
- .1 Toe space unless otherwise specified.
- .2 Sleepers, web frames, dust panels, stretchers and solid sub tops.
- .3 The underside of cabinet bottoms less than 610 mm above the finished floor.
- .4 The flat top of cabinets 2032 mm or more above the finished floor, except if visible from an upper floor or building level.
- .5 The three non-visible edges of adjustable shelves.
- .6 The underside of countertops, knee spaces and drawer aprons.
- .7 The faces of cabinet ends of adjoin units that butt together.
- .8 Other surfaces not usually visible after installation.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  - .1 Scales: profiles full size, details half full size.
- .2 Indicate materials, thicknesses, finishes and hardware.
- .3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit four (4) samples of each type of substrate for plastic laminate and melamine: sample size 300 mm x 300 mm.
- .3 Submit four (4) samples of each type and colour of laminated plastic.
- .4 Submit four (4) samples of laminated plastic joints, edging, cutouts and profiles.

.5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, and wood based composite panels to CSA and ANSI standards.

1.6 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .1 Protect millwork against dampness and damage during and after delivery.
- .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect architectural woodwork from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 AWMAC custom grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Douglas fir plywood (DFP): to CSA O121, standard construction; G1S or G2S grade; 19 mm thick unless noted otherwise.

.4 Canadian softwood plywood (CSP): to CSA O151, standard construction, G1S or G2S grade; 19 mm thickness unless noted otherwise.

.5 Substrate for plastic laminate (except counter tops): conforming to Section 4 - Sheet Products, in the AWI/AWMAC/WI - Architectural Woodwork Standards (Edition 2 - 2014); one of the following:
- .1 Multi-Layer plywood: Engineered MDF composite cross banding with inner plies of voidless veneer core. Surface to be smooth, MDF ready to receive plastic laminate finish. Ensure MDF is not manufactured with binders, coatings or adhesives which contain resins or other compounds that have potential to release formaldehyde during final product's use;

.1 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.

.2 Acceptable Products:

.1 Classic Core as manufactured by Columbia Forest Products.

.2 Armor Core as manufactured by States Industries Inc.

.3 Pro-Core MDF as manufactured by Timber Products.

.2 Filled industrial grade particle board to ANSI A208.1, with minimum density of 737 kg/m^3. Ensure particle board is not manufactured with binders, coatings or adhesives which contain resins or other compounds that have potential to release formaldehyde during final product's use;

.1 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.

.3 Sheet size to be 1220 mm x 2440 mm or larger as required to produce as few joints as possible. Thickness to be 19 mm unless indicated otherwise.

.4 Note: to doors, use multi-layer plywood core. To all other locations, use either multi-layer plywood core or filled industrial grade particle board core.

.6 Substrates for Plastic laminate faced counter tops and backsplashes:

.1 Canadian softwood plywood or Douglas fir plywood to CSA O151 and CSA O121 respectively, G1S or G2S grade, 19 mm thickness unless indicated otherwise.

.7 Thermofused Melamine: to NEMA LD3 Grade VGL.

.1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).

.2 Substrates for thermofused melamine:

.1 Filled industrial grade particle board to ANSI A208.1, with minimum density of 737 kg/m^3. Ensure particle board is not manufactured with binders, coatings or adhesives which contain resins or other compounds that have potential to release formaldehyde during final product's use;

.1 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.

.3 Sheet size to be 1220 mm x 2440 mm or larger as required to produce as few joints as possible. Thickness to be 19 mm unless indicated otherwise.

.4 Colour: white.

.8 Laminated plastic for flatwork: to NEMA LD 3.

.1 Type: General purpose.

.2 Grade: HGS.

.3 Size: 1.27 mm thick.

.4 Type: multilayered.

.5 Manufacturers, colours, patterns: as selected by the Departmental Representative from the manufacturers' standard range. Note: not all colours and patterns will be from one manufacturer.

.6 Finish: matte.

.9 Laminated plastic for backing sheet: to NEMA LD 3.

.1 Type: Backer.

.2 Grade: BKH.

.3 Size: same thickness as face laminate.

.4 Colour: same colour as face laminate.

.10 Stainless Steel Counter Tops: as specified in Section 05 72 00.

.11 Nails and other fasteners: to ASTM F1667.

.12 Screws: to ASTM D1761.

.13 Bolts, nuts, washers, lags, pins and screws: of size and type to suit application. Where fasteners are exposed, use stainless steel screws with stainless steel or chrome cup washers, and space neatly and evenly to the satisfaction of the Departmental Representative.

.14 Splines: wood or metal.

.15 Sealant: in accordance with Section 07 92 00 - Joint Sealants, type 4.

.16 Laminated plastic adhesive:

.1 Adhesive: contact adhesive to CAN/CGSB-71.20.

2.2 MANUFACTURED UNITS

.1 Casework:
- .1 Fabricate caseworks to AWMAC custom]quality grade.
- .2 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.
  - .1 S2S is acceptable for all locations.
  - .2 Board sizes: "standard" or better grade.
  - .3 Dimension sizes: "standard" light framing or better grade.
  - .4 Urea-formaldehyde free.
- .3 Case bodies (ends, divisions and bottoms).
  - .1 To exposed locations: Multi-core plywood or industrial grade particle board, square edge, 19 mm thick, with plastic laminate finish.
  - .2 To semi-exposed locations: industrial grade particle board, square edge, 19 mm thick, with thermofusible melamine finish, including to all faces ends and edges.
- .4 Backs:
  - .1 To exposed locations: Multi-core plywood or industrial grade particle board, square edge, 13 mm thick, with plastic laminate finish.
  - .2 To semi-exposed locations: industrial grade particle board, square edge, 13 mm thick, with thermofusible melamine finish, including to all faces ends and edges.
- .5 Shelving:
  - .1 To exposed locations: Multi-core plywood or industrial grade particle board, square edge, 19 mm thick, with plastic laminate finish.
  - .2 To semi-exposed locations: industrial grade particle board, square edge, 19 mm thick, with thermofusible melamine finish, including to all faces ends and edges.

.2 Drawers:

.1 Fabricate drawers to AWMAC custom grade supplemented as follows:
.2 Sides and Backs.
.1 Industrial grade particle board, square edge, 13 mm thick, with thermofusible melamine finish, including to all faces ends and edges.
.3 Bottoms:
.1 Industrial grade particle board, square edge, 13 mm thick, with thermofusible melamine finish, including to all faces ends and edges.
.4 Fronts:
.1 Multi-core plywood or industrial grade particle board, square edge, 19 mm thick, with plastic laminate finish.

.3 Casework Doors:
.1 Fabricate doors to AWMAC custom grade supplemented as follows:
.2 Multi-core plywood, square edge, 19 mm thick, with plastic laminate finish.

.4 Counter Tops:
.1 Where stainless steel is indicated: provide 19 mm Douglas Fir plywood (DFP) or Softwood Plywood (CSP), G1S generally, G2S where there are no base cabinets below the counter tops. Laminate stainless steel to 19 mm thick plywood substrate; coordinate with Section 05 72 00.
.2 Where plastic laminate counter tops and backsplashes are indicated: provide 19 mm Douglas Fir plywood (DFP) or Softwood Plywood (CSP), G1S generally, G2S where there are no base cabinets below the counter tops. Apply plastic laminate to all exposed faces and edges as specified in this Section.

2.3 APPLICATION OF PLASTIC LAMINATE SURFACING

.1 Comply with NEMA LD3, Annex A.

.2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.3 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.

.5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.6 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.7 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.8 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.9 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.

.10 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.11 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.

.12 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where indicated on the reviewed shop drawings. Slightly bevel arrises.

.13 For site application, offset joints in plastic laminate facing from joints in core.

2.4 FABRICATION

.1 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.

.2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.3 Shelving to cabinetwork to be adjustable unless otherwise noted.

.4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.7 Install all cabinet hardware as specified in Section 08 70 05; adjust as required for smooth operation.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Do architectural woodwork to Quality Standards of AWMAC.

.2 Install prefinished millwork at locations shown on drawings.
.1 Position accurately, level, plumb straight.

.3 Fasten and anchor millwork securely.
.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts in countertop joints.

.5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

.7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.9 Site apply laminated plastic to units as specified in this Section.

.10 For site application, offset joints in plastic laminate facing from joints in core.

.11 Coordinate installation of stainless steel to counter tops, with Section 05 72 00.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Clean cabinet work including exterior and interior surfaces and inside of drawers.
.2 Remove excess glue from surfaces.

3.4 PROTECTION

.1 Protect cabinet work from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM Standards:
- .1 ASTM D41/D41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- .2 ASTM D449-03(2014)e1, Standard Specification for Asphalt Used in Dampproofing and Waterproofing.
- .3 CAN/CGSB-37.5-M89: Cut Back Asphalt Plastic Cement.
- .4 CGSB 37-GP-6Ma-83: Asphalt, Cutback, Unfilled, for Dampproofing.
- .5 CGSB 37-GP-9Ma: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .6 CGSB 37-GP-12Ma: Application of Unfilled Cutback Asphalts for Dampproofing.
- .7 CAN/CGSB-37.29-M89: Rubber Asphalt Sealing Compound.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-37.5-M89: Cut Back Asphalt Plastic Cement.
- .2 CGSB 37-GP-6Ma-83: Asphalt, Cutback, Unfilled, for Dampproofing.
- .3 CGSB 37-GP-9Ma: Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .4 CGSB 37-GP-12Ma: Application of Unfilled Cutback Asphalts for Dampproofing.
- .5 CAN/CGSB-37.29-M89: Rubber Asphalt Sealing Compound.

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for bituminous dampproofing application and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect dampproofing materials from damage.
- .3 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

.1 Ambient Conditions: temperature, relative humidity, moisture content.
- .1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
- .2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
- .3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.
- .4 Do not apply dampproofing in wet weather.

.2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

.3 Ventilation:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
- .2 Provide continuous ventilation during and after dampproofing application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of dampproofing installation.

2 Products

2.1 MATERIALS

.1 Asphalt:
- .1 For application and curing at temperatures above 5 degrees C: to ASTM D44 and CGSB 37-GP-6Ma.
  - .1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.

.2 Sealing compound: plastic cutback asphalt cement to CAN/CGSB-37.5.

.3 Asphalt primer: to ASTM D41 and CGSB 37-GP-9Ma.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for bituminous dampproofing application installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 WORKMANSHIP

.1 Keep asphalt within its equiviscous temperature range at place of application.

3.3 PREPARATION

.1 Before applying dampproofing:
  .1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.4 APPLICATION

.1 Do dampproofing in accordance with CGSB 37-GP-12Ma.

.2 Do sealing work in accordance with CGSB 37-GP-11M.

.3 Do priming of surface in accordance with CGSB 37-GP-15M.

.4 Apply primer to CGSB primer standard.

3.5 SCHEDULE

.1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.2 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

3.6 CLEANING

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

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

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by dampproofing application.

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
.1 ASTM C578-14, Standards Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.2 CSA Group
.1 CSA B149 PACKAGE-10, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.

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

.4 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S604-2012, Standard for Factory-Built Type A Chimneys.
.2 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for board insulation and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's during application and curing.

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

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

.5 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect all insulation materials from damage.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 INSULATION

.1 Extruded polystyrene (XPS): to CAN/ULC-S701.
- .1 Type: 4.
- .2 Compressive strength: 240 kPa.
- .3 Thickness: as indicated.
- .4 Size: 610 mm x 2440 mm.
- .5 Edges: shiplapped.
- .6 Cavity Wall Insulation: Long Term Thermal Resistance (LTTR-Value minimum) 5.706 RSI (R32.4) per 150 mm thickness.

.2 To portions of perimeter insulation which extend above grade, use insulation specified in item 2.1.1 above, except 1220 mm x 610 mm board size with factory applied 8 mm thick latex modified concrete facing. boards to have tongue and groove edges along 1220 mm edges.

2.2 ADHESIVE

.1 Adhesive (for polystyrene to foundation walls): to CGSB 71-GP-24M.
- .1 Type: 1.
- .2 Class: A.
- .3 Ensure adhesive is compatible with dampproofing.

2.3 ACCESSORIES

.1 Screwed fasteners: 6.4 mm diameter, drilled self tapping galvanized or stainless steel screw anchors complete with PVC or galvanized steel discs approximately 38 mm diameter. Screws to be long enough to penetrate through insulation and gypsum board into metal studs framing or into concrete or concrete block back-up minimum 32 mm to securely anchor system into place and to withstand all super-imposed loads.

.2 Fasteners for concrete faced insulation: purpose made galvanized steel clips and fasteners, formed to fit into grooves complete with two (2) 32 mm long corrosion resistant fasteners per clip, minimum 2 clips per panel. Where required provide 82.5 mm long corrosion resistant fasteners for surface fastening where required.

.3 Flashing for concrete faced insulation: galvanized steel flashing, 2400 mm lengths, formed in "J" profile with 57 mm x 57 mm x 100 mm minimum back face; insulation manufacturer's standard.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for board insulation application in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 type A chimneys CSA B149.1 and CSA B149.2 type B and L vents.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 BOARD INSULATION INSTALLATION

.1 Apply perimeter foundation insulation with adhesive to polystyrene with a notched trowel in accordance with manufacturer's recommendations.

.2 To locations above grade, mechanically fasten insulation with screw type fasteners, minimum 6 fasteners per board.

.3 To locations where insulation is installed to masonry faced cavity walls, fasten insulation in place with masonry ties specified in Section 04 05 19 - Masonry Anchorage and reinforcing, with minimum 6 anchors per board. Where required, supplement maosnry anchorage with screw fasteners to ensure there is a combination of minimum of 6 masonry fasteners and/or screw fasteners per board.

.4 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.4 PERIMETER FOUNDATION INSULATION

.1 Exterior application: extend boards from 150 mm below grade down to top of footing unless indicated otherwise, by adhering it with adhesive in accordance with manufacturer's recommendations.

.2 Stagger all vertical joints on insulation except free ends or line of expansion/control joints.

.3 Lay out insulation so that ends overlap minimum 100 mm and maximum of 150 mm over line of expansion/contraction joints. Leave overlapping ends of insulation unbonded over line of these joints, allowing insulation to move freely with foundation.

.4 Install board to prevent displacement. Protect insulation during backfill operations to prevent damage. Ensure complete coverage in insulation with backfill materials.

3.5 INSTALLATION/CONCRETE FACED INSULATION

.1 To all locations where perimeter foundation insulation extends above grade, install concrete faced insulation vertically, using manufacturer's recommended securement clips, 2 per board as recommended by the manufacturer. Install from top of perimeter foundation insulation (150 mm below finished grade), to underside of cavity wall insulation.

.2 Fasten all base clips without inserts to wall, position end clips 300 mm from top and bottom of the wall and the remaining clips at 610 mm oc apart.

.3 Cut two slots on tongue side of first board and insert clips with inserts into board slots. Slide board onto mounted clips until flush with corner. Fasten tongue side clip to wall. Repeat until first row of boards is complete.

.4 If subsequent rows are required, install in accordance with manufacturer's directions.

.5 Install to all walls using the same procedure.

.6 To all outside corners, install "J" flashing in accordance with manufacturer's recommendations.

.7 To all inside corners, install securement clips without inserts to hold in place the last board in a wall section and the first board of the adjacent wall.

.8 Avoid using exposed fasteners, unless there is no other way of fastening top edge of boards.

3.6 CAVITY WALL INSTALLATION

.1 Install polystyrene insulation boards on outer surface of inner wythe of wall cavity and to other location as indicated and behind all exterior cladding as detailed.

3.7 CLEANING

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

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

END OF SECTION

1 General

1.1 REFERENCES

.1 ASTM International
- .1 ASTM C553-13, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
- .2 ASTM C665-12, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .3 ASTM C1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.2 CSA Group
- .1 CSA B149 PACKAGE-10, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.

.3 Underwriters Laboratories of Canada (ULC)

.4 ULC Standards:
- .1 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .3 CAN/ULC-S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .4 CAN/ULC-S115-11, Standard Method of Fire tests for Firestop Systems.
- .5 CAN/ULC-S604-2012, Standard for Factory-Built Type A Chimneys.
- .6 CAN/ULC-S702-14, Standard for Mineral Thermal Fibre Insulation for Buildings.
- .7 CAN/ULC-S702.2-10, Mineral Fibre Thermal Installation for Building, Part 2: Application Guidelines.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:
- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect insulation materials from damage.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 INSULATION

.1 Batt and blanket mineral fibre: to ASTM C553, ASTM C665 and CAN/ULC-S702.
- .1 Type: 1.
- .2 Thickness: as indicated.

2.2 ACCESSORIES

.1 Insulation clips:
- .1 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.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys CSA B149.1 and CSA B149.2 Type B and L vents.

.5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 CLEANING

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

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

END OF SECTION

1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for foam-in-place insulation and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Submit product data including manufacturer’s written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of sprayed urethane insulation/air barrier.

.4 Submit product certificates for foam-in-place insulation, certifying compatibility of foam-in-place insulation and accessory materials with adjacent materials that connect to or that come in contact with the foam-in-place insulation; signed by the product manufacturer’s representative.

.5 Provide copies of qualification data for applicators.

1.2 ENVIRONMENTAL REQUIREMENTS

.1 Apply foam-in-place insulation only when substrate and ambient temperatures are within the prescribed limits.

.2 Ensure that the temperature is maintained throughout the curing period.

.3 The use of insulation products manufactured with CFCs and HCFCs as blowing agents is prohibited.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect foam-in-place insulation from damage.
- .3 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 51 00 - Temporary Utilities.

.2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

1.5 PROTECTION

.1 Provide temporary enclosures to prevent spray and noxious vapour from contaminating air beyond application area.

.2 Protect workers as recommended by insulation manufacturer.

.3 Protect adjacent surfaces and equipment from damage by over spray, fall-out, and dusting of insulation materials in accordance with Alberta Human Resources & Employment.

.4 Dispose of waste foam daily in location designated by Consultant and decontaminate empty drums in accordance with foam manufacturer's instructions.

2 Products

2.1 MATERIALS

.1 The use of insulation products manufactured with CFCs or HCFCs as blowing agents is prohibited.

.2 Insulation: one or two component rigid urethane foam, conforming to CAN/ULC-S705.1.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sprayed insulation application accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 APPLICATION

.1 Apply insulation to clean surfaces in accordance with manufacturer's printed instructions.

.2 Fill hollow metal door frames, overhead door frames and louvre frames, 75% full with foam-in-place insulation after air/vapour barrier membrane strip is attached but prior to installation of frames. Fill the remainder of the frame after installation, through the gap between the frame and the wall construction.

.3 Install foam-in-place insulation around all exterior aluminum curtain wall, windows and entrances to maintain continuity of the thermal barrier after air/vapour barrier has been installed and sealed to aluminum frames

.4 Ensure that foam completely fills spaces, without voids, and that foam is continuous at corners.

.5 Install foam-in-place insulation around all protrusions including mechanical and electrical protrusions and elsewhere as required to achieve and maintain continuity of thermal barrier around such protrusions.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 07 27 00.01 - Air Barriers

.3 Section 07 42 46 - Solid Phenolic Panels

.4 Section 07 42 48 - Cementitious Composite Panels

.5 Section 07 52 00 - Modified Bituminous Membrane Roofing

.6 Section 09 21 16 - Gypsum Board Assemblies

1.2 REFERENCES

.1 AATCC - American Association of Textile Chemists and Colorists.
- .1 Test Method 127 Water Resistance: Hydrostatic Pressure Test.

.2 AMMA Standards:
- .1 AMMA 2400: Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction.
- .2 AAMA 711-05: Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.

.3 ASTM Standards:
- .1 ASTM C920-14a: Standard Specification for Elastomeric Joint Sealants.
- .2 ASTM C1193-13: Standard Guide for Use of Joint Sealants.
- .3 ASTM E84-15a: Test Method for Surface Burning Characteristics of Building Materials.
- .4 ASTM E96/E96M-14: Water Vapour Transmission of Materials.
- .5 ASTM E283-04(2012): Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .6 ASTM E 2112-07: Standard Practice for Installation of Exterior Windows, Doors and Skylights.
- .7 ASTM E2178-13: Standard Test Method for Air Permeance of Building Materials.
- .8 ASTM E2357-11: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

.4 ICC-ES Standards:
- .1 ICC-ES AC 38: Acceptance Criteria for Water-Resistive Barriers.
- .2 ICC-ES AC 188: Acceptance Criteria for Roof Underlayments.
- .3 ICC-ES AC 48: Acceptance Criteria for Roof Underlayment for use in Severe Climates.

.5 TAPPI:

.1 Test Method T-410: Grams of Paper and Paperboard (Weight per Unit Area).
.2 Test Method T-460: Air Resistance (Gurley Hill Method).

.6 AWCC: Association of Wall and Ceiling Contractors/Wall & Ceiling Institute, Specification Standards Manual, 2012 (5th Edition).

1.3 SUBMITTALS

.1 Submit product data and samples in accordance with Section 01 33 00.

.2 Submit shop drawings indicating terminations and the like and sealing around other penetrations through the self adhered exterior sheathing membrane.

.3 Submit documentation from an approved independent testing laboratory certifying compliance with:
.1 The air leakage rates of the self adhered exterior membrane assembly, including primary membrane, primer and sealants have been tested to meet ASTM E2357.
.2 ICC-AC 38.
.3 Peel adhesion to unprimed plywood and cyclic and elongation per ICC-AC 48.
.4 Class A flame spread index and smoke development per ASTM E84.

.4 Submit documentation from an approved independent testing laboratory certifying the air leakage and vapour permeance rates of the self adhered exterior sheathing membranes, exceed the requirements of the National Building Code of Canada (2010) and in accordance with ASTM E2178.

.5 Provide test reports, including test results on porous substrate and include sustained wind load and gust load air leakage results.

.6 Submit manufacturers' current product data sheets for the self adhered exterior sheathing membrane system.

1.4 QUALITY ASSURANCE

.1 Submit document stating the applicator of the self adhered exterior sheathing membranes specified in this Section is authorized by the manufacturer as suitable for the execution of the Work.

.2 Perform Work in accordance with manufacturer's written instructions and this specification.

.3 Maintain one copy of manufacturer's written instructions on site.

.4 Allow access to Work site by the self adhered exterior sheathing membrane manufacturer's representatives.

.5 Source all components from one manufacturer, including self adhered exterior sheathing membrane, sealants, primers, mastics, flashings and adhesives.

.6 Single-Source Responsibility:

.1 Obtain self adhered exterior sheathing membrane materials from a single manufacturer regularly engaged in manufacturing the product.
.2 Provide products which comply with all federal, provincial, and local regulations controlling use of volatile organic compounds (VOCs).

1.5 PRE-INSTALLATION CONFERENCE

.1 One week prior to commencing Work of this Section, convene a pre-installation conference under provisions of Section 01 31 19 - Project Meetings.

.2 Ensure all Subcontractors responsible for creating a continuous plane of air tightness are present.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Refer to the current product MSDS for proper storage and handling.

.2 Deliver self adhered exterior sheathing membrane materials to the site in undamaged and original factory wrapped rolls with labels indicating:
.1 Manufacturer or trade name.
.2 Compliance with applicable standard.
.3 Material type, thickness, roll width and area.

.3 Store roll materials on end in original packaging. Protect materials from direct exposure to sunlight and physical damage.

.4 Store self adhered exterior sheathing membranes, adhesives and primers at temperatures of 5°C and rising.

.5 Keep solvent away from open flame or excessive heat.

1.7 CO-ORDINATION

.1 Co-ordinate installation of self adhered exterior sheathing membrane with work of other Sections to achieve a weather tight and air tight building envelope.

2 Products

2.1 MATERIALS

.1 Self adhered exterior sheathing membrane: water resistive, vapour permeable, air barrier membrane, consisting of tri-laminate of modified polyolefin, with 2 layers of non-woven polyethylene, self adhered. Membrane to have the following physical properties:
.1 Air leakage: <0.02L/s/m^2 @ 75Pa when tested in accordance with ASTM E2178.
.2 Water Vapour Permeance: 1658 ng/Pa.m^2.s (29 perms) to ASTM E96, Method B.
.3 Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies.
.4 Resistance to Water Penetration: Pass ICC-ES AC 38.
.5 Water Penetration Resistance around Nails: Pass when tested to AAMA 711 & ASTM D1970 modified.

.6 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84: Flame Spread Rating of 0 and Smoke Development Classification of 105.
.7 Basis Weight: Minimum 160 gm/m^2, when tested in accordance with TAPPI Test Method T-410.
.8 Tensile Strength: 182N MD and 129N CD per ASTM D828.
.9 Average Dry Breaking Force: 565N MD, and 405N CD per ASTM D 5034.
.10 Cyclic and Elongation: Pass at 100 cycles, -29 C per ICC-ES AC 48.

.2 Through-wall flashing membrane (Self-Adhering): an SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. Membrane to have the following physical properties:
.1 Membrane Thickness: 1.0 mm.
.2 Film Thickness: 0.1mm 4.0 mils.
.3 Flow (ASTM D5147): Pass @ 100°C.
.4 Puncture Resistance: 134 lbf to ASTM E 154.
.5 Tensile Strength (film): 5723 psi ASTM D882.
.6 Tear Resistance: 13lbs. MD to ASTM D1004.
.7 Low temperature flexibility: -30°C to CGSB 37-GP-56M.

2.2 PRIMERS

.1 Primer (for self adhered exterior sheathing membrane): as recommended by the manufacturer.

.2 Primer for SBS modified self-adhered membrane flashings: bituminous primer, as recommended by the membrane manufacturer.

2.3 PENETRATION & TERMINATION SEALANT

.1 Termination Sealant: as recommended by the manufacturer.

3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this Section. Notify the Departmental Representative in writing of any discrepancies. Commencement of the Work or any parts thereof means acceptance of the prepared substrates.

.2 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the membranes. Fill voids, gaps and spalled areas in substrate to provide an even plane.

.3 Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.

3.2 SURFACE PREPARATION

.1 Surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane.

.2 Ensure new concrete is cured for a minimum of 14 days and must be dry before primer for self adhered exterior sheathing membranes are applied.

.3 Ensure all preparatory Work is complete prior to applying primary self adhering exterior sheathing membrane.

.4 Set mechanical fasteners used to secure sheathing boards or penetrate sheathing boards, flush with sheathing and fastened into solid backing.

.5 Prime concrete block and gypsum sheathing substrates prior to application of self-adhering exterior sheathing membrane.

3.3 APPLICATION OF SUBSTRATE PRIMER

.1 Prime all surfaces receiving self adhered exterior sheathing membrane, and SBS Modified Self-Adhered Membranes. Do not apply more primer than that which is recommended by the manufacturer so as to create an air/vapour barrier in lieu of a breathable air barrier membrane.

.2 For the application of SBS modified self-adhered through-wall flashings and other applications of SBS modified self-adhered transition membranes, condition the substrate with applicable primer.
- .1 Apply primer at rate recommended by manufacturer to all areas to receive SBS modified self-adhering sheet membrane as indicated on drawings by roller or spray and allow to dry.
- .2 Primed surfaces not covered by self-adhering membrane or self-adhering through-wall flashing membrane during the same working day must be re-primed.

.3 Lightly prime all surfaces receiving self adhered exterior sheathing membrane, in strict accordance with manufacturer’s recommendations.
- .1 Prime all laps.
- .2 Where appropriate surface adhesion can not be achieved, prime substrate with specified primer as per Technical Data Sheet.
- .3 Prime precast concrete substrates prior to application of self-adhering exterior sheathing membrane.

3.4 INSTALLATION/INSIDE AND OUTSIDE CORNERS

.1 Seal inside and outside corners of sheathing boards with a strip of self-adhering vapour permeable membrane extending a minimum of 75 mm on either side of the corner detail.

.2 For inside corners, pre-treat the corner with a continuous 13 mm bead of termination sealant.

.3 Prime surfaces where appropriate due to surface conditions, to achieve surface adhesion as per manufacturers' instructions and allow to dry.

.4 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all side laps and 75 mm overlap at all end laps of membrane.

.5 Roll all laps and membrane with a counter top roller to ensure seal.

3.5 INSTALLATION/TRANSITION AREAS

.1 Tie-in to roofing systems, adjacent air/vapour barriers and at the interface of dissimilar materials as indicated in drawings with self-adhered air barrier transition membrane.

.2 Tie-in to parapet curbs, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhered air barrier transition membrane.

.3 Prime surfaces where appropriate due to surface conditions, to achieve surface adhesion as per manufacturers' instructions and allow to dry.

.4 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 75 mm lap to all substrates.

.5 Ensure minimum 50 mm overlap at all side laps and 75 mm overlap at all end laps of membrane.

.6 Roll all laps and membrane with a counter top roller to ensure seal.

.7 Install self adhered SBS membrane at all movement joints.

3.6 INSTALLATION/THROUGH-WALL FLASHING MEMBRANE

.1 Apply through-wall flashing membrane along the base of masonry veneer walls.

.2 Prime surfaces and allow to dry, press membrane firmly into place, over lap minimum 50 mm at all side and end laps. Promptly roll all laps and membrane to ensure the seal.

.3 Ensure applications form a continuous flashing membrane and extend up a minimum of 203 mm up the back-up wall.

.4 Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.

.5 Install through-wall flashing membrane and extend 13 mm from outside edge of veneer. Provide "end dam" flashing as detailed.

3.7 INSTALLATION/PRIMARY SELF ADHERED EXTERIOR SHEATHING MEMBRANE

.1 Apply self adhered exterior sheathing membrane to exterior side of parapets, from top of parapet and overlapping air/vapour barrier membrane minimum 200 mm and completely and continuously sealing in place. Install self adhered exterior sheathing membrane to other locations where indicated.

.2 Apply self adhered exterior sheathing membrane to exterior side of parapets, from top of parapet and overlapping air/vapour barrier membrane below parapets.

.3 Apply self-adhering exterior sheathing membrane complete and continuous to substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

.4 Prime surfaces to achieve surface adhesion as per manufacturers' instructions and allow to dry.

.5 Align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.

.6 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.

.7 Ensure minimum 75 mm overlap at all end and 50 mm side laps of subsequent membrane applications.

.8 Pressure roll all membrane surfaces, laps and flashings with a counter top roller or 'J-roller' to ensure appropriate surface adhesion.

.9 Coordinate installation of roofing membrane over parapets, so that the roofing membrane overlaps the self adhered exterior sheathing membrane minimum 100 mm. Coordinate with Section 07 52 00.

.10 Where applicable, extend self adhered exterior sheathing membrane to overlap adjacent air/vapour barrier specified in Section 07 27 00.01, minimum 200 mm and completely and continuously seal in place. Prime areas where self adhered exterior sheathing membrane laps onto air/vapour barrier of Section 07 27 00.01.

.11 At the end of each days work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel apply a feathered edge to seal termination and shed water.

3.8 APPLICATION OF TERMINATION SEALANT

.1 Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the primary self adhered exterior sheathing membrane and around the perimeter edge of membrane terminations with specified termination sealant.

3.9 FIELD QUALITY CONTROL

.1 Notify the Departmental Representative when sections of Work are complete to allow review prior to covering self adhered exterior sheathing system.

.2 Reviews: review membrane for punctures, misaligned seams and fishmouths, apply additional membrane on affected areas, extending min 150mm beyond damage areas.

.3 Coordinate proper construction of roof/wall intersections to maintain continuity.

.4 Examine completed self adhered exterior sheathing membrane systems, repair and seal break in the systems to ensure continuity and integrity.

3.10 PROTECTION

.1 Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.

.2 Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed self adhered exterior sheathing membrane installations.

.3 Self adhered exterior sheathing membrane is not designed for permanent exposure Cover as soon as possible, not to exceed 90 days.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

.1 ASTM:
  .1 ASTM E1745-11: Standard Specification for Water Vapor Barriers Used in Contact with Soil or Granular Fill under Concrete Slabs.

.2 CGSB Standards:
  .1 CAN/CGSB-51.33-M89: Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

1.3 SUBMITTALS

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

.2 Submit product data sheets for under slab sheet vapour barrier. Include:
  .1 Product characteristics.
  .2 Performance criteria.
  .3 Limitations.

.3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.

1.4 PRODUCT HANDLING

.1 Deliver all under slab sheet vapour barrier materials to the site suitably protected with the manufacturer's seals and labels intact, and store in dry locations protected from damage by weather, and construction activity. Manufacturer's labels to indicate the following:
  .1 Manufacturer or trade name.
  .2 Compliance with ASTM/CGSB standard.
  .3 Material type, thickness, roll width and area.

.2 Prior to and during installation, take all precautions and handle with due care all under slab sheet vapour barrier materials to prevent breakage, puncture, tearing and the like. Protect materials from direct exposure to sunlight.

.3 Replace under slab sheet vapour barrier materials damaged or installed in such a manner as may be detrimental to designed performance of the material in the opinion of the Departmental Representative.

2 Products

2.1 SHEET MATERIALS

.1 Under Slab Sheet Vapour Barrier: conforming to ASTM E1745, Class A, underslab vapour barrier, manufactured using a blend of virgin polyolefins; 0.38 mm thickness.

2.2 ACCESSORIES

.1 Joint sealing tape: as recommended by the Under slab sheet vapour barrier Manufacturer.

.2 Termination bars: as recommended by the manufacturer.

3 Execution

3.1 INSTALLATION/UNDER SLAB SHEET VAPOUR BARRIER

.1 Install under slab sheet vapour barrier below all slabs on grade including over horizontal polystyrene insulation below slabs on grade. Cover entire area with sheet vapour barrier.

.2 Lap joints minimum 150 mm and continuously seal with tape. Wrap under slab sheet vapour barrier up adjacent walls and vertical surfaces, minimum 100 mm. Where recommended by the manufacturer, install termination bars to attached vapour barrier to vertical surfaces, in strict accordance with manufacturer's recommendations.

.3 Protect under slab sheet vapour barrier during concrete installation and take care not to damage or displace under slab sheet vapour barrier.

3.2 CLEANING

.1 Promptly as work proceeds, and on completion, clean up and remove from premises all rubbish and surplus materials resulting from work of this Section, leaving areas in clean condition.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

.3 Section 05 50 00 - Metal Fabrications

.4 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.5 Section 07 11 13 - Bituminous Dampproofing

.6 Section 07 21 13 - Board Insulation

.7 Section 07 21 16 - Blanket Insulation

.8 Section 07 21 19 - Foam-In-Place Insulation

.9 Section 07 25 00 - Self Adhered Exterior Sheathing Membrane

.10 Section 07 26 16 - Under Slab Sheet Vapour Barrier

.11 Section 07 42 46 - Solid Phenolic Panels

.12 Section 07 42 48 - Cementitious Composite Panels

.13 Section 07 52 00 - Modified Bituminous Membrane Roofing

.14 Section 08 11 00 - Metal Doors and Frames

.15 Section 08 11 16 - Aluminum Doors and Frames

.16 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

.17 Section 09 21 16 - Gypsum Board Assemblies

1.2 REFERENCES

.1 ASTM International
- .1 ASTM E330/E330M-14: Standard for testing the Structural Performance of exterior Windows, Curtain Walls, and doors by Uniform Static Air pressure Difference.
- .2 ASTM E783-02(2010): Standard Test Method for Field Measurements of Air Leakage Through Installed Exterior Windows and Doors.
- .3 ASTM E1186-03(2009): Standard Practices for Air Leakage Site Detection in Building Envelope and Air Retarder Systems.

.4 ASTM E2357-11: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

.2 Alberta Building Code 2014 and National Building Code of Canada 2010, Part 5, Environmental Separation.

.3 Canadian Construction Materials Centre CCMC Technical Guide 07273 Air Barrier Materials.

.4 CGSB Standards:

.1 CAN/CGSB-51.33-M89: Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.5 CSC Tek Aid Digest on Air Barriers.

1.3 DEFINITIONS

.1 The air/vapour barrier for the purpose of these specifications, is a membrane which performs three functions, air barrier, moisture barrier and vapour retarder as defined below.

.2 The definition of the vapour retarder for the purpose of these specifications is a continuous membrane including joints of membrane to adjacent construction and to itself which retards the passage of moisture as it diffuses through the assembly of materials in the wall.

.3 The definition of the air barrier for the purpose of these specifications is a continuous membrane including joints of membrane to adjacent construction and to itself, which stops outside air from entering the building through the walls, windows, curtain wall, or roof, and inside air from exfiltration through the building envelope to the outside.

1.4 PERFORMANCE REQUIREMENTS

.1 Be responsible for establishing that sealing work as indicated and specified is carried out correctly and in accordance with the overall intent of this Section.

.2 The air/vapour barrier must be continuous through the building envelope. The air/vapour barrier membrane of the wall must be continuous with the air/vapour barrier of the roof air/vapour barrier.

.3 The air/vapour barrier must be adhered with some fastening at perimeter connection details, to the supporting structure to resist a peak wind load, and sustained stack effect or pressurization from ventilation equipment; it must be sufficiently rigid to resist displacement.

.1 The materials and configuration of the air/vapour barrier assembly must resist the highest expected air pressure load, inward or outward, without rupturing or detaching from the support.

.2 The assembly must not creep away from the substrate or part at a joint under sustained pressure difference.

.3 The deflection of the air/vapour barrier materials between supports must be minimized to prevent the displacement of other materials.

.4 The air/vapour barrier system (mean area plus joints) must be virtually air-impermeable.
.5 A combined air/vapour barrier system must meet the requirements of the air barrier, moisture barrier and vapour retarder functions.
.6 Use galvanized sheet steel as a substrate to support the air/vapour barrier membranes as necessary. Do not allow the galvanized material to interfere with the perimeter edge seals of the air barrier membranes.
.7 Use brake formed galvanized sheet steel as compartmentalization baffles in exterior cavity walls.
.8 The air/vapour barrier installation must be designed and installed to accommodate building movement without rupture.

.4 Building sealing comprises of the following:
.1 Prevention of entry of air and water into interior building spaces.
.2 Prevention of air leakage from inside of the building.
.3 Control of water vapour migration.

.5 Prevent interior air leakage through gaps in air/vapour barrier membrane which cause condensation or frost accumulation.

.6 Where air/vapour barriers are specified or indicated, ensure that no gaps, openings, or cracks are left. Seal all cracks, gaps, and the like, to satisfaction of the Departmental Representative.

.7 The method for prevention of air leakage is indicated or specified. Ensure that the work is carried out fully and correctly.

.8 Unless specifically noted otherwise, use only one type of self adhered air/vapour barrier throughout the project. Notwithstanding any trade scope definitions, install all air/vapour barrier specified in this Section, using only one installer for all work of this project, except at connections of air/vapour barrier tie ins to aluminum curtain wall and windows as specified in Section 08 44 13 - Glazed Aluminum Curtain Wall & Windows.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit WHMIS MSDS - Material Safety Data Sheets.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Departmental Representative.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Provide manufacturer's installation instructions indicating preparation, installation requirements and techniques, product storage and handling criteria and special installation requirements as indicated on the drawings and specified herein. Provide manufacturer's written acceptance of the selected transition membrane sheets, with regards to compatibility and adhesion.

.4 Submit confirmation that the membrane is compatible with adjacent materials.

.5 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

.6 Submit document stating the applicator of the air/vapour barrier membranes specified in this Section is authorized by the manufacturer as suitable for the execution of the Work.

.7 Perform Work in accordance with manufacturer's written instructions and this specification.

.8 Maintain one copy of manufacturer's written instructions on site.

.9 Allow access to Work site by the air/vapour barrier membrane manufacturer's representatives.

.10 Single-Source Responsibility:

.1 Obtain air/vapour barrier materials from a single manufacturer regularly engaged in manufacturing the product. Source all components from one manufacturer, including air/vapour barrier membrane, air barrier sealants, primers, mastics, flashings and adhesives.

.2 Provide products which comply with all federal, provincial, and local regulations controlling use of volatile organic compounds (VOCs).

.4 Qualifications:

.1 Applicator: The air/vapour barrier must be installed by a manufacturer's approved installer having a minimum of 2 years documented experience in the installation of the product on similar projects. The manufacturer must submit a written declaration that the air/vapour barrier installation including connection to other air/vapour barriers and membranes is done in accordance with the manufacturer's specifications and recommendations to achieve a complete air/vapour barrier.

.1 Completed installation must be approved by the material manufacturer.

.2 Applicator: company:

.1 Currently licensed by National Air Barrier Association.

.2 Must maintain their license throughout the duration of the project.

1.6 MOCK-UP

.1 Provide mock-up of air barrier materials under the provisions of Section 01 43 39.

.2 Incorporate air/vapour barrier into mockups specified in Sections 04 05 00, 07 42 46, 07 42 48 and 08 44 13.

1.7 SITE MEETINGS

.1 Before commencement of air/vapour barrier work, arrange a pre-installation conference to be attended by the General Contractor's Superintendent, representatives of the Subcontractor and suppliers of the air/vapour barrier membrane, the adjoining membranes which lap with the air/vapour barrier membrane, and the aluminum curtain wall and

entrances. Arrange this meeting only when the representative of the Departmental Representative can attend or alternatively, on a conference call with the Departmental Representative. Methods of operation, and trade responsibility will be resolved. Provide photos to the Departmental Representative, if the Departmental Representative does not attend the site meeting.

.2 Other Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
- .2 At mockup review stage.
- .3 Upon completion of Work, after cleaning is carried out.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Protect materials from direct exposure to sunlight and physical damage.

.4 Protect materials from weather by use of raised platforms and waterproof covering. Do not double stack pallets on the job site.

.5 Store mastic and liquid materials in dry area, away from high heat, open flames and sparks.

.6 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.7 Clean spills and leave area as it was prior to spill.

1.9 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.10 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

2 Products

2.1 SHEET MATERIALS

.1 Self adhered air/vapour barrier membrane: self-adhesive bitumen laminated to high-density polyethylene film, nominal total thickness of 1 mm consisting of Rubberized asphalt - 0.91 mm (36 mils) and Polyethylene Sheet - 0.10 mm (4 mils).

.2 Through wall flashing: through wall flashing membrane as recommended by the self adhered air/vapour barrier membrane manufacturer.

.3 Sheet Air/Vapour Barrier Membrane at movement joints: movement joint membrane as recommended by the air/vapour barrier membrane manufacturer.

.4 Liquid Membrane: one component elastomeric bituminous trowel or spray applied membrane having the following characteristics:
- .1 Air permeability: 0.0006/s m^2 @ 75 Pa.
- .2 Water vapour permeance: 5.0g/Pa.m^2.s. (0.08 perms).
- .3 Elongation: 500% to ASTM D412.
- .4 Liquid membrane must be compatible with air/vapour barrier membrane.

.5 Primer: bituminous primer, as recommended by the membrane manufacturer.

2.2 SEALANTS

.1 Rubber asphalt sealant: Conforming to CAN/CGSB-37.29-M89.

.2 Substrate Cleaner: non-corrosive type recommended by sealant manufacturer and compatible with adjacent materials.

2.3 ADHESIVES

.1 Mastic Adhesive: black asphalt caulking compound meeting CAN/CGSB-37.5-M89, and compatible with the membrane.

2.4 ACCESSORIES

.1 Sheet metal membrane support: Z275 designation galvanized sheet metal commercial quality conforming to ASTM A653/A653M, 0.91 mm (20 gauge) thickness.

.2 Battens: channels formed of 1.2 mm base metal thickness, Z275 designation galvanized sheet steel, commercial quality conforming to ASTM A653/A653M, 19 mm wide with 9.5 mm legs.

.3 Mechanical Fasteners: galvanized flat head screws, of type and size suitable for securing metal battens to substrate.

2.5 FABRICATION/SHEET METAL BACKING

.1 Brake form sheet metal to permit installation using self tapping, self-drilling screws or drilled anchors.

.2 Make provisions in air/vapour barrier design to accommodate movement resulting from thermal change and from structural deflection. Provide sheet metal membrane support to bridge all gaps in excess of 12 mm.

.3 Supply and install sheet metal membrane support to all locations where no other substrate occurs to support the membrane, including at all locations of through wall membrane flashing at cavities; coordinate with Sections 04 21 13 and 04 22 00 where gaps exceed 12 mm. Form return flanges or provide suitable angles, and fasten to adjacent substrates to prevent deflection movement.

.4 Form 13 mm hem on sheet metal edges overlapped with air/vapour barrier membrane, membrane flashing and waterproof membrane.

.5 Brake form sheet metal backing able to accommodate movement with continuous “V” groove to allow for expansion and contraction.

.6 Cut, fit trim and form metal air/vapour barrier supports as required to accommodate conflicting framing connections.

.7 Cut back all 90 degree corners to a 45 degree to prevent puncturing of air/vapour barrier materials with sharp edged corners.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive sealants in accordance with manufacturer's instructions.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Prime the wall and other surfaces using primer recommended by membrane manufacturer.

.3 Before installing membrane to substrate in final position, allow the membrane to relax. Position membrane without stretching.

.4 Install self-adhered membrane to manufacturer's directions. Apply a bead of sealant along edge of lower leaf of lap, if temperature or other conditions prevent satisfactory seal to the poly sheet surface.

.5 Apply heavy pressure to membrane at top and bottom terminations of each sheet, using roller as recommended by the manufacturer, to assure positive adhesion at the edge. Apply pressure over entire area, using small roller.

.6 All side laps to be minimum 65 mm and all end laps to be 150 mm minimum.

.7 Carefully plan the installation in advance to avoid excessive layering of the membrane at laps and change in direction bends that will compromise the proper installation of later materials and components. Offset laps so as not to thicken membrane.

.8 Completely adhere the entire membrane to the substrate after application of primer, and roll with a weighted roller, in accordance with the manufacturer's instructions. Install membrane to achieve smooth wrinkle free surfaces, completely bonded to the substrate, without air entrapment.

.9 Ensure complete coverage of (and adhesion to) all substrates to receive air/vapour barrier membrane, including all wall protrusions. Ensure co-operation of other trades to obtain continuity of the membrane.

.10 Wherever possible, install membrane prior to installation of Z girts, masonry anchors and the like. Where membrane is installed after ties and anchors and the like, are in place, notch membrane around ties and seal penetrations using a combination of membrane patches and rubber asphalt sealant.

.11 Apply membrane so the horizontal joints overlap with the upper sheet over the lower sheet, shingle style. Use mastic sealant where reverse lapping cannot be avoided.

.12 Inspect membrane thoroughly before covering and immediately make any corrections or modifications required. Misaligned or inadequately lapped seams, punctures, fishmouths or other damage must be repaired with patch of membrane extending minimum 150 mm in all directions from edge of damaged area. Seal all edges of the patch with mastic. Slit fishmouths prior to repair with a membrane patch.

.13 Where membrane is not otherwise mechanically held in place, fasten membrane to the substrate with vertical battens spaced 600 mm maximum centres. Place additional battens adjacent to openings, edges, and corners. Install battens and mechanical fasteners where the membrane bond width to substrate is less than 50 mm. Ensure batten occur in locations that will not be exposed in the final assemblies.

.14 Fasten battens through the membrane and gypsum board sheathing into the framing or into concrete block substrate at 300 mm centres, with the legs facing out. Bend up ends of battens and file smooth so that thermal movement will not cause end of batten to dig into membrane. Use battens in lengths not exceeding 1200 mm, and leave 25 mm gaps between ends of battens on the same alignment. Where back up substrate is gypsum sheathing and steel studs, ensure that battens are fastened through into studs or into solid blocking.

.15 Dress the membrane around corners. At all inside and outside corners, use 300 mm wide reinforcing piece of membrane strip, centred on corner, prior to installation of membrane. Cut, lap, and weld double return corners and other complicated changes of direction.

.16 Apply liquid membrane to difficult areas which do not allow for easy installation of sheet membrane. Apply liquid membrane by trowel or spray to a minimum wet thickness of 3 mm as recommended by the Manufacturer. Exercise care to ensure full contact of coating around all protrusions.

.17 Apply insulation specified in Section 07 21 13, in a timely manner, especially in cold weather, to minimize condensation at sheathing to membrane surfaces.

.18 At all movement joints, install air/vapour barrier specified for movement joints, in strict accordance with manufacturer’s recommendations, to accommodate all movement and to maintain continuity of the air/vapour barrier. Use minimum 300 mm wide strip of movement joint membrane and overlap adjacent air/vapour barrier and adjacent materials where applicable, minimum 150 mm and completely and continuously seal in place to maintain continuity of the air/vapour barrier.

3.6 INSTALLATION/METAL AIR/VAPOUR BARRIER BACK-UP

.1 Prior to installation, apply a heavy protective coating of alkali resistant bituminous paint or zinc chromate primer, to concealed surfaces of galvanized sheet steel, which come in direct contact with steel, dissimilar metals, concrete and masonry.

.2 Supply and install sheet metal membrane support to all locations where no other substrate occurs to support the membrane where gaps exceed 12 mm. Form return flanges or provide suitable angles, and fasten to adjacent substrates to prevent deflection movement.

.3 Provide membrane supports for all gaps in the substrate or between components, larger than 12 mm, or as otherwise recommended by the membrane manufacturer.

.4 Provide metal backing at junctions between different substrates as indicated.

.5 Overlap metal back-up with adjoining substrates and securely attach with fasteners appropriate for the substrate encountered. Where metal back-up is used to span deflection joints or areas where movement is anticipated between dissimilar materials, fasten metal on one side only to allow for movement. Provide continuity of air/vapour barrier with adjacent air/vapour barrier systems.

.6 Gun apply a continuous 6 mm bead of sealant at all joints and junctions with adjacent construction. Liberally butter screws fastenings with sealant. Attach sheet metal membrane supports with screws at 300 mm o.c.

.7 Cut back all sheet metal corners, and ensure that the sheet metal supports do not interfere with the perimeter edge seals of the air/vapour barrier membranes.

3.7 THROUGH-WALL FLASHING

.1 Install where indicated.

.2 Install over all door heads, curtain wall and entrance heads, louvres heads to exterior walls.

.3 At openings, extend flashing 200 mm beyond jambs.

.4 Apply continuous membrane flashing over all ledger angles or supporting sills, extending flashing up behind air/vapour barrier, and up vertical surface minimum 200 mm. Coordinate installation of flashing with installation of air/vapour barrier, so that air/vapour barrier weather laps over membrane flashing to provide a weather tight installation and to maintain continuity of the air/vapour barrier. Extend flashing horizontally over ledger angle or supporting sill, stopping maximum 10 mm from horizontal leg of ledger angle or supporting sill.

.5 Lap and fully adhere all joints and cuts. Use manufacturer’s recommended primer. Add adhered 'patches' at cuts at changes of direction, or lap separate pieces. Use mastic sealant were reverse lapping cannot be avoided.

3.8 PERIMETERS

.1 Wherever air/vapour barriers of different systems meet, such as aluminum curtain wall and windows, aluminum entrances, roofs and the like, and air/vapour barrier of this Section, ensure that the air/vapour barriers are connected to each other and completely sealed to maintain continuity.

.2 Cut corners are to prevent curling back of membrane and to prevent water migration through horizontal end laps at termination edges.

.3 Extend air/vapour barrier membrane under parapet framing to tie wall air/vapour barrier to roof air/vapour barrier. Coordinate sequencing with Steel Stud parapet framing specified in Section 05 41 00. Overlap and seal air/vapour barrier membrane over adjacent roofing air/vapour barrier membrane minimum 200 mm and completely and continuously seal in place to maintain continuity of the air/vapour barrier.

.4 Extend air/vapour barrier membrane down to minimum 150 mm below adjacent floor slabs, unless indicated otherwise and lap over bituminous dampproofing minimum 100 mm and completely and continuously seal in place. Note: ensure that bituminous dampproofing extends minimum 150 mm above adjacent grade.

.5 Ensure that a complete seal is obtained at overlap situations, and that the work is carried out in accordance with the agreements with other trades, made at the site meeting referred to in Part 1.

.6 Position lap seal over firm bearing.

.7 At heads of door, window, curtain wall and entrance frames, apply self adhered air/vapour barrier membrane strip, minimum 300 mm wide unless indicated otherwise, and sealed to adjacent frame as specified below. Then install metal flashing as detailed; coordinate with Section 07 62 00 and 08 44 13; ensure top edge of wall leg of flashing is not less than 75 mm below top edge of air/vapour barrier tie-in strip. After metal flashing is installed, extend wall air/vapour barrier over air/vapour barrier membrane tie in strip and metal flashing down to bottom of vertical leg of metal flashing and completely and continuously seal in place as detailed to maintain continuity of the air/vapour barrier.

.8 At junctions between air/vapour barrier and hollow metal door frames, overhead door frames and louvres, apply a 300 mm wide strip of membrane, sealed to the inside of the frame, prior to application of foam in place insulation. Do not remove release on unadhered portion of strip until the door frame is in place and the adjacent air/vapour barrier membrane is in place and ready to be sealed. Seal to adjacent membranes to achieve a continuous and complete air/vapour barrier.

.9 At junctions between aluminum curtain wall, windows and entrance frames and air/vapour barrier, mechanically fasten and continuously seal air/vapour barrier into glazing rabbet of frame using continuous anti-rotational channels as specified in Sections 08 11 16 and 08 44 13, form a complete and continuous air/vapour seal between the aluminum curtain wall, window and entrance framing and the air/vapour barrier. Lap over adjacent air/vapour barrier of this Section minimum 150 mm and completely and continuously seal in place. Note: connection of air/vapour barrier membrane to aluminum curtain wall, window and entrance framing is to be done under Section 08 44 00 and 08 44 23, and is the responsibility of the aluminum curtain wall, window and entrance Subcontractor. Coordinate with Sections 08 11 16 and 08 44 13.

.10 Inspect air/vapour barrier for continuity. Pay particular attention to change in direction bends, such as at windows head, sill and jamb intersections. Repair tears, punctures, rips, with pieces of membrane.

3.9 GAP SEALING

.1 At all locations where non-moving gap and joints does not exceed 12 mm, and joints are not otherwise sealed, install 'Rubber Asphalt Sealant' or other approved sealing method which is compatible with the membrane.

.2 At all moving joints and at all gaps which exceed 12 mm, use sheet metal backing as specified in this Section, to bridge gaps and then apply air/vapour barrier membrane to sheet metal backing and seal in place to maintain continuity of the air/vapour barrier.

.3 Supply and apply joint filler, expanding foam and rubber asphalt sealant as noted or required, where not specified in other Sections of the specification.

.4 Supervise the sealing work described in other Sections.

.5 Report to the Departmental Representative any aspects of the work requiring clarification or explanation.

3.10 SEALING AROUND PROTRUSIONS

.1 Coordinate the installation of air/vapour barrier membranes with the installation of foam-in-place insulation around aluminum curtain wall, window and entrances, hollow metal door frames, overhead door frames, louvres and protrusions through the exterior air/vapour barrier membrane to ensure a complete and continuous thermal barrier. Refer to Section 07 21 19. Ensure that air/vapour barrier membrane specified in this Section is compatible with foam-in-place insulation and adjoining materials.

3.11 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.2 Do not cover any portion of the air/vapour barrier installation, including foam-in-place insulation, until it has been reviewed and accepted by the Departmental Representative. Reviews of the air/vapour barrier membrane installation, before application of covering materials, is MANDATORY. There will be no exceptions.

.3 The Departmental Representative will engage a National Air Barrier Association (NABA) third party quality assurance program, based on the principles outlined in ISO 9000. Costs will be paid for by the Contractor out of the Cash Allowance specified in Section 01 21 00.

.4 Thermographic scanning of the building will be performed after the building is enclosed and heated, to detect air leakage and heat loss. Cost of initial thermographic scan will be borne by the Contractor out of the Cash Allowance specified in Section 01 21 00. Repair all defective areas discovered with the thermographic scan at no cost to the Owner.

.5 Remove cladding to access the defect area using same trade who initially installed cladding. Repair defect or gap in air/vapour barrier and reinstall cladding using original installer at no cost to the Owner.

.6 When the repairs have been completed, another thermographic scan will be done to ensure that the repairs have been properly performed and to ensure that all defects have been repaired. The cost of this thermographic scans will be borne by the Contractor (not out of the Cash Allowance).

.7 If further defects are detected, perform additional repairs, and perform an additional thermographic scan to verify that the air barrier is continuous and complete. Pay all costs of such additional repairs and thermographic scans (not out of the Cash Allowance).

3.12 CLEANING

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

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

3.13 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications

.2 Section 06 10 00 - Rough Carpentry

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B18.6.3-2011, Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series).

.2 ASTM International
- .1 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A924/A924M-14: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 CSSBI Publications:
- .1 CSSBI 20M-99: Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.
- .2 CSSBI B16-94: Prefinished Sheet Steel for Building Construction.
- .3 CSSBI S14-2000: CSSBI How to Series - Lightgauge Steel Roofing and Siding.
- .4 CSSBI S8-2001: Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
- .5 CSSBI Pub. No. 38.6-79: Metric Standard for Sheet Steel Cladding.
- .6 CSSBI Pub. No. 40.6-79: Metric Zinc Coated (Galvanized) Sheet Steel for Structural Building Products.
- .7 CSSBI Pub. No, 40.7-79: Prefinished and Post-Painted Galvanized Sheet Steel for Exterior Building Products.

.4 Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) "Architectural Sheet Metal Manual", 7th edition, Published in 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for metal cladding and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, and related work.

.4 Samples:
.1 Submit four (4), 300 mm long x full width samples of cladding material, of colour and profile specified.

1.4 QUALITY ASSURANCE

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

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect metal cladding from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 METAL CLADDING AND COMPONENTS

.1 Metal Cladding: Prepainted, hot dipped galvanized Z275 designation cold formed steel conforming to ASTM A653/A653M (current edition).
.1 Thickness: 0.61 mm base metal thickness.
.2 Profile: 300 mm wide x 40 mm deep, preformed interlocking joints, concealed fastening, installed vertically.
.3 Finish: Prefinished steel with factory applied silicone modified polyester.
.1 Colours selected by Departmental Representative from manufacturer's standard range.
.2 Specular gloss at 60°: 20 to 80 units +/- 5 in accordance with ASTM D523.
.3 Coating thickness:
.1 Top coat 0.7 to 0.8 mils
.2 Primer: 0.2 to 0.3 mils
.3 Total system: 0.9 mils to 1.1 mils.
.4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

2.2 FASTENERS

.1 Screws: ASME B18.6.3. Purpose made stainless steel.

2.3 ACCESSORIES

.1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION

.1 Install cladding in accordance with manufacturer's written instructions and as detailed on the drawings and reviewed shop drawings.

.2 Install continuous starter strips, outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

.3 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.4 Install cladding vertically in one piece lengths per location. End joints are not acceptable.

.5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.6 Attach components in manner not restricting thermal movement.

3.4 CLEANING

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by preformed metal cladding installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

.3 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.4 Section 07 21 13 - Board Insulation

.5 Section 07 25 00 - Self Adhered Exterior Sheathing Membrane

.6 Section 07 27 00.01 - Air/Vapour Barrier

.7 Section 07 42 48 - Cementitious Composite Panels

.8 Section 07 62 00 - Sheet Metal Flashing and Trim

1.2 REFERENCES

.1 ASTM International:
- .1 ASTM D792-13: Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- .2 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 European National Standards (EN):
- .1 EN 438-2: Decorative High-Pressure Laminates (HPL) Sheets Based on Thermosetting Resins. Determination of Properties.

.3 Deutches Institut fur Normung e. V. (German Standards Institute) (DIN).

1.3 SUBMITTALS

.1 Submit shop drawings, product data and samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit four samples, 100 mm x 100 mm, of each colour and thickness of material used.

.3 Submit manufacturer’s standard product data and installation instructions.

.4 Provide shop drawings indicating all materials, sizes, thickness, wall panel elevations, soffit cladding, layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colours, patterns and textures.

.5 Quality Assurance Submittals: Submit the following:

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

.2 Certificates:

.1 Qualification Certificates: Submit certificate indicating compliance with qualification requirements in Quality Assurance article.

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

.4 Manufacturer's Field Reports: Manufacturer's field reports specified herein.

.6 Professional Structural Engineer Qualifications: Engage a professional structural engineer registered in the Province of Alberta and who is experienced in providing solid phenolic panel cladding systems engineering services of the kind indicated.

.1 Engineering services are defined as those performed for installations of solid phenolic panel cladding system that are similar to those indicated for this Project in material, design, and extent.

.2 Ensure all shop drawings are signed and sealed by the professional Engineer registered in the province of Alberta.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer Qualifications: Manufacturer producing product in ISO 9001 certified facility, capable of providing field service representation during fabrication and approving application method.

.2 Obtain from a single manufacturer.

.2 Fabricator/Installer Qualifications: Use Installer who is approved by the manufacturer and experienced in performing work of similar type and scope.

.3 Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 - Project Meetings. Review methods and procedures related to solid phenolic panel cladding assemblies including, but not limited to, the following:

.1 Meet with Departmental Representative, Departmental Representative, testing and inspecting agency representative, solid phenolic panel cladding assemblies installer, solid phenolic panel cladding assemblies manufacturer's representative, structural-support installer, and installers whose work interfaces with or affects solid phenolic panels including installers of doors, curtain wall and windows, louvres and the like.

.2 Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.3 Review methods and procedures related to solid phenolic panel cladding assemblies installation, including manufacturer's written instructions.

.4 Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.

.5 Review flashings, special cladding details, wall penetrations, openings, and condition of other construction that will affect solid phenolic panel cladding assemblies.

.6 Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

.7 Review temporary protection requirements for solid phenolic panel cladding assemblies during and after installation.

.8 Review solid phenolic panel cladding assemblies observation and repair procedures after solid phenolic panel cladding assemblies installation.

.9 Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in the manufacturer’s original protective packaging with identification labels intact.

.2 Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

1.6 ACCLIMATIZATION

.1 Open all boxes and remove all components from the packaging and stacked flat with spacers between the pieces in their final environment for a minimum 3-4 days prior to installation.

1.7 PROJECT CONDITIONS

.1 Do not install material under environmental conditions where it is likely to be immersed in water for extended periods of time.

1.8 COORDINATION

.1 Field Measurements: verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

.2 Coordination: Furnish anchorage and top connection devices or material as specified.

1.9 WARRANTY

.1 For Work of this Section, 12 months warranty period is extended to 120 months.

.2 Wall panel to be warranted against delaminating, colour loss and loss of specified physical and mechanical properties of solid phenolic panel installation.

.3 The factory authorized fabricator; product installer and material manufacturer must sign the Warranty documents and submit a copy to the Contractor.

.4 Manufacturer's Warranty: Submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Departmental Representative may have under Contract Documents.

2 Products

2.1 MATERIALS

.1 Panel Description: flat panel based on thermosetting resins, homogeneously reinforced with cellulose fibers and manufactured under high pressure and temperature. The panels have a pigmented resin, decorative surface that is electron-beam cured for superior chemical and dirt resistance.

.2 Basis of design: coloured one side colour and texture as indicated on the drawings.

.3 Thickness: 10 mm.

.4 Panel Core: Standard black core.

.5 Panel Properties:
- .1 Panel Standard Sizes: as indicated on the drawings.
- .2 Panel Thickness: 10 mm.
- .3 Modulus of Elasticity: 1,200,000 psi (8000 N/mm^2) minimum per DIN 53457.
- .4 Tensile Strength: 13,000 psi (90 N/mm^2) per DIN 53455.
- .5 Flexural Strength: 16,000 psi (110 N/mm^2) minimum per DIN 53452.
- .6 Surface Impact Resistance: 9 lbf (40 N) index minimum per EN 438-2 (11).
- .7 Scratch Resistance: 0.79 lbf (3.5 N) index minimum per EN 438-2 (14).
- .8 Water Absorption: Less than 1.0% per EN 438-2 (7).
- .9 Porosity: Nonporous surface and edges.
- .10 Microbial Characteristics: Will not support microorganic growth.
- .11 Cleanability: Resists dirt pickup. Easily cleaned.
- .12 Colour Stability: 4 - 5 grey scale per ISO 105 A02-87 (3000 hr xenon lamp test)

.6 Z girts: as specified in Section 05 41 00 - Cold Formed Structural Steel Framing Systems.

2.2 ACCESSORIES

.1 Panel Corner Profile: as detailed on the drawings and reviewed shop drawings.

.2 Secondary Aluminum Channel Subframing: sizes and shapes as indicated on the reviewed shop drawings and as recommended by the manufacturer to suit installation.

.3 Secondary framing, rails and fixed brackets for concealed fastening system consisting of:
- .1 Aluminum Rails: Aluminum hanging rails, manufacturer's standard type as indicated on the reviewed shop drawings and as recommended by the manufacturer to suit installation.
- .2 Fixed Aluminum Brackets attached to back of panels; with no visible fastening on exposed faces; manufacturer's standard.

.4 J trim: prefinished metal J trim moulding, Fry Reglet or preapproved product; size as indicated on the reviewed shop drawings.

.5 Prefinished metal joint strips: continuous 100 mm wide, black prefinished metal strips behind all panel joints.

.6 Installation Materials: Provide Extruded aluminum trim colour matched, corrosion resistant screws colour matched, joint closures as required to suit project conditions.

2.3 FABRICATION

.1 Fabricate solid phenolic wall panels and accessory items in accordance with manufacturer's recommendations and approved submittals.

.2 Fabricate panels to profile indicated.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

.1 Examine all surfaces to receive solid phenolic panels, for defects.

.2 Ensure surfaces are even, smooth, sound, clean, dry and free from defects detrimental to Work.

.3 Verify substrate conditions, which have been previously installed under other Sections, are acceptable for product installation in accordance with manufacturer's instructions.

.4 Notify the Departmental Representative of surfaces which are considered unacceptable to receive the work of this Section. Commencement of work implies unconditional acceptance of the surfaces.

3.3 INSTALLATION/Z GIRTS

.1 Ensure air/vapour barrier specified in Section 07 27 00.01 is installed and has been reviewed and accepted by the Departmental Representative, prior to installation of Z girt framing.

.2 Install Z girt framing as specified in Section 05 41 00 - Cold Formed Structural Steel Framing Systems.

.3 Coordinate installation of insulation between Z girts with Section 07 21 13.

3.4 INSTALLATION

.1 Prior to application of aluminum subframing members, apply bituminous paint to all Z girt surfaces which are in contact with aluminum subframing members, to prevent electrolysis.

.2 Install vertical “J” channels spaced as indicated on the reviewed shop drawings, fastened to substrate at maximum 400 mm o.c.

.3 Install horizontal aluminum hanging rails, spaced as indicated on the drawings and reviewed shop drawings. Fasten to each vertical “J” channel at locations where they cross “J” channels. Ensure all ends of horizontal aluminum hanging rails occur over “J” vertical channel subframing members.

.4 Attach fixed clips to back side of panels, in strict accordance with manufacturer’s recommendations, and as indicated on the reviewed shop drawings. Securely fasten in place to withstand all superimposed loading and so that fasteners are not visible on exposed side of panels.

.5 Install solid phenolic wall and soffit panels using concealed fastening system by hanging panels on horizontal aluminum rails, plumb and level and accurately spaced in accordance with manufacturer’s recommendations and approved submittals and to withstand all superimposed loading. Install panels with joints at locations indicated on the reviewed shop drawings.

.6 Install phenolic panel system to sizes, configurations, patterns and layouts as indicated on the drawings and reviewed shop drawings.

.7 Install joints with closures as indicated on the drawings and reviewed shop drawings and in accordance with manufacturer’s recommendations.

.8 Compartmentalize system in accordance with NRC “Rainscreen principals” and reviewed shop drawings.

.9 Install corner profiles, gaskets and trim with fasteners appropriate for use with adjoining construction as indicated on drawings and as recommended by manufacturer.

.10 Coordinate installation of flashings with Section 07 62 00, to shed moisture to the exterior.

3.5 CLEANING

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

.2 Clean panels with standard cleaning solution. Mild solvents may be used to remove stubborn marks and dirt.

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

3.6 PROTECTION OF FINISHED WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 After installation, the protect the panels from damage. Keep the panels free from paint, plaster, cement scratches, or any other destructive forces.

.3 Do not permit adjacent work to damage work of this section.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

.3 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.4 Section 07 21 13 - Board Insulation

.5 Section 07 27 00.01 - Air/Vapour Barrier

.6 Section 07 42 46 - Solid Phenolic Panels

.7 Section 07 62 00 - Sheet Metal Flashing and Trim

.8 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

1.2 REFERENCE STANDARDS

.1 ASTM International:
- .1 ASTM D792-08: Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- .2 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Deutches Institut fur Normung e. V. (German Standards Institute) (DIN).

1.3 SUBMITTALS

.1 Submit shop drawings, product data and samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit four samples, 100 mm x 100 mm, of each colour and thickness of material used.

.3 Submit manufacturer’s standard product data and installation instructions.

.4 Provide shop drawings indicating all materials, sizes, thickness, panel elevations, layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colours, patterns and textures.

.5 Quality Assurance Submittals: Submit the following:
- .1 Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates:
.1 Qualification Certificates: Submit certificate indicating compliance with qualification requirements in Quality Assurance article.

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

.4 Manufacturer's Field Reports: Manufacturer's field reports specified herein.

.5 Installer Qualifications: Certification stating that installer is experienced in the installation of the specified products, and who has completed installations similar in extent and design with a record of successful performance.

.6 Professional Structural Engineer Qualifications: Engage a professional structural engineer registered in the Province of Alberta and who is experienced in providing cementitious composite panel cladding systems engineering services of the kind indicated.
.1 Engineering services are defined as those performed for installations of cementitious composite panel cladding system that are similar to those indicated for this Project in material, design, and extent.
.2 Ensure all shop drawings are signed and sealed by the professional Engineer registered in the province of Alberta.

1.4 MOCK-UPS

.1 Provide Mock-ups in accordance with the requirements of Section 01 45 00 - Quality Control.

.2 Construct mockup consisting of minimum 4 panels, installed to walls complete with exposed fastening system, Z girts and metal flashings, indicating construction, installation, level of workmanship, colours, textures, patterns and materials.

.3 Adjust sample installations as required to conform with the referenced standards, the drawings, and this specification, and to gain acceptance by the Departmental Representative, at no additional cost to the Departmental Representative.

.4 Accepted sample installations will become the standard for the project and may be incorporated into the Work. All cementitious composite panel work will be judged against accepted sample installation.

1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Manufacturer Qualifications: Manufacturer producing product in ISO 9001 certified facility, capable of providing field service representation during fabrication and approving application method.
.2 Obtain from a single manufacturer.

.2 Fabricator/Installer Qualifications: Use Installer who is approved by the manufacturer and experienced in performing work of similar type and scope.

.3 Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 - Project Meetings. Review methods and procedures related to cementitious composite panel cladding assemblies including, but not limited to, the following:

.1 Meet with the Departmental Representative, testing and inspecting agency representative, cementitious composite panel cladding assemblies installer, cementitious composite panel cladding assemblies manufacturer's representative, structural-support installer, and installers whose work interfaces with or affects cementitious composite panels including installers of doors, curtain wall and windows, louvres and the like.

.2 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.3 Review methods and procedures related to cementitious composite panel cladding assemblies installation, including manufacturer's written instructions.

.4 Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.

.5 Review flashings, special cladding details, wall penetrations, openings, and condition of other construction that will affect cementitious composite panel cladding assemblies.

.6 Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

.7 Review temporary protection requirements for cementitious composite panel cladding assemblies during and after installation.

.8 Review cementitious composite panel cladding assemblies observation and repair procedures after cementitious composite panel cladding assemblies installation.

.9 Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in the manufacturer's original, unopened protective packaging with identification labels intact, clearly indicating product name and manufacturer.

.2 Store materials in unopened packages, protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer, until ready for installation.

.3 Protect materials during handling to prevent damage.

1.7 ACCLIMATIZATION

.1 Open all boxes and remove all components from the packaging and stacked flat with spacers between the pieces in their final environment for a minimum 3-4 days prior to installation.

1.8 PROJECT CONDITIONS

.1 Do not install material under environmental conditions where it is likely to be immersed in water for extended periods of time.

1.9 COORDINATION

.1 Field Measurements: verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

.2 Coordination: Furnish anchorage and top connection devices or material as specified.

1.10 WARRANTY

.1 For Work of this Section, 12 months warranty period is extended to 120 months.

.2 Wall panel to be warranted against delaminating, colour loss and loss of specified physical and mechanical properties of solid phenolic panel installation.

.3 The factory authorized fabricator; product installer and material manufacturer must sign the Warranty documents and submit a copy to the Contractor.

.4 Manufacturer's Warranty: Submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Departmental Representative may have under Contract Documents.

2 Products

2.1 MATERIALS

.1 Panel Description: flat panel based on integrally coloured, cementitious composite sheet consisting of high quality Portland cement, synthetic fibres, cellulose materials and stable pigments, complete with special surface finish, sealed edges and back coating.

.2 Basis of design: integral coloured throughout, finish and colour to be as selected by the Engineer.

.3 Thickness: 13 mm.

.4 Net Cut Sheet size: 3040 mm x 1220 mm and 2500 mm x 1220 mm, or as otherwise required to suit installation.

.5 Panel Properties:

Technical Data	EU Standards	Standard
Bulk Density	2.0 - 2.4 kg/dm^3	
Modulus of Elasticity	Approx. 10,000 N/mm^2	

Bending Strength	. 18.5 N/mm^2	EN 12467, Category 4
Swelling	0.384 mm/m	
Shrinkage	0.737 mm/m	
Thermal Expansion Co-efficient	10 x 10^{-6} °K-1	DIN 51045
Dead Load/Mass per unit area (13 mm)	26 - 31.5 kg/m^2	
Building Material Class	A1 - incombustible	DIN 4102/EN13501
Temperature Stability	according to humidity up to 350°C	
Specific Heat Capacity	approx. 1.0000 Joules/kg K	
Conductivity	lambda: ca. 2.0 W/m K	
Water Impermeability	given	EN 12467
Heat-Rain-Alternate Test	given	EN 12467
Frost Resistance	given	EN12467
UV-light Resistance	light, UV colour pigments	DIN 12878
Hot Water Resistance	given	EN 12467
West Storage Resistance	given	EN12467
Joint Width	minimum 8 mm.	

.6 Fasteners: non-corrosive fasteners, of sizes and capacities to suit installation and to withstand all superimposed loading. Exposed fasteners to be manufacturer's standard rivets.

.7 Mounting: Exposed Fasteners to a Galvanized Steel Subframe.

.8 Sub Girts: as specified in Section 05 41 00 - Cold Formed Structural Steel Framing Systems.

.9 Flashing: as specified in Section 07 62 00.

.10 Black prefinished metal flashing, 100 mm wide continuous strips at all panel joints, as detailed on the drawings.

2.2 FABRICATION

.1 Fabricate cementitious composite panels and accessory items in accordance with manufacturer's recommendations and accepted submittals.

.2 Fabricate panels to profile indicated.

.3 Pre drill panels as required for exposed fasteners.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

.1 Examine all surfaces to receive cementitious composite panels, for defects.

.2 Ensure surfaces are even, smooth, sound, clean, dry and free from defects detrimental to Work.

.3 Verify substrate conditions, which have been previously installed under other Sections, are acceptable for product installation in accordance with manufacturer's instructions.

.4 Notify the Departmental Representative of surfaces which are considered unacceptable to receive the work of this Section. Commencement of work implies unconditional acceptance of the surfaces.

.5 Do not begin installation until substrates have been properly prepared.

.6 Verify compatibility of different metallic surfaces in contact with each other to protect against electro-chemical corrosion.

3.3 SUB GIRTS

.1 Coordinate installation of Z girt framing with Section 05 41 00.

.2 Shim Z girt framing as required to ensure that a finished tolerance for flatness of the panels of 1:1000 is achieved.

.3 Coordinate installation of insulation between Z girts with Section 07 21 13.

3.4 PREPARATION

.1 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

.2 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

.3 No special sealers or treatments required on exposed edges of panels

3.5 INSTALLATION

.1 Install cementitious composite wall and soffit panels using exposed fasteners, plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals and to withstand all superimposed loading. Install panels with joints at locations indicated on the reviewed shop drawings. Evenly space fasteners as indicated on the reviewed shop drawings.

.2 Provide ventilated minimum airspace of 19 mm between the face of the insulation and the back surface of the panels. Provide a minimum gap of 10 mm between panels is also required along all perimeter edges. Install as per manufacturer's installation instructions.

.3 Install cementitious composite panel system to sizes, configurations, patterns and layouts as indicated on the Drawings and reviewed shop drawings. Install with exposed fasteners, spaced as indicated on the reviewed shop drawings and to support all superimposed loading.

.4 Install joints with closures as indicated on the drawings and reviewed shop drawings and in accordance with manufacturer's recommendations.

.5 Compartmentalize system in accordance with NRC "Rainscreen principals" and reviewed shop drawings.

.6 Coordinate installation of flashings with Section 07 62 00, to shed moisture to the exterior.

3.6 CLEANING

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

.2 Clean panels with standard cleaning solution. Mild solvents may be used to remove stubborn marks and dirt.

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

3.7 PROTECTION OF FINISHED WORK

.1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.

.2 After installation, the protect the panels from damage. Keep the panels free from paint, plaster, cement scratches, or any other destructive forces.

.3 Do not permit adjacent work to damage work of this section.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry

.2 Section 07 27 00.01 - Air/Vapour Barrier

.3 Section 07 62 00 - Sheet Metal Flashing and Trim

.4 Section 07 72 33 - Roof Access Hatch

.5 Section 07 92 00 - Joint Sealing

.6 Division 22 - Roof drains, vents, and flashings

.7 Division 23 - Counter flashing for mechanical equipment

1.2 REFERENCES

.1 ARCA: Alberta Roofing Contractors Association Manual.

.2 ASTM International Inc.
- .1 ASTM C1177/C1177M-13: Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .2 ASTM C1396/C1396M-14a: Standard Specification for Gypsum Board.
- .3 ASTM C1289-15: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .4 ASTM D6162-00a(2015)e1: Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
- .5 ASTM D6163-00(2015)e1: Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- .6 ASTM D6164/D6164M-11: Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.3 Canadian General Standards Board (CGSB)
- .1 CGSB 37-GP-56M plus Amendments No. 1 and 2 dated October 1985: Standard for Membrane, Modified, bituminous, Prefabricated and Reinforced for Roofing.
- .2 CAN/CGSB-51.33-M89: Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.4 Canadian Standards Association (CSA International)
- .1 CSA A123.21-14: Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems.

.5 CSC TEK.AID REFERENCE on Modified Bituminous Roofing 1993.

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

.1 Material Safety Data Sheets (MSDS).

.7 Underwriters Laboratories' of Canada (ULC)
.1 CAN/ULC-S101-14: Fire Endurance Tests of Building Construction and Materials.
.2 CAN/ULC-S107-10: Fire Tests of Roof Coverings.
.3 CAN/ULC S701-11: Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.4 CAN/ULC-S704-11: Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning roofing Work, with roofing contractor's representative, Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and indicate VOC content for:
.1 Primers.
.2 Asphalt.
.3 Sealers.
.4 Filter fabric.

.3 Provide shop drawings:
.1 Indicate flashing, control joints, tapered insulation details.

.2 Provide layout for tapered insulation.

.4 Samples: submit four (4) samples 300 mm x 300 mm long pieces of each type of insulation.

.5 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.6 Test and Evaluation Reports: submit laboratory test reports certifying compliance of membrane with specification requirements.

.7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.8 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.

.9 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.5 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems approved by manufacturer with 5 years documented experience.

1.6 FIRE PROTECTION

.1 Fire Extinguishers:
- .1 Maintain one stored pressure rechargeable type with hose and shut-off nozzle,
- .2 ULC labelled for A, B and C class protection.
- .3 Size 14 kg on roof per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.7 DELIVERY, STORAGE, AND HANDLING

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

.2 Storage and Handling Requirements:
- .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of membrane in upright position. Store membrane rolls with salvage edge up.
- .4 Remove only in quantities required for same day use.
- .5 Place plywood runways over completed Work to enable movement of material and other traffic.
- .6 Store sealants at +5 degrees C minimum.
- .7 Store insulation protected from daylight and weather and deleterious materials.

1.8 SITE CONDITIONS

.1 Ambient Conditions
- .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or to manufacturers' recommendations.
- .2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.9 WARRANTY

.1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing , 12 months warranty period is extended to 60 months.

2 Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

2.2 DECK COVERING

.1 Glass Matt faced Gypsum sheathing: to ASTM C1177/C1177M, glass matt faced silicone treated core gypsum board, as recommended by the roofing membrane manufacturer; 12.7 mm thick.

2.3 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9Ma and as recommended by the membrane manufacturer.

2.4 AIR/VAPOUR BARRIER

.1 Self adhesive air/vapour barrier modified bitumen membrane, of type as recommended by the roofing membrane manufacturer.

2.5 MEMBRANE

.1 Base sheet: to CGSB 37-GP-56M, polyester fibres to ASTM D6164 or glass fibres to ASTM D6163.
  .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, non-woven fibreglass reinforcement or 180 g/m^2 non-woven polyester reinforcement, 2.6 mm to 3 mm thickness.

  .2 Type 2, fully self adhered.
  .3 Class C - plain surfaced.
  .4 Grade 2 - heavy duty service.
  .5 Top and bottom surfaces:
    .1 Thermofusible plastic film/self adhering with release paper.
  .6 Base sheet membrane properties: to CGSB 37-GP-56M.
    .1 Strain energy (longitudinal/transversal): 8.4/8.3 kN/m.
    .2 Tensile strength (longitudinal/transversal): 18/16 N/5 cm.
    .3 Ultimate elongation (longitudinal/transversal): 55/56 %.
    .4 Tear resistance: 12 N.

.5 Cold bending at -30 degrees C : no cracking.
.6 Softening point: ≥ 110 degrees C.
.7 Static puncture resistance: 380.
.8 Dimensional Stability: 0.1 / 0.4 %.

.7 ULC certification: Class A.

.2 Cap sheet membrane: to CGSB 37-GP-56M polyester fibres to ASTM D6164.
.1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, polyester reinforcement, having nominal weight of 250 g/m^2, 4 mm thickness.
.2 Type 1, fully adhered.
.3 Class A-slate granule surfaced.
.4 Grade 2-heavy duty service.
.5 Bottom surface: thermofusible plastic film.
.6 Top surface slate granules, colour to be as selected by the Departmental representative from the manufacturer's standard range. Note: use a different coloured granule to roof walkways.
.7 Cap sheet membrane properties: to CGSB 37-GP-56M.
.1 Strain energy (longitudinal/transversal): 10/10 kN/m.
.2 Breaking strength (longitudinal/transversal): 18/16 kN/m.
.3 Ultimate elongation (longitudinal/transversal): 60/65 %.
.4 Tear resistance: 75 N.
.5 Cold bending at -30 degrees C: No cracking.
.6 Softening point: ≥ 110 degrees C.
.7 Static puncture resistance: 420.
.8 Dimensional Stability: -0.8 / -0.2 %.
.8 ULC certification: Class A.

2.6 ADHESIVE

.1 Adhesive (for insulation and roof underlay board over air/vapour barrier): as recommended by the manufacturer and as approved by ARCA to withstand all superimposed loading, including wind uplift and meeting the requirements of CAN/CSA-A123.21. Ensure adhesive is compatible with insulation, air/vapour barrier and roof underlay board.

2.7 OVERLAY BOARD

.1 Overlay Board: glass faced gypsum roof board conforming to ASTM C1177/C1177M, 12.7 mm thickness, 1220 mm x 2440 mm sized sheets, acrylic coated and glass mat surfacing, moisture resistant; as acceptable to the roofing membrane manufacturer.
.1 Install over insulation to provide torch safe surface.

2.8 TAPERED EXPANDED POLYSTYRENE INSULATION

.1 Tapered Rigid polystyrene insulation: conforming to CAN/ULC-S701, taper sloped to achieve roof backslopes as indicated, square edges, polystyrene board type 2, Class B. Bead board, density approximately 16 kg/m^3.

2.9 POLYISOCYANURATE INSULATION

.1 Polyicocyanurate Insulation: conforming to CAN/ULC-S704, rigid roof insulation board consisting of a polyisocyanurate foam core bonded chemically in the manufacturing process to glass fibre and other facings which are compatible to roofing membrane, 25 lb density; aged RSI value of 1.06 per 25.4 mm thickness; thickness as indicated. Install in maximum 50 mm thick layers, to achieve RSI value as indicated on the drawings. All insulation supplied for this project must have 3rd party certification that it meets the requirements of CAN/ULC-S704, type 2, Class 3. Ensure that insulation is date stamp on date of manufacture, and that the insulation is not installed until 3 months after it has been manufactured. Provide minimum 50 mm thickness of polyisocyanurate on to top layer of all insulation assemblies.

.2 Determine Long Term Thermal Performance (LTTR) of polyisocyanurate insulations in accordance with CAN/ULC-S770.

2.10 SEALERS

.1 Plastic cement: asphalt.

.2 Sealing compound: rubber asphalt type.

.3 Sealants: see Section 07 92 00 - Joint Sealants.

2.11 WALKWAYS

.1 Walkways to consist of one additional ply of cap sheet membrane. Colour to be different from field membrane as selected by Departmental Representative.

2.12 CARPENTRY

.1 Refer to Section 06 10 00 - Rough Carpentry.

2.13 FASTENERS

.1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.

3 Execution

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and Alberta Roofing Contractors Association Manual.

.2 Do priming in accordance with manufacturers written recommendations.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material plywood providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:
  .1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment:
  .1 Prior to beginning of work ensure:
    .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
    .2 Curbs have been built.
    .3 Roof drains have been installed at proper elevations relative to finished roof surface.
    .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 PREPARATION OF STEEL DECK (CHANNEL TYPE)

.1 Steel decking will be treated with rust proofing or galvanization.

3.5 DECK SHEATHING

.1 Mechanically fasten to steel deck Glass Mat Gypsum Board with screws to steel deck's upper rib surfaces, spaced 400 mm on centre each way and to meet the requirements of CAN/CSA-A123.21.

.2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

3.6 PRIMING DECK

.1 Apply deck primer to glass mat gypsum board roofing substrate at the rate recommended by manufacturer.

3.7 AIR/VAPOUR BARRIER

.1 Before installing membrane to substrate in final position, allow the membrane to relax. Position membrane without stretching.

.2 Install self-adhered membrane to manufacturer's directions. Apply a bead of sealant along edge of lower leaf of lap, if temperature or other conditions prevent satisfactory seal to the poly sheet surface.

.3 Apply heavy pressure to membrane at top and bottom terminations of each sheet, using roller as recommended by the manufacturer, to assure positive adhesion at the edge. Apply pressure over entire area, using small roller.

.4 All side laps to be minimum 65 mm and all end laps to be 150 mm minimum.

.5 Carefully plan the installation in advance to avoid excessive layering of the membrane at laps and change in direction bends that will compromise the proper installation of later materials and components. Offset laps so as not to thicken membrane.

.6 Completely adhere the entire membrane to the substrate after application of primer, and roll with a weighted roller, in accordance with the manufacturer's instructions. Install membrane to achieve smooth wrinkle free surfaces, completely bonded to the substrate, without air entrapment.

.7 Ensure complete coverage of (and adhesion to) all substrates to receive air/vapour barrier membrane, including all wall protrusions. Ensure co-operation of other trades to obtain continuity of the membrane.

.8 Apply membrane so the horizontal joints overlap with the upper sheet over the lower sheet, shingle style.

.9 Overlap wall air/vapour barrier membrane minimum 150 mm and completely and continuously seal in place to maintain continuity of the air/vapour barrier at wall/roof junctions. Coordinate with Section 07 27 00.01.

.10 Inspect membrane thoroughly before covering and immediately make any corrections or modifications required. Misaligned or inadequately lapped seams, punctures, fishmouths or other damage must be repaired with patch of membrane extending minimum 150 mm in all directions from edge of damaged area. Seal all edges of the patch with mastic. Slit fishmouths prior to repair with a membrane patch.

3.8 INSTALLATION/INSULATION (FULLY ADHERED)

.1 Insulation: fully adhered, adhesive application:

.2 Install insulation over air/vapour barrier, fully adhered over air/vapour barrier membrane in accordance with manufacturer's directions, using manufacturers and ARCA recommended adhesive and to meet CSA A123.21 and ARCA wind uplift requirements.

.3 Install sloped polystyrene insulation over air/vapour barrier as indicated, to provide positive slopes to drains in accordance with the reviewed shop drawings and in accordance with manufacturer's specifications and recommendations to achieve uniform slopes to drains. Follow numbering of insulation boards corresponding to the manufacturer's shop drawing for location of boards. Place boards with joints in line each way.

.4 Cut and trim insulation boards to provide plain butt joints at perimeter, parapet, curbs and the like. Lay insulation boards in parallel courses, butted together in moderate contact without gaps, with staggered end joints.

.5 Install flat insulation over tapered insulation, in maximum 50 mm thickness layers to achieve total thickness indicated on the drawings. Stagger joints of flat insulation from joints in sloped insulation below. Fully adhere each layer of insulation using specified adhesive, in accordance with manufacturer's directions, using manufacturers and ARCA recommended adhesive and to meet CSA A123.21 and ARCA wind uplift requirements.

.6 Lay multiple layers of insulation with joints offset minimum 300 mm from underlying layer.

.7 Fill gaps over 10 mm wide, with foam in place insulation.

.8 Install fibreglass faced gypsum board insulation overlay board over all roof insulation. Lay fibreglass faced gypsum board in parallel courses with the end joints staggered a minimum of 300 mm. Apply fibreglass faced gypsum insulation overlay board, butt ends and edges tightly together ensuring complete coverage of insulation and providing a sound uniform surface for membrane application. Use the same care in installation as specified for insulation. Fully adhere each layer of fibreglass faced gypsum board insulation overlay board in accordance with manufacturer's directions, using manufacturers and ARCA recommended adhesive and to meet CSA A123.21 and ARCA wind uplift requirements.

3.9 INSTALLATION/ROOFING MEMBRANE - GENERAL

.1 Install two ply prefabricated and elastomeric bituminous membrane to roof surfaces.

.2 Provide a smooth applications, free of air pockets, wrinkles, fishmouths and tears. Provide a 6 mm bleed out to ensure seal at laps.

.3 Seal around all protrusions through the roof membrane including in accordance with manufacturer's recommendations to form a waterproof seal.

3.10 INSTALLATION/SELF ADHERED BASE SHEET

.1 Ensure that substrates are dry, smooth, even, fully adhered, and primed where required.

.2 Start at slope bottom, unroll each roll dry onto insulation overlay board. Do not immediately remove protective film on paper. Let stand for a few minutes before re-rolling.

.3 Where adhesive is site applied, apply adhesive to insulation overlay board at rate as recommended by the manufacturer. Spread adhesive to areas which can be covered with membrane within the open time allowable for the adhesive. Ensure that membrane is completely adhered to insulation overlay substrate.

.4 Once aligned, re-roll both ends towards the centre.

.5 Using the tip of a sharp blade, cut through surface of protective film without cutting membrane.

.6 Remove small length of protective film and unroll exposed membrane for initial adherence. Continue removing protective film and advance roll onto insulation overlay board deck. Ensure surface remains smooth. Avoid wrinkling or warping. If roll is not properly aligned, do not push to one side or another. Instead, cut roll and realign properly. Overlap end joints minimum 150 mm.

.7 Overlap adjacent rolls 80 mm by removing protective film from top face of side laps. Do not remove protective film before installation, to avoid accumulation of any debris on exposed roll. Overlap all end joints by 150 mm. Stagger end laps minimum 300 mm.

.8 Complete base sheet adhesion to insulation overlay board by rolling over the entire surface as it is installed with 34 kg rollers; roll along each centre and each overlap and finish along sides by aligning roller edge to lower part of overlap. Watch for air pockets beneath end joints. Do not lance; instead, roll air toward edge of seams. Torch weld all parts of overlaps not coated with self adhesive bitumen.

.9 End self-adhesive base sheet a minimum 25 mm along vertical face of upstands.

.10 Obtain review of the base membrane by the roofing inspector prior to placement of any cap sheet.

3.11 INSTALLATION/BASE STRIPPING

.1 Before primer application, remove thin poly film on surface of base sheet with a light torch to prepare surface for overlap zone of self-adhesive membrane.

.2 Apply base sheet flashing only once primer coat is dry.

.3 Install fireguard tape in strict accordance with ARCA requirements.

.4 Install base sheet flashing in metre widths and lapped 100 mm onto roof base sheet. Overlap side laps by 75 mm. Stagger side laps by at least 225 mm from base sheet overlaps on roof to avoid excessive layering.

.5 Continue length of membrane to run up adjacent plywood sheathing and over the top of parapet or curb and down opposite vertical face.

.6 At parapets, extend the flashing base sheet, across the top, flat portion of the parapet and extending 50 mm down the outside wall.

.7 Partially remove release sheet from underside and adhere at vertical junction with membrane pressed tightly into angle changes. Continue to remove release sheet while smoothing membrane onto substrate and ensuring uniform contact. Use a roller over entire surface to complete application.

.8 Nail membrane to substrate with round-top nails according to ARCA guidelines.

.9 Install membrane gussets at all inside and outside corners. Heat membrane surface and press gusset into place.

.10 Torch and trowel membrane edges on vertical and horizontal overlaps to complete waterproof seal.

3.12 INSTALLATION/CAP SHEET (TORCH APPLIED)

.1 Install the cap sheet no later than seven (7) days from the date of installation of base membrane, unless otherwise directed by the Departmental Representative. Do not leave any portion of the base membrane exposed without cap sheet for longer than the specified time.

.2 Do not leave any portion of the base membrane exposed without cap sheet for longer than the specified time.

.3 Prior to cap sheet application, have the manufacturers representative inspect and approve base sheet and base flashing application.

.4 Lay rolls such that minimum end lapping is achieved, throughout the work. Use full rolls wherever possible to reduce to a minimum end laps.

.5 Over the membrane base sheet, fully torch the membrane cap sheet. Lap side joints 90 mm and end joints 150 mm. Stagger end joints and stagger joints between plies of membrane so that at no location will the distance between joints of the bottom ply and the top ply be minimum 300 mm. Stagger end laps no less than 1800 mm.

.6 Torch apply cap sheet in straight even rows, and in the same direction as the base membrane, using torches approved by the membrane manufacturer, and approved mechanics. Ensure that torch heat is sufficient to totally bond cap sheet to base membrane but not so hot as to excessively liquidize, melt, leach out or oxidize the bitumen.

.7 Ensure that the cap sheet selvage is fully covered by each adjacent cap sheet. Exposed selvage is considered a deficiency.

3.13 CAP SHEET STRIPPING

.1 Upon completion of cap sheet install cap sheet stripping.

.2 Do not exceed 1 m width for stripping.

.3 Install one ply of stripping using a self adhered membrane to the vertical surfaces, down to bottom of vertical surface, and extending onto the flat of the roof a minimum of 150 mm from the bottom of the vertical surface.

.4 Stagger joints of the flashing cap sheet and membrane cap sheet a minimum of 300 mm.

.5 Terminate cap sheet stripping a minimum of 75 mm onto top of parapet. Trowel seal leading edge of membrane. Extend cap sheet stripping up vertical surfaces no less than 200 mm, and wrap over curbs, parapets, roof edges, and the like. Lap side joints no less than 75 mm. To walls around roof hatch locations and the like, extend cap sheet stripping to top of wall.

.6 Nail through the top of the completed flashings where indicated, using large head galvanized nails at 150 mm oc. Locate nails not closer than 50 mm from the top edge of membrane flashings.

.7 Ensure the cap sheet stripping selvage is fully covered by each adjacent cap sheet stripping. Exposed selvage is considered a deficiency.

3.14 EXPANSION JOINTS

.1 Construct expansion joints as detailed on the drawings, using expansion joint membrane specified. Install in strict accordance with manufacturer’s recommendations.

3.15 INSTALLATION/ROOF DRAINS, VENTS & FLASHINGS

.1 Supply roof drains, vents and flashings, set in place and connected as part of the work specified under Division 22.

.2 Ensure the drain outlet will not be above the general level of the completed roof membrane and will permit drainage of all water from the roof.

.3 Use base sheet drain cover patch for flashing roof drains.

.4 Prime top surface of flange or metal flashing and allow 24 hours to dry.

.5 Set flange or metal flashing in manufacturer's recommended adhesive and secure in place.

.6 Over flange or metal flashing, apply 1 m square of flashing base sheet (centered over drain or protrusion) and fully torch in place.

.7 Caulk between the plies and the clamping ring with flexible seal caulking.

.8 Apply a bead of flexible seal caulking between the membrane and the metal flashing to direct water away from the joint.

3.16 WALKWAYS

.1 Apply manufacturer's recommended primer onto surfaces of cap sheets within boundaries of walkway membrane.

.2 Install walkways consisting of an extra layer of cap sheet with a accent coloured of granule as selected by the Departmental Representative. Torch on the extra cap sheet to all areas where walkways are indicated. Walkways are to be of a uniform width of minimum 760 mm unless indicated otherwise, and are to be straight and true to line.

3.17 FIELD QUALITY CONTROL

.1 Inspections:

.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
.2 Departmental Representative will pay for tests as specified in Section 01 45 00 - Quality Control.
.3 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.

3.18 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

.3 Section 04 23 00 - Glass Unit Masonry

.4 Section 07 25 00 - Self Adhered Exterior Sheathing Membrane

.5 Section 07 27 00.01 - Air/Vapour Barrier

.6 Section 07 42 46 - Solid Phenolic Panels

.7 Section 07 42 48 - Cementitious Composite Panels

.8 Section 07 52 00 - Modified Bituminous Membrane Roofing

.9 Section 07 92 00 - Joint Sealing

.10 Section 08 11 00 - Metal Doors and Frames

.11 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Alberta Roofing Contractors Association (ARCA)
.1 Roofing Specifications Manual.

.3 Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) "Architectural Sheet Metal Manual", 7th Edition, Published in 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:

.1 Submit shop drawings for flashing detail acceptance, before commencement of work of this type. Indicate all joint types, brake shape configurations, lengths, joint locations, caulking, reglets, corners, intersection, sealing to adjacent air/vapour barrier membranes, exterior sheathing membranes and adjacent construction, underlayment at cap flashings and all other details required to completely describe metal flashing installation for this project.

.2 Clearly indicate bending, folding, jointing, fastening installation details and materials, thickness, weight and finishes. Indicate profiles, shapes, seams and dimensions. Provide details of expansion joint covers.

.4 Samples:

.1 Submit four (4), 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

.2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative, Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

2 Products

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: 0.61 mm base metal thickness, commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.

.1 Colours selected by Departmental Representative from manufacturer's standard range.
.2 Specular gloss at 60°: 20 to 80 units +/- 5 in accordance with ASTM D523.
.3 Coating thickness:
.1 Top coat 0.7 to 0.8 mils
.2 Primer: 0.2 to 0.3 mils
.3 Total system: 0.9 mils to 1.1 mils.
.4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing: high temperature resistant self adhered modified bituminous membrane flashing.

.4 Sealants: Sealant type 1 as specified in Section 07 92 00.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners (to wood): of same material as sheet metal, to ASTM F1667, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Flashing screws (for fastening to metal): 300 series stainless steel, non-corrosive self-tapping, pan head.

.9 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable ARCA details and to SMACNA details and as indicated.

.2 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 0.61 mm base metal thickness prefinished steel.

2.6 PANS

.1 Form pans to receive roofing plastic from 0.61 mm base metal thickness prefinished steel with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners.
.1 Rivet joints.
.2 Make pans minimum 50 mm wider than member passing through roof membrane.

2.7 REGLETS AND CAP FLASHINGS

.1 Form metal cap flashing of 0.61 mm base metal thickness prefinished metal. Form reglets of minimum 0.61 mm base metal thickness galvanized steel sheet to be built-in concrete and masonry work for base flashings as detailed in accordance with ARCA recommendations.
.1 Provide slotted fixing holes and steel/plastic washer fasteners.
.2 Cover face and ends with plastic tape.

2.8 SCUPPERS

.1 Form scuppers from 0.61 mm base metal thickness prefinished sheet metal.

.2 Sizes and profiles as indicated.

.3 Provide necessary fastenings.

.4 Fabricate roof scuppers from with one piece deck flange, minimum 250 mm. Fabricate through wall scuppers to be 4 sided, with sheet metal to top of scupper as well as sides and bottom.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work as detailed on the drawings and in accordance with ARCA and SMACNA details.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
.1 Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
.1 Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.7 Insert metal flashing into reglets and under cap flashing to form weather tight junction.

.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.9 Caulk flashing at reglet with sealant.

.10 Install pans, where shown around items projecting through roof membrane.

3.3 SCUPPERS

.1 Install scuppers as indicated.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING

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

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

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 52 00 - Modified Bituminous Membrane Roofing

.2 Section 07 62 00 - Sheet Metal Flashing and Trim

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A506-12, Standard Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.
- .2 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM D2369-10(2015)e1, Standard Test Method for Volatile Content of Coatings.
- .4 ASTM D2832-92(2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .5 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for roof hatches and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
  - .1 Indicate VOC's for caulking materials during application and curing.

.3 Shop Drawings:
- .1 Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.

.4 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

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

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

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit operation and maintenance data for hardware complete with pertinent details, spare parts lists and warnings against harmful maintenance materials and practices for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect roof hatches from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 DESIGN REQUIREMENTS

.1 Roof hatches must withstand snow load and wind uplift and and temperature range as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010 for the Elk Point area, without damage to unit or permanent deformation to seals.

2.2 MATERIALS

.1 Steel sheet: regular quality alloy steel to ASTM A506.

.2 Galvanized steel sheet: commercial quality to ASTM A653/A653M, Z275 designation zinc coating.

.3 Gaskets: extruded resilient vinyl, silicone or neoprene, with full recovery after 50% compression.

.4 Fasteners: nails to ASTM F1667; screws to manufacturers standard, stainless steel.

.5 Sealants: Sealant Type 1 as specified in Section 07 92 00.
.6 Primers and Paints: in accordance with manufacturer's recommendations for surface conditions

.7 Isolation coating: alkali resistant bituminous paint or epoxy solution.

2.3 HATCH COVER

.1 Metal Cover:

.1 Preformed 1.9 mm thick galvanized steel outside sheet, 0.76 mm thick galvanized steel liner; 76 mm beaded overlapping flange, fully welded corners, internally reinforced for 195 kg/m^2 live load; insulated sandwich construction.

2.4 CURBED FRAME

.1 Preformed metal curb: 25 mm thick x 300 mm high, fibreboard insulated sandwich construction, fully welded corners, with 89 mm wide deck flange with 11 mm holes provided for securing frame to roof deck or curb..

2.5 ACCESSORIES

.1 Screws: stainless steel for curb to structure for hatch lip frame to outer attachment.

.2 Hinges: type recommended by roof hatch manufacturer.

.3 Latch: positive snap with turn handles inside and out and padlock hasps inside.

.4 Securing latch: hold open operating arm with vinyl grip handle to permit one-handed release.

.5 Resilient gasket/seal to inner face of lid in contact with hatch lid support frame.

2.6 FABRICATION

.1 Fabricate components free of twists, bends, or visual distortion and insulated. Weld corners and joints.

.2 Assemble roof hatch components as indicated.

.3 Ensure continuity of weather-tight seal.

.4 Design extrusions to collect and lead off accumulated condensation.

.5 Zinc plate hardware and attachments and shop prime ready for field painting.

3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION

.1 Erect components plumb, level and in proper alignment.

.2 Ensure continuity of building envelope air barrier and vapour retarder systems.

.3 Adjust and seal assembly with provision for expansion and contraction of components.

.4 Secure prefabricated curb assembly to structure.

.5 Coat aluminum and copper in contact with dissimilar materials, with isolation coating.

.6 Secure and seal frame to curb.

3.4 CLEANING

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by roof hatch installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 20 00 - Concrete Unit Masonry

.2 Section 07 92 00 - Joint Sealing

.3 Section 09 21 16 - Gypsum Board Assemblies

.4 Division 22 & 23 - Mechanical

.5 Division 26 - Electrical

1.2 REFERENCES

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

.2 ASTM International:
- .1 ASTM E814-13a: Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- .2 ASTM E2174-14: Standards Practice of on-site inspection of installed Firestops (Penetration).
- .3 ASTM E2307-10: Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus.
- .4 ASTM E2393-10a: Standard Practice for on-site inspection of installed Fire resistive Joint systems and perimeter fire barriers.

.3 IFC Guidelines for evaluating Firestop systems engineering Judgments

.4 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S101-14: Standard Method of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC-S115-11: Standard Method of Fire tests for Firestop Systems.
- .3 ULC: List of Equipment and Materials, Fire stop systems and components (current edition).
- .4 Underwriter's Laboratories of Canada (ULC): ULC-FS-14 Firestop Systems and Components 2014 Edition, (2 Volumes - Volumes 1 and 2).

1.3 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: ABC and NBCC): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.

.2 Construction details should accurately reflect actual job conditions.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.

.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and all other related information.

.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Installer: company specializing in fire stopping installations approved by manufacturer with 5 years documented experience.

.2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 31 19 - Project Meetings. Arrange this meeting only when the representative of the Departmental Representative can attend or alternatively, on a conference call with the Departmental Representative. Methods of operation, and trade responsibility will be resolved. Provide photos to the Departmental Representative, if the Departmental Representative does not attend the site meeting. Site meeting is to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.2 Twice during progress of Work at 25% and 60% completion of work of this Section.
.3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer and ULC markings.

.2 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.

.2 All materials to provide a flame rating (F) to penetrations equal to the rating of the Fire Separation. A flame and temperature rating (FT) is required on all penetration in fire walls and assemblies. All construction joint firestopping systems must provide a rating equal to the rating of the surrounding assemblies.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with Alberta Building Code 2014 and National Building Code of Canada 2010.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
  .1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier where applcable.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.4 SPECIAL REQUIREMENTS

.1 Provide special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies where required, as follows:
  .1 Movement.
  .2 Designed for re-entry, removable.
  .3 To obtain fire rating to match adjacent assembly.

3.5 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

.2 Install floor fire stopping before interior partition erections.

.3 Mechanical pipe insulation: certified fire stop system component.
  .1 Ensure pipe insulation installation precedes fire stopping.

3.6 FIELD QUALITY CONTROL

.1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.7 CLEANING

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

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

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.8 SCHEDULE

.1 Fire stop and smoke seal at:
- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Top of fire-resistance rated masonry and gypsum board partitions.
- .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .5 Penetrations through fire-resistance rated ceilings where applicable.
- .6 Openings and sleeves installed for future use through fire separations.
- .7 Around mechanical and electrical assemblies penetrating fire separations.
- .8 Rigid ducts: greater than 129 cm^2 : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
- .9 Penetrations through floor to crawlspace.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

.3 Section 04 23 00 - Glass Unit Masonry

.4 Section 05 72 00 - Stainless Steel Fabrications

.5 Section 06 40 00 - Architectural Woodwork

.6 Section 07 62 00 - Sheet Metal Flashing and Trim

.7 Section 07 84 00 - Fire Stopping

.8 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

.9 Section 09 21 16 - Gypsum Board Assemblies

.10 Section 09 30 13 - Ceramic, Glass and Porcelain Tiling

.11 Section 09 67 10 - Epoxy Flooring

.12 Section 09 96 59 - Epoxy Wall Coatings

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C603-04(2008): Standard Test Method for Extrusion Rate and Application Life of elastomeric Sealants.
- .2 ASTM C919-12: Standard Practice for Use of Sealants in Acoustical Applications.
- .3 ASTM C920-14a: Standard Specification for Elastomeric Joint Sealants.
- .4 ASTM C1193-13: Standard Guide for Use of Joint Sealants.
- .5 ASTM C1518-04(2009): Standard Specification for Precured Elastomeric Silicone Joint Sealant.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .2 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .3 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Manufacturer's product to describe:
  - .1 Caulking compound.
  - .2 Primers.
  - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Manufacturer's Instructions:
- .1 Submit instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

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

1.6 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Proceed with installation of joint sealants only when:
  - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
  - .2 Joint substrates are dry.
  - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

.2 Departmental Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Sealant Type 1: one component silicone sealant to CAN/CGSB-19.13-M87, type 2, Class 25, shore A hardness of 25 - 30, non sag, neutral curing.

.2 Sealant Type 2: one component paintable acrylic latex, to CAN/CGSB-19.17-M90.

.3 Sealant Type 3: multi component, chemical curing, self levelling, polyurethane sealant, conforming to CAN/CGSB-19.24-M90, type 1, Class B, and U.S Federal Specification TT-S-00227E, and ASTM C920, type M, Grade P, Class 25.

.4 Sealant Type 4: one component, mildew resistant, silicone rubber sealant, conforming to ASTM C920.

.5 Sealant Type 5: Epoxy sealant (for interior of cells): 2 component, solvent-free, moisture-insensitive, high-modulus, high-strength, structural epoxy; compressive strength

of 78 MPa (ASTM D 695) after 28 days at 23 deg.C.; the following materials meet the requirements:

.1 Tremco Permaquik 2252.
.2 Pecora Dynapoxy EP-430 Fast.
.3 Pecora Dynapoxy EP 1200.
.4 Sika AnchorFix 3.
.5 BASF Epolith G.

.6 Sealant Type 6: Acoustical sealant to ASTM C919.

.7 Joint Filler: Round closed cell, non-staining, non-absorbent foam, extruded polyethylene shore hardness 20, tensile strength 138-207 KPa oversized 30-50%. For backup to large joints, cavities or voids, use fibreglass wool.

.8 Bond Breaker: Pressure sensitive polyethylene or PVC tape, not bondable to sealant.

2.3 COLOURS

.1 Colours: to match adjacent material, as selected by the Departmental Representative.

2.4 SEALANT SELECTION

.1 Apply sealant type 1 to exterior at joints between dissimilar materials, control joints, around exterior louvres, around door and window installations, between concrete and masonry, to control joints in brick and concrete masonry veneer and between brick and concrete masonry veneer and adjacent materials, around glass unit masonry openings, to metal flashing and to all other exterior joints to render areas of application weather tight.

.2 DO NOT APPLY SEALANT BETWEEN METAL FLASHING AND AN ADJACENT MATERIAL ON THE TOP SIDE, SO AS TO PREVENT MOISTURE DRAINAGE OUT OF WALL OR WINDOW ASSEMBLY.

.3 Use Sealant type 2 to all other joints to interior such as between dissimilar materials around door frames and between drywall and concrete block, except to cells. Apply sealant prior to painting. Allow sealant to cure properly prior to paint application.

.4 Apply traffic Grade sealant type 3 around openings and joints in floor slabs, including sawcuts, and where slabs abut foundation walls to provide a continuous watertight joint. Install sealant type 3 to construction and expansion joints in floors with urethane coating in strict accordance with manufacturer’s recommendations. Joints to be 3 mm wide x 32 mm deep. Provide 5 mm backer rod to joints.

.5 Apply silicone sealant type 4 around all showers including around fixtures, and at all joints between ceramic tiles and fixtures and at joints between plastic laminate covered countertops and stainless steel counter tops and adjacent walls, and all inside corner joints of ceramic tile and between floor tile and wall tile. Also, apply silicone sealant at all other joints requiring a high degree of adhesion under severe wetting conditions. Apply silicone around pipes penetrating ceramic tiled walls, behind the pipe escutcheon plate.

.6 Apply sealant type 5 to all joints within cells, including at all areas/joints and or transitions as required to produce smooth and consistent finish. Apply around cell toilets, door frames, light fixtures, between coved floor base and epoxy wall coating and the like.

.7 Apply sealant type 6 to edges of gypsum board and steel stud partitions which receive acoustical batt insulation. Apply sealant at each face of partition. Locate the sealant bead at the corner where track or stud meets the surface to which it is mounted. This will seal the sound transmission path between substrate and framing, and also between the board and the framing when the board fits close at the edge. Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to acoustically seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes and ducts in partitions where perimeter sealed with acoustic sealant.

2.5 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:
- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

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

3.8 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.3 Section 07 92 00 - Joint Sealing

.4 Section 08 14 16 - Flush Wood Doors

.5 Section 08 71 00 - Door Hardware

.6 Section 08 80 50 - Glazing

.7 Section 09 21 16 - Gypsum Board Assemblies

.8 Section 09 91 13 - Exterior Painting

.9 Section 09 91 23 - Interior Painting

.10 Section 09 96 59 - Special Wall Coatings

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A653/A653M-15, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-1.181-99: Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84: Rigid Vinyl Extrusions for Windows and Doors.

.3 Canadian Standards Association (CSA International):
- .1 CAN/CSA-G40.20-13: General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G40.21-13: Structural Quality Steels.
- .3 CSA W59-13: Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 Canadian Steel Door Manufacturers' Association, (CSDMA):
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.
- .2 Recommended Selection and Usage Guide - Section 08 11 00, 2009.
- .3 CSDMA Recommended Specifications for Commercial Steel Door and Frame Products - Section 08 11 00, 2009.
- .4 CSDMA Fire Labelling Guide, 2009.

.5 ITS/Warnock Hersey Professional Services Ltd. (WHI):

.1 Fire Rating Services, Building Materials and Equipment, Listings (ITS/WH).

.6 National Fire Protection Association (NFPA):
- .1 2013 NFPA 80: Standard for Fire Doors and Fire Windows.
- .2 NFPA 252: Standard Methods of Fire Tests of Door Assemblies.

.7 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S104-10: Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105-09: Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.
- .3 CAN/ULC-S701-11: Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .4 List of Equipment and Materials, Vol. II, Building Construction.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:

- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
- .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S104 and NFPA 252 for ratings specified or indicated.
- .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN/ULC-S104, ASTM E152, NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, glazed openings, arrangement of hardware, fire rating and finishes.
- .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings reinforcing, fire rating and finishes.
- .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .4 Submit test and engineering data, and installation instructions.

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

.5 Submit one 300 x 300 mm corner sample of each type of frame.
- .1 Show glazing stops.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

2 Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: Commercial grade steel to ASTM A653/A653M, CS, Type B, hot dipped galvanized, ZF075 coating designation. For doors in exterior walls, use coating designation Z275 (fully galvanized). Minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.2 Reinforcement: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75 to interior doors, Z275 to exterior doors.

2.2 DOOR CORE MATERIALS

.1 To interior Doors: Honeycomb construction:
.1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m^3 minimum sanded to required thickness.

.2 To exterior Doors:
.1 Polystyrene: Rigid extruded, fire retardant, closed cell board, density 16 to 32 kg/m^3, thermal value RSI 1.0 minimum.

.3 Temperature rise rated (TRR) (where required by the NBCC 2010): Core composition to limit temperature rise on the unexposed side of door to 250°C at 30 to 60 minutes, as determined by governing building code requirements. Test Cores as part of a complete door assembly, in accordance with CAN/ULC-S104, ASTM E152 or NFPA 252, covering standard methods of tests of door assemblies and listed by a nationally recognized testing agency having a factory inspection service.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene cores: heat resistant, epoxy resin based, low viscosity, contact cement.

2.4 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

.1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting and 09 91 13 - Exterior Painting and Section 09 96 56 - Special Wall Coatings. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.6 REINFORCEMENT

.1 Door Reinforcement for Hardware:
- .1 Locks: minimum 1.6 mm (16 gauge) thick steel.
- .2 Butts:
  - .1 Top hinge: minimum 3.5 mm thick steel high frequency hinge bracket.
  - .2 All other hinges: minimum 2.7 mm thick steel, minimum 200 mm long.
  - .3 For continuous hinges, provide minimum 3.5 mm thick continuous steel plate for full length of hinges.
- .3 Flush bolts: minimum 1.6 mm thick steel.
- .4 Door closers: minimum 2.5 mm (12 gauge) thick steel.
- .5 Door holders: minimum 2.5 mm thick steel.
- .6 Door pulls: minimum 2.5 mm thick steel.

.2 Frame Reinforcement for Hardware: steel to the following minimum thickness:
- .1 Strikes: minimum 1.5 mm thick steel.
- .2 Butts:
  - .1 Top hinge: minimum 3.5 mm thick steel high frequency hinge bracket assembly.
  - .2 All other hinges: minimum 2.7 mm thick steel, minimum 200 mm long.
  - .3 For continuous hinges, provide minimum 3.5 mm thick continuous steel plate for full length of hinges.
- .3 Flush bolts: minimum 1.5 mm thick steel.
- .4 Door closers: minimum 2.5 mm thick steel.
- .5 Door holders: minimum 2.5 mm thick steel.

.3 Mortar Guard Boxes: minimum 0.8 mm thick; welded in place. Note: provide to all door frames, including in masonry and steel stud applications.

2.7 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Exterior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate glazing stops as formed channel of minimum 0.9 mm thick steel and minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with tamperproof counter-sunk oval head sheet metal screws. For exterior doors, ensure glass stops will accommodate sealed unit glazing, or use channel as specified for glazing to hollow metal frames, and ensure channel is of sufficient width to accommodate sealed unit glazing.

.4 Door bottom seal: as specified in Section 08 71 00 - Door Hardware.

.5 Metallic paste filler: to manufacturer's standard.

.6 Fire labels: metal rivited.

.7 Sealant: Type 1 as specified in Section 07 92 00.

.8 Glazing: as specified in Section 08 80 05 - Glazing.

.9 Make provisions for glazing as indicated and provide necessary glazing stops.
.1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with tamperproof countersunk stainless steel screws.
.2 Design all glazing stops to be tamperproof.

.10 Thermally broken frames: hollow metal frames incorporating thermal spline consisting of rigid PVC extrusion conforming to CGSB 41-GP-19Ma, eliminating through-metal contact. Frames must meet or exceed CAN/CGSB-82.5-M88 standards.

2.8 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Fabricate exterior frames of 1.6 mm base thickness steel welded type construction thermally broken except where fire rated exterior frames occur. Fabricate interior frames and exterior fire rated frames of 1.6 mm base thickness steel welded type construction.

.4 Blank, reinforce, drill and tap frames for mortised, templated hardware, electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.5 Reinforce and prepare door frames to receive hardware. Provide junction box where electric hinge is required. In mortar-filled frames, adhere a piece of spruce wood 12 mm thick to the closer reinforcement to facilitate tapping of screw holes.

.6 Protect mortised cutouts with steel guard boxes.

.7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.8 Manufacturer's nameplates on frames and screens are not permitted.

.9 Conceal fastenings except where exposed fastenings are indicated.

.10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.11 Reinforce frames wider than 1200 mm with 2.5 mm thick formed steel channels welded in place, flush with top of frames.

.12 Insulate exterior frame components with polyurethane insulation.

.13 To reception, patrol corridor, LAN room, exhibit rooms and detached garage, provide 25 mm strike bucket to accept 25 mm threaded bolt. Wedge in area of strike bucket to prevent spreading at interior frames and grout at perimeter frames.

2.9 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Floor Anchors, channel spreaders and wall anchors. Sheet steel to the following minimum core thicknesses:

.1	Jamb floor anchors	1.6 mm
.2	Jamb spreaders	0.9 mm
.3	Masonry strap type	1.2 mm
.4	Steel Stud type	0.9 mm
.5	Stirrup - strap type wall anchors	1.6 mm
.6	Wire type anchors	NOT ACCEPTABLE
.7	Use ULC approved types for labelled frames.	

.3 Jamb Anchors: manufacturer's standard type recommended for applicable installation; of suitable design and capable of securely and rigidly anchoring frames in place.

.4 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.5 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.6 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.10 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.11 HOLLOW METAL SCREEN AND SIDELIGHT FRAMES

.1 Fabricate hollow metal frames for glazed screens and sidelights, to profiles indicated, as for door frames. Provide screwed glass stops. Use tamper proof screws.

.2 Provide thermally broken frames to all exterior door frames, sidelights, entrances and transoms, except for exterior fire rated frames. Where fire rated frames are required for exterior door frames, sidelights, entrances and transoms, use non-thermally broken fire rated frames.

.3 Provide structural steel members as required or as indicated within sections, or where multiple sections butt together.

.4 Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills.

.5 When required due to site access, or due to shipping limitations, fabricate frames for large openings in sections, with splice joints assembled on site.

2.12 DOOR FABRICATION GENERAL

.1 Fabricate hollow metal doors in accordance with requirements of "Canadian Manufacturing Standards for Steel Doors and Frames" produced by the Canadian Steel Door and Frame Manufacturers' Association, and as indicated on drawings.

.2 Fabricate fire rated hollow metal doors in accordance with the label authority requirements. Provide ULC or Intertek Testing Services labels or other testing laboratory approved by the Authority Having Jurisdiction. Place metal labels where visible when installed, rivetted to doors.

.3 Test fire labelled doors in strict conformance with CAN/ULC-S104, ASTM E152 or NFPA 252. Construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.4 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.5 Form each face of exterior doors from a sheet of 1.6 mm thick steel with polystyrene core laminated under pressure to face sheets.

.6 Form each face sheet of interior doors from a sheet of 1.2 mm thick steel with honeycomb core laminated under pressure to face sheets.

.7 Form each face sheet of fire rated doors from a sheet of 1.2 mm steel with honeycomb core laminated under pressure to face sheets. Use temperature rise rated doors where required by NBCC 2010.

.8 Door thickness: 45 mm unless indicated otherwise.

.9 For interior doors, fully weld longitudinal edges. Weld, fill and sand and grind seams and edges flush and smooth. Fully weld top and bottom edges.

.10 For doors in exterior walls, stitch weld longitudinal edges using tack welds at 150 mm oc. Weld, fill and sand and grind seams and edges flush and smooth. Factory caulk edges between stitch welds.

.11 Shop prime face and backside of all welds where accessible.

.12 Ensure spot welding does not leave marks on exposed faces. Fill spot weld marks on door faces with filler as specified. Sand smooth, leaving spot weld marks invisible and producing a uniform surface. Doors with spot weld marks on exposed faces will be rejected.

.13 Reinforce and prepare doors to receive hardware. Blank, reinforce, drill and tap for mortise, templated hardware. Fabricate doors for continuous hinges where indicated.

.14 Cut out areas to receive glass as indicated. Reinforce cut-out areas at full perimeter with welded inserts, filled and ground smooth. Do not use surface-lapping trim. Provide screwed stops.

.15 Blank, reinforce, drill doors and tap for mortised, templated hardware including electronic hardware.

.16 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.17 Reinforce doors where required, for surface mounted hardware. Provide flush PVC top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.18 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.19 Manufacturer's nameplates on doors are not permitted.

2.13 THERMALLY BROKEN DOORS AND FRAMES

.1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.

.2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate thermally broken frames separating exterior parts form interior parts with continuous interlocking thermal break.

.4 Apply insulation.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 In masonry walls, limit of acceptable frame distortion 1.5 mm of plumb measured on face of frame. Maximum twist corner to corner 3.0 mm.

.4 In steel stud partitions, limit of distortion to be 1.6 mm out of plumb each jamb, measured on face of frame resulting in maximum twist of frame of 2 mm measured from upper corner to lower diagonal corner.

.5 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.6 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.7 In interior stud and gypsum board walls, fill frames with batt insulation.

.8 Install mortar in hollow metal frames to interior masonry walls.

.9 Fill exterior frames with foam-in-place insulation as specified in Section 07 21 19. Coordinate with installation of air/vapour barrier specified in Section 07 27 00.01.

.10 Caulk perimeter of frames between frame and adjacent material.

.11 Provide vertical support at centre for head to frames over 1200 mm wide.

.12 Make allowance for deflection to ensure structural loads are not transmitted to frames.

.13 Where field jointing, use countersunk metal screws. Joints to be filled and ground smooth.

.14 Drill and tap for surface applied hardware.

.15 Remove all hardware before painting commences and replace upon completion of painting or original condition without damage to adjacent finished surfaces. All hardware is to be removed and reinstalled by the original hardware installer, who will store hardware until required for reinstallation.

.16 Coordinate installation of wood doors in hollow metal frames with Section 08 14 16.

3.4 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
- .1 Hinge side: 3.0 mm.
- .2 Latchside and head: 3.0 mm.
- .3 Finished floor and thresholds: 19 mm.

.3 Adjust operable parts for correct function.

3.5 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.6 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 - Glazing.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 - Joint Sealing

.2 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

.3 Section 08 71 00 - Door Hardware

.4 Section 08 80 50 - Glazing

1.2 REFERENCES

.1 AAMA/WDMA/CSA/101/I.S.2/A440-11: North American Fenestration Standard /Specification for Windows, Doors and Skylights.

.2 Aluminum Association (AA):
- .1 Aluminum Design Manual, 2005.
- .2 Welding Aluminum: Theory and Practice.
- .3 Properties of Aluminum Alloys: Tensile, Creep, and Fatigue Data at High and Low Temperatures.

.3 American Architectural Manufacturer's Association (AAMA):
- .1 AAMA 501-05: Methods of Test for Exterior Walls.
- .2 AAMA 501.1-05: Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
- .3 AAMA 501.2-09: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
- .4 AAMA 609/610-09: Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
- .5 AAMA 611-98: Voluntary Specification for Architectural Anodized Aluminum.
- .6 AAMA 1304-04: Voluntary Specifications for Forced Entry Resistance of Side-Hinged Door Systems.
- .7 AAMA 1503-09: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- .8 AAMA 2603-02: Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .9 AAMA AFPA-91: Anodic Finishes/Painted Aluminum.
- .10 AAMA CW-RS-1-04: The Rain Screen Principle and Pressure Equalized Wall Design.
- .11 AAMA RPC-00: Rain Penetration Control - Applying Current Knowledge.

.4 ASTM Standards:
- .1 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A385/A385M-11: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

.3 ASTM D6386-10: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
.4 ASTM E283-04(2012): Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and doors Under Specified Pressure Differences Across the Specimen.
.5 ASTM E330/E330M-14: Standard for testing the Structural Performance of exterior Windows, Curtain Walls, and doors by Uniform Static Air pressure Difference.
.6 ASTM E331-00(2009): Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
.7 ASTM E547-00(2009): Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
.8 ASTM E783-02(2010): Standard Test Method for Field Measurements of Air Leakage Through Installed Exterior Windows and Doors.
.9 ASTM E1233/E1233M-14: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential.
.10 ASTM E1886-13a: Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
.11 ASTM E1996-14a: Standard Specifications for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

.5 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.40-97: Anticorrosive Structural Steel Alkyd Primer.
.2 CAN/CGSB-12.1-M90: Tempered or Laminated Safety Glass.
.3 CAN/CGSB-12.8-97: Insulating Glass Units.
.4 CAN/CGSB-12.20-M89: Structural Design of Glass for Buildings.
.5 CAN/CGSB 19.13-M87: Sealing Compound, One Component, Elastomeric, Chemical Curing.
.6 CAN/CGSB-19.24-M90: Multi-Component, Chemical Curing Sealing Compound.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for doors and frames and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered in the Province of Alberta.

.2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:

.1 Interior trim and exterior junctions with adjacent construction.

.2 Junctions between combination units.

.3 Elevations of units.

.4 Core thicknesses of components.

.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.

.6 Location of caulking.

.7 Each type of door system including location.

.8 Arrangement of reinforcing for hardware and joints.

.9 Arrangement of hardware and required clearances.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit one 300 x 300 mm corner sample of each type door and frame.

.3 Submit sample showing glazing detail, reinforcement, finish and location of manufacturer's nameplates.

.4 Frame sample to show glazing stop, door stop, jointing detail, finish, wall trim.

.5 Manufacturers Reports:

.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Use coatings that are easy to remove and residue free.

.2 Leave protective covering in place until final cleaning of building.

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect aluminum doors and frames from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 DESIGN CRITERIA

.1 Design frames and doors in exterior walls to:
- .1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.
- .2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E330 under wind loads as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010, for the Elk Point area; submit certificate of tests performed.
- .3 Movement within system.
- .4 Movement between system and perimeter framing components or substrate.

.2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.

.3 Include continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

2.2 MATERIALS

.1 Aluminum extrusions: to Aluminum Association alloy AA6063-T54, T5 or T6 anodizing quality.

.2 Sheet aluminum: to Aluminum Association alloy AA5005- H32 or H34 anodizing quality; minimum 1.29 mm thickness.

.3 Steel reinforcement: to CSA G40.20/G40.21, grade 300 W, galvanized after fabrication. Provide continuous 2.7 mm thick steel backup plate to hinges.

.4 Fasteners:
- .1 In contact with aluminum: 300 series stainless steel, conforming to ASTM A167 or 400 series cadmium plated steel, finish conforming to ASTM A165, Type NS, or aluminum, finish to match framing.
- .2 In contact with steel: zinc plated steel, finish conforming to ASTM A164, Type LS.
- .3 Exposed fasteners where permissible: aluminum, finish to match framing.

.5 Weatherstripping: Manufacturer's standard weatherstripping either woven pile conforming to AAMA 701.1 or waterproof, rot-proof pile fibre 4 mm high x 6 mm wide in neoprene backing of flexible vinyl, at heads, jambs, and on sweeps at door bottoms.

.6 Door bumpers: black neoprene.

.7 Door bottom seal: adjustable door seal of anodized extruded aluminum frame (colour to match door) and vinyl weather seal.

.8 Isolation coating: alkali resistant bituminous paint.

.9 Glass: as specified in Section 08 80 05 - Glazing; single tempered glazing to interior doors and frames, sealed unit tempered glazing to exterior doors.

.10 Glass settings and Gaskets: resilient type as recommended by the door manufacturer, suitable for receiving glazing as specified in Section 08 80 05 - Glazing. Use 100% silicone setting blocks and spacers.

.11 Sealants: colour selected by Departmental Representative, in accordance with Section 07 92 00 - Joint Sealants.

2.3 ALUMINUM DOORS

.1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.

.2 Door stiles nominal 127 mm wide plus or minus 6 mm.

.3 Top rail nominal 127 mm wide plus or minus 6 mm.

.4 Bottom rail nominal 300 mm wide plus or minus 6 mm.

.5 Reinforce mechanically-joined corners of doors to produce sturdy door unit.

.6 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.

.7 Supply thermally broken doors for exterior.

.8 Hardware: as specified in Section 08 71 00 - Door Hardware. Refer to Division 28 for access control.

2.4 ALUMINUM FRAMES

.1 Interior frames (including door frames and interior glazed frames and storefront): construct non-thermally broken frames of aluminum extrusions with minimum wall thickness of 2.4 mm.

.2 Frame members to be of sizes indicated on the drawings and reviewed shop drawings, for flush glazing.

.3 Exterior Frames: thermally broken curtain wall frames as specified in Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows.

2.5 SLIDING GLASS PASS THROUGH

.1 Provide sliding glass panel as detailed on the drawings and reviewed shop drawings, complete with aluminum framing and glass panel.

.2 Hardware for sliding glass panel:
- .1 Recessed pull handle (install on office side).
- .2 Cylinder –slam shut lock locking device; install thumb turn on interior office side.
- .3 Lock: Sobinco Spring loaded Transom Latch Model # 865 as supplied by Anotec Manufacturing Inc.
- .4 Rubber faced door stop to restrict window movement at the maximum window opening.

.3 All sliding window components are to be heavy duty construction.

.4 Provide sliding glass hung by two heavy duty roller brackets, each having self-lubricating nylon wheel and ball bearing assembly; running in an extruded aluminium track assembly. Provide extruded aluminium door glides and retainer clips along bottom for positive guide no- sway operation of sliding panel.

.5 Provide pass through door complete with drop down door as detailed on the drawings and reviewed shop drawings.

2.6 ALUMINUM FINISHES

.1 Clear anodic finish to all exposed aluminum surfaces: conforming to Aluminum Association AA-M12C 22A31 specification, class II minimum thickness of 0.10 mm thickness, free from defects and blemishes..

2.7 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with zinc coating to ASTMA123/A123M.

2.8 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as indicated. Provide minimum 22 mm bite for insulating glazed units and single glazing.

.3 Fabricate interior window frames where indicated, including where vertical butt joint glazing occurs within perimeter aluminum frames as detailed on the drawings and reviewed shop drawings.

.4 Provide structural steel reinforcement as required.

.5 Fit joints tightly and secure mechanically.

.6 Conceal fastenings.

.7 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Door Hardware.

.8 Neatly and accurately brake form all aluminum brake shapes, closures and trim as detailed on the drawings and reviewed shop drawings.

.9 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

.10 Install strike buckets with deadbolts at all entrances.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum doors and frames installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Coordinate installation of exterior doors into aluminum curtain wall specified in Section 08 44 13 - Glazed Curtain Wall and Windows.

.3 Install interior door frames and screen frames as detailed on the drawings. Provide counter barrier with aluminum framing, complete with aluminum framed sliding pass through door and hardware.

.4 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.5 Anchor securely.

.6 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.7 Adjust door components to ensure smooth operation.

.8 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

.9 Install sliding glazed panel as detailed on the drawings. Adjust as required for smooth operation.

.10 Install pass through complete with drop down door as detailed on the drawings.

.11 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing, including butt jointed silicone sealed glazing joints within aluminum perimeter frames as indicated.

.12 Seal joints to provide weathertight seal.

.13 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Departmental Representative.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits:
- .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
- .2 Twice during progress of Work of this Section at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

.4 Obtain reports within 3 days of review and submit.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
- .3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .4 Clean aluminum with damp rag and approved non-abrasive cleaner.
- .5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
- .6 Clean glass and glazing materials with approved non-abrasive cleaner.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 71 00 - Door Hardware

.3 Section 08 80 50 - Glazing

.4 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 ANSI/WDMA:
.1 ANSI/WDMA I.S 1A-11: Architectural Wood Flush Doors.

.2 AWI/AWMAC/WI: Architectural Woodwork Institute / Architectural Woodwork Manufacturer's Association of Canada / Woodwork Institute - Architectural Woodwork Standards (Edition 2 - 2014).

.3 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
.2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.4 Canadian Standards Association (CSA International).
.1 CSA Certification Program for Windows and Doors.

.5 International Organization for Standardization (ISO)
.1 ISO 14040-2006: Environmental Management-Life Cycle Assessment - Principles and Framework.
.2 ISO 14041-2000: Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
.1 For caulking materials during application and curing.
.2 For door materials and adhesives.

.2 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate door types and cutouts for lights, louvres, sizes, core construction, transom panel construction and cutouts.

1.4 SAMPLES

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

.2 Submit four (4) 300 x 300 mm corner sample of each type wood door.

.3 Show door construction, core, glazing detail and faces.

.4 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

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

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

.3 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 31 19 - Project Meetings.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
.1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
.2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.

.3 Protect doors from scratches, handling marks and other damage. Wrap doors.
.4 Store doors away from direct sunlight.

2 Products

2.1 WOOD FLUSH DOORS

.1 Provide doors to meet WDMA Performance duty value for Heavy Duty rating.

.2 Solid core: to CAN/CSA-O132.2.1.

.1 Construction:
.1 Cores: conforming to WDMA - 1.S. A-1 and one of the following:
.1 Particle board cores: as AWI/AWMAC/WI specifications, sanded and bonded construction. Ensure particle board is not manufactured with binders, coatings or adhesives which contain resins or other compounds that have potential to release formaldehyde during final product's use;

.1 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.

.2 "Structural Composite Lumber Core", Laminated Strand Lumber, uniform density of approx. 38 pcf, or other Structural Composite Lumber meeting the requirements of ASTM D5456.

.3 Stiles and rails to be continuously edge bonded to core. Sand entire unit prior to application of door face.

.2 Face Panels: Provide paint finish face of one of the following:

.1 Medium Density Fibreboard (MDF): conforming to ANSI A208.2; minimum density of 769 kg/m^3, 3.2 mm thick. Manufacture medium density fibreboard so that formaldehyde emissions do not exceed 0.5 ppm or 1806 g/m^3 when tested in accordance with ASTM E1333.

.2 Hardboard , 3.2 mm thick must be manufactured such that formaldehyde emissions do not exceed 0.15 ppm or 1806 g/m^3 when tested in accordance with ASTM E1333, Standard Test Method for Determining Formaldehyde Levels From Wood Products Under Defined Test Conditions Using a Large Chamber.

.3 Adhesive: Type II (water resistant) for interior doors.

2.2 GLAZING

.1 Glass: 6 mm clear tempered float glass as specified in Section 08 80 05 - Glazing.

.2 Accessories: paint grade hardwood stops for all glazing.

2.3 FABRICATION

.1 Bevel vertical edges of doors 3 mm on lockside and 1.5 mm on hinge side.

.2 Seal top and bottom door edges, and edges of cut-outs if cut-out is done at the plant.

.3 Door thickness to be 45 mm.

.4 Provide cut-outs for glass and louvres as indicated. Include blocking and stops of paint grade hardwood.

.5 Door edge construction to be at the option of the door manufacturer, but must conform to AWI/AWMAC/WI - Architectural Woodwork Standards (Edition 2 - 2014), Section 9.

.6 Fabricate paint grade doors with one ply of 3.2 mm hardboard or MDF with exposed edge on each side.

.7 Fabricate flush wood doors with reinforced door edge and blocking system for hardware in accordance with AWI/AWMAC/WI - Architectural Woodwork Standards (Edition 2 - 2014) Section 9, details. Use 125 mm deep top rail blocking for all doors with closers. Provide Centre blocking at both vertical edges for all doors with panic hardware and at strike edge for locksets, latchsets and the like. Locations of blocking are to be as indicated in Section 9 of the AWI/AWMAC/WI - Architectural Woodwork Standards (Edition 2 -

2014); as a minimum, provide HB-8 to hinged doors. To hinged doors with closers, provide HB-3 top rail in addition to HB-8 blocking.

.8 Prepare doors to receive hardware, using templates provided. Factory prepare doors to receive hardware, using proper tools, equipment and drill jigs, to ensure proper fit of hardware, for smooth operation.

.9 Allowable tolerances on dimensions: as AWI/AWMAC/WI standards.

.10 Undercut doors as required to suit floor finish, to a maximum of 6 mm above finish floor.

.11 Install conduit in doors during construction of doors, to accommodate electronic hardware such as electric hinges and strikes; see door schedule. Coordinate with electronic hardware supplier. Conduit size to be as recommended by the electronic hardware supplier.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Unwrap and protect doors in accordance with AWI/AWMAC/WI custom grade requirements.

.2 Install doors and hardware in accordance with manufacturer's printed instructions and AWI/AWMAC/WI requirements. Coordinate installation of wood doors with hollow metal frames specified in Section 08 11 00 - Metal Doors and Frames and Section 08 71 00 - Door Hardware.

.3 Adjust operable parts for correct function.

.4 Seal top and bottom edges of doors if site trimmed. Seal edges of cut-outs if done at site, in accordance with manufacturer’s recommendations and as per AWI/AWMAC/WI requirements.

.5 Allowable tolerances on deformation: as AWI/AWMAC/WI standards. Measured after finishing, and period of adjustment to service temperature and humidity.

.6 Leave paint grade doors ready to receive finish as specified under Section 09 91 23 - Interior Painting.

.7 When fitting and hanging doors, allow approximately 1.6 mm to 3 mm clearance at jambs and head and 6 mm at bottom.

.8 Drill pilot holes for screws as required to prevent splitting or structural impairment of doors.

.9 Mill doors to receive hardware and install hardware to template and in accordance with the installation instructions supplied with the hardware.

.10 Install glazing in accordance with Section 08 80 50 - Glazing.

3.3 ADJUSTMENT

.1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking; clean doors and frames.

.3 Clean glass and glazing materials with approved non-abrasive cleaner.

.4 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 09 21 16 - Gypsum Board Assemblies

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect access doors from nicks, scratches, and blemishes.
- .3 Apply temporary protective coating to finished surfaces. Remove coating after installation.
  - .1 Use coatings in accordance with manufacturer's written instructions that are easily removable.
  - .2 Leave protective coating in place until final cleaning of building.
- .4 Replace defective or damaged materials with new.

2 Products

2.1 ACCESS DOORS

.1 Sizes: as follows unless indicated:
- .1 For body entry: 600 x 600 mm minimum.
- .2 For hand entry: 300 x 300 mm minimum.

.2 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.

.3 Materials:
- .1 Tiled or special wall coating surfaces: stainless steel with brushed satin.
- .2 Other areas: prime coated steel.

2.2 EXCLUSIONS

.1 Lay-in tile ceilings: use unobtrusive identification locators.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.
- .1 Tiled surfaces: in accordance with Section 09 30 13 - Ceramic, Glass and Porcelain Tiling.
- .2 Install masonry surfaces: in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .3 Install gypsum board surfaces: in accordance with Section 09 21 16 - Gypsum Board Assemblies.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 71 00 - Door Hardware

.3 Section 08 80 50 - Glazing

.4 Section 09 91 23 - Interior Painting

.5 Section 09 96 59 - Special Wall Coatings

1.2 REFERENCES

.1 ANSI/NAAMM/HMMA 863-04: Guide Specifications For Detention Security Hollow Metal Doors & Frames.

.2 ASTM Standards:
- .1 ASTM A480/A480M-14b: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .2 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM A924/A924M-14: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .4 ASTM A1008/A1008M-15: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- .5 ASTM A1011/A1011-14: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- .6 ASTM C665-12: Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .7 ASTM F1450-12a: Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities.

.3 AWS D1.1/D1.1M 2010: Structural Welding Code - Steel.

.4 Canadian Standards Association (CSA International):
- .1 CAN/CSA-G40.20-13: General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G40.21-13: Structural Quality Steels.
- .3 CSA W59-13: Welded Steel Construction (Metal Arc Welding) (Metric Version).

.5 CGSB Standards:
- .1 CAN/CGSB-12.12-M90: Plastic Safety Glazing.

.6 ITS/Warnock Hersey Professional Services Ltd. (WHI):

.1 Fire Rating Services, Building Materials and Equipment, Listings (ITS/WH).

.7 National Fire Protection Association (NFPA)
- .1 2013 NFPA 80: Standard for Fire Doors and Fire Windows.
- .2 NFPA 252: Standard Methods of Fire Tests of Door Assemblies.

1.3 PERFORMANCE REQUIREMENTS

.1 Examine drawings, door schedules and details to determine full extent of work required.

.2 Carry out all work to assure that the complete area is vandal proof and that no items can be removed without special equipment, without sharp materials, rough or jagged items or materials exposed within the cell area.

1.4 REGULATORY REQUIREMENTS

.1 Install fire labelled steel door and frame products in accordance with NFPA-80 except where otherwise noted. Apply labels indicating fire rated sound transmission class, to each detention door and frame.

1.5 SUBMITTALS

.1 Submit shop drawings, product data and test reports in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate door and frame elevations, anchorage types, closure methods, finishes, locations of cut-outs for hardware, arrangement of hardware, glazing, frames, required clearances and installation details.

.3 Submit manufacturer’s standard product data for detention door assemblies.

.4 Installation Instructions: Submit manufacturer's installation instructions.

.5 Submit proof of National Association of Architectural Metal Manufacturers (NAAMM) testing.

1.6 QUALITY ASSURANCE

.1 Perform work to requirements of ANSI/NAAMM/HMMA 863-04 standards.

.2 Manufacturer: Minimum 5 years documented experience manufacturing detention doors and frame assemblies.

.3 Pre-installation Meeting: Convene a pre-installation meeting 2 weeks before start of installation of detention door and frame assemblies. Require attendance of parties directly affecting work of this section, including contractor, Departmental Representative, installer, and manufacturer's representative. Review installation and coordination with other work.

1.7 DELIVERY, STORAGE AND PROTECTION

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and HMMA 840.

.2 Handle and protect doors and ancillary equipment to prevent damage.

.3 Weld minimum two temporary jamb spreaders per frame prior to shipment.

.4 Remove doors and frames from wrappings or coverings upon receipt on site and inspect for damage.

.5 Store in vertical position, spaced with blocking to permit air circulation between components.

.6 Store materials out of water and covered to protect from damage.

.7 Clean and touch up scratches or disfigurement caused by shipping or handling with zinc-rich primer.

1.8 COORDINATION

.1 Coordinate installation of anchorages for steel door frames.

.2 Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in Concrete or masonry.

.3 Coordinate with hardware trade to ensure the proper preparation and fabrication of doors and frames. Coordinate where holes and grommets are required in framing system to accommodate cabling.

.4 Deliver such items to Project site in time for installation.

1.9 MAINTENANCE DATA

.1 Provide maintenance data for hardware and operating mechanism, for incorporation into the maintenance manual specified in Section 01 78 00 - Closeout Submittals.

1.10 WARRANTY

.1 For Work of this Section , 12 months warranty period is extended to 60 months.

2 Products

2.1 ACCEPTABLE DETENTION DOOR AND FRAME MANUFACTURERS

.1 Acceptable sliding cell door and frame manufacturers:
- .1 Kach Inc., 1439 Speers Rd., Oakville, Ontario, L6L 2X5; Telephone 905-827-9901; Fax 905-827-9971.
- .2 CP Distributors Ltd., #133, 2634 - 45th Ave. S.W., T2B 3M1; Telephone 403-253-2006; Fax 403-255-3345.

.3 Apex Industries Inc., 100 Millenium Drive, Moncton, NB E1E 2G8; Telephone 506-857-1600/1-800-268-3331; Fax 506-857-1672.
.4 SWS Detention Group Inc., 751 Wall Street, Winnipeg, Manitoba R3G 2T6; Telephone 1-877-797-1999; Fax 1-877-797-2097.
.5 Steelgate Security Products, 7456 Tranmere Drive, Mississauga, Ontario L5S 1K4.
.6 Other preapproved product.

2.2 MATERIALS

.1 Sheet Steel (WGCS): tension levelled steel to ASTM A924M, galvanized to ASTM A653M, commercial steel (CS), type B, coating designation ZF120 (paintable Galvaneal).

.2 Hot Rolled Carbon Steel Sheet: commercial quality to ASTM A1011, for concealed reinforcement for materials, 2.7 mm minimum thickness.

.3 Cold rolled carbon sheet steel (CRCS): commercial quality, to ASTM A1008, shop prime coated.

.4 Glazing:
.1 Plastic glazing: to CAN/CGSB-12.12M, clear polycarbonate sheet. Acceptable Product:
.1 Lexan 6 mm thickness with Margard anti-scratch finish on inside sheet.
.2 Plastic Spacers: 6 mm thickness x 25 mm.

.5 Glazing sealant: one component, fast skinning sealant which cures to a high modulus silicone rubber on exposure to atmospheric moisture at room temperature and is a neutral cure sealant. General Electric GlasSil, SilGlaze N10 - on component, fast skinning, neutral curing sealant or preapproved product.

.6 Glazing tape: performed butyl tape, 10 - 15 durometer hardness, paper release, thickness and width to suit.

.7 Shop paint primer: primer compatible with epoxy finish coat specified in Section 09 96 59.

.8 Fasteners: security screws and bolts with security heads (five lobe and centre post) to prevent removal except with special tools; non-corrosive type. Acceptable product: Torx-Plus tamper resistant. For fasteners that are not required to be removed, provide flat head fasteners, having an extra head that will twist off when fully secured, leaving the main had counter-sunk flush without slots, so that crew cannot be backed out by means of a screw drive or wrench. Where thickness of metal will not allow screws to be counter sunk, use round head security screws with hexagonal break-off heads.

2.3 CELL DOORS AND FRAMES

.1 Supply and install sliding cell doors, frames and hardware as noted on the drawings and the attached details.

.2 Fabricate frames from 2.6 mm thick steel and to profiles indicated on the drawings and attached details, for installation of steel door frames in masonry walls. Prime paint.

.3 Fabricate detention type doors, 50 mm thickness, with hollow steel vertically stiffened and steel ribs with all voids filled with sound deadening, semi-rigid fibrous insulation conforming to level 3 - ANSI/NAAMM/HMMA 863-04 and ASTM F1450 performance criteria for static load, rack, impact and edge crush tests. Provide door skins of 2.0 mm thick sheet steel. Provide 2.6 mm steel channel reinforcement at perimeter and at all openings. Incorporate food pass door of flush design, and sliding viewport as indicated. Arrange steel ribs to frame openings in door. Provide 6 mm thick steel plate reinforcing for door locks. Provide cutout on guard side of door for lock, complete with 4.8 mm thick steel cover plate secured to door face with security screws (part of lock mounting hardware). Prime paint.

.4 Door Viewport shutter (for cell doors and other doors in cell block area as scheduled):

.1 Fabricate glazing assemblies with outer light (room side) of 6 mm thickness mar resistant polycarbonate, notched on cell side to have glazing sit flush with inside cell door face.

.2 Provide 6 mm mar resistant polycarbonate glazing with 6 mm x 25 mm spacers separating double glazing. Construct window shutter of 3.6 mm thick stainless steel, satin finish, with radius corners.

.3 Fabricate perimeter shutter frame of steel with radiused perimeter edges.

.4 Provide teflon coating at top and bottom shutter tracks.

.5 Install stainless steel finger pull, screwed to shutter door with security screws. Provide door pull attached to shutter frame.

.5 Food Pass Assemblies:

.1 Lock: fabricate flush mounted food pass assembly with security lock incorporating a bevel latch, surface mounted on food pass door; Southern/Folger 1017 snap type. Note: spot weld mogul key blank to cylinder to act as thumb turn.

.2 Hinge: welded continuous 2.28 mm steel piano hinge x 50 mm wide with 6 mm diameter brass pin, Faucher #751-0113.

.3 Weld 2 mm sheet metal skin to food pass door on cell side to provide a maximum 2 mm gap between interior door skin perimeter of food pass.

.6 Door trackset, receiver and door guide:

.1 Door trackset, receiver and door guide: custom fabricated as per details attached to this Section.

.7 Door Hardware:

.1 Lockset: non-slam lock, operated by paracentric key on secure side, with lock mounting/plate and escutcheon x 32D with fixed knob mounted to door on secure side and no trim on cell side. Acceptable Products:

.1 Southern Steel 1030-D1.

.2 Folger Adam 32D.

.3 Chubb 1030-D1.

.4 RR Brink 7030D

.2 Door pulls: custom fabricated pull, integral with sliding shutter frame.

.8 Keying: all cell door locks are to be keyed alike.

2.4 FABRICATION

.1 Form metal true in accordance with reviewed shop drawings, free from defects impairing strength, durability and appearance.

.2 Fabricate components with required structural properties to safely withstand or abstain strain and stresses to which they will be subjected.

.3 Fabricate steel plates free from buckles or waves.

.4 Supply anchoring devices required for fabrication and erection of work of this Section.

.5 After fabrication remove mill scale, scrape and clean all ferrous metals and apply 1 coat of primer.

.6 Welding:

.1 Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or continuous brazing or welding. Grind smooth to true, sharp arises and profiles, and sand down to smooth, true, uniform finish.

2.5 CLEANING AND PAINTING

.1 Thoroughly clean steel work of all loose mill scale, rust, spatter, slag, oil, dirt and other foreign materials.

.2 Grind all welds smooth.

.3 Apply one (1) coat of epoxy compatible primer to all steel.

3 Execution

3.1 INSTALLATION/GENERAL

.1 Install detention doors and frames in accordance with manufacturer's recommendations and with the reviewed shop drawings, plumb, true, with all hardware, templates, fastenings and accessories, securely anchored to adjacent structure.

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

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

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

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

3.2 DOOR FRAME INSTALLATION

.1 Install door frames plumb, level and square. Install frames within a tolerance +/- 2 mm maximum. Ensure maximum gap between concrete block and cell door frame is 3 mm or less.

.2 Solidly brace frames at time of installation both vertically and horizontally and solidly block, within the frame opening to prevent bowing of the frame when it is grout filled.

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with templates, and manufacturer’s instructions.

.2 Adjust operable ports for correct function.

.3 Adjust operable parts for correct clearances and function.

3.4 GLAZING OF VIEWPORT

.1 Remove protective coatings and clean contact surfaces with solvent and wipe dry.

.2 Cut glazing tape to proper length and set against permanent stops 1.5 mm below sight line. Install horizontal strips first, extend over entire width of opening before applying vertical strip.

.3 Install glass, ensure full contact and adhesion at perimeter.

.4 Place glazing tape on free perimeter of glass in manner described above.

.5 Install removable stops without displacing tape and sealant.

3.5 CLEANING AND TOUCH UP

.1 Clean all steel work to remove all loose dirt, oil and other foreign materials.

.2 Touch up any damaged primer coat.

3.6 ERECTION TOLERANCES

.1 Installation tolerances of installed frame for squareness, alignment, twist and plumbness are to be no more then +/- 1.5 mm in compliance with HMMA 841.

3.7 FIELD QUALITY CONTROL

.1 Provide qualified manufacturer's representative to instruct installers on the proper installation and adjustment of door assemblies.

.2 Provide manufacturer's representative to inspect door installation, and test minimum ten (10) cycles of operation. Correct any deficient doors.

END OF SECTION

Hollow Metal Door & Pressed Steel Frame Shop Drawings

Project: SLIDING AND SWINGING CELL DOORS
LEVEL 3 NAAMM 863-98 ASTM F1450-97 PERFORMANCE CRITERIA

Prepared By: CATRIONA L JOHNSON

Date: SEPTEMBER 26, 2007

FINAL

GENERAL NOTES: PLEASE READ

1) FABRICATION OF HOLLOW METAL DOORS & FRAMES WILL NOT COMMENCE UNTIL THE FOLLOWING IS RECEIVED:
   A) APPROVED HARDWARE SCHEDULE
   C) ALL NECESSARY HARDWARE TEMPLATES
   NOTE: LEAD TIMES VARY SO THIS INFORMATION IS CRITICAL

2) THESE DRAWINGS ARE FOR THE RCMP USE ONLY. RCMP WILL NOT ACCEPT ANY RESPONSIBILITY DUE TO ERRORS CAUSED BY THE USE OF THESE DRAWINGS BY OTHER TRADES.

3) DOORS AND FRAMES TO BE REINFORCED FOR SURFACE MOUNTED HARDWARE AS REQUIRED. DRILLING AND TAPPING FOR ATTACHING OF SURFACE MOUNTED HARDWARE BY OTHERS. DOORS AND FRAMES WILL BE BLANKED, REINFORCED, DRILLED AND TAPPED FOR MORTISED TEMPLATED HARDWARE. TRIM MOUNTING HOLES AND ALL HOLES Ø1/2" [13 mm] & LESS, BY OTHERS.

4) MAXIMUM ALLOWABLE DISTANCE BETWEEN THE SLIDING DOOR AND THE FRAME MUST BE LIMITED TO 1/8" [3 mm]. FIELD SHIMMING MAY BE REQUIRED ON SITE BY THE INSTALLATION CONTRACTOR TO OBTAIN THE DESIRED CLEARANCES.

5) ALL DOORS AND FRAMES TO BE MARKED WITH THE DOOR MANUFACTURER'S NAME AND PRODUCT NUMBER ON THE SECOND HINGE FROM THE TOP UNLESS SPECIFIED OTHERWISE.

6) ALL HOLLOW METAL FRAMES SHALL BE OF WELDED CONSTRUCTION UNLESS NOTED OTHERWISE.

7) ALL SWING TYPE FRAMES TO BE PREPARED FOR PUSH-IN TYPE SILENCERS, 3 PER STRIKE JAMB FOR SINGLE FRAMES OR 2 PER HEAD FOR DOUBLE FRAMES.

8) ALL HARDWARE LOCATIONS ON THE DOORS & FRAMES TO BE AS PER THE FOLLOWING DRAWINGS, UNLESS ADVISED OTHERWISE.

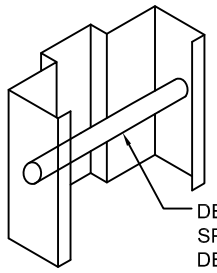
9) GENERAL CONTRACTOR IS RESPONSIBLE TO ENSURE THAT FRAMES AND DOORS ARE SET PLUMB, SQUARE, LEVEL AND THAT WALLS AND FRAME ARE FULLY GROUTED. THE MANUFACTURER OF HOLLOW METAL DOORS AND/OR PRESSED STEEL FRAMES CAN NOT CONTROL THE QUALITY OF EITHER THE HARDWARE, THE FIELD INSTALLATION OF HARDWARE, OR THE PROPER ERECTION OF FRAMES IN THE WALL.

10) ALL BURRS AND SHARP EDGES MUST BE REMOVED AFTER INSTALLATION.

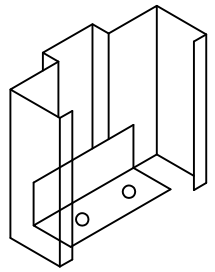
11) THE FOLLOWING SHOP DRAWINGS REFLECT A STANDARD 195 mm BLOCK WALL CONSTRUCTION, SITE CONDITIONS MAY VARY.

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 2

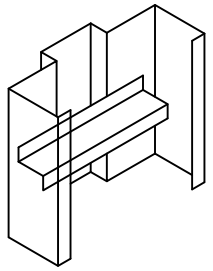
A-3 ANCHOR TYPES



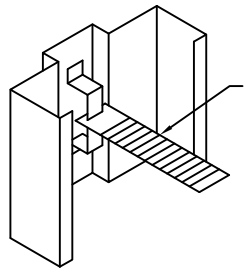
WELDED ROD ANCHOR



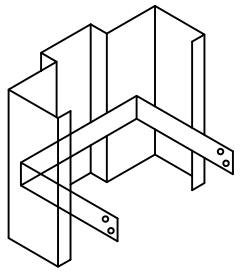
STANDARD FIXED BASE ANCHOR



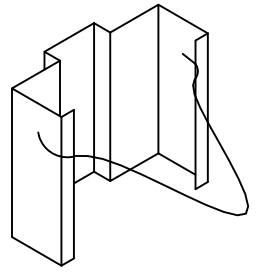
STEEL STUD ANCHOR



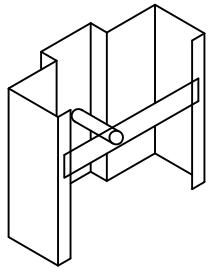
CORRUGATED TAIL ANCHOR



WOOD STUD ANCHOR



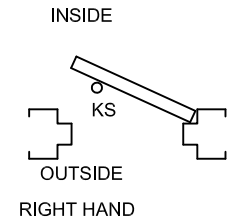
CONCRETE BLOCK WALL WIRE ANCHOR



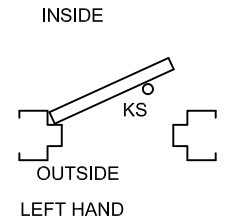
EXISTING WALL ANCHOR

B-3 DOOR AND FRAME HANDING CHART

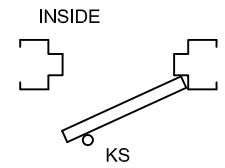
TO DETERMINE HAND(SWING) OF DOOR AND FRAME STAND OUTSIDE - FACING DOOR



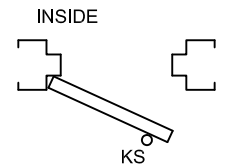
RIGHT HAND



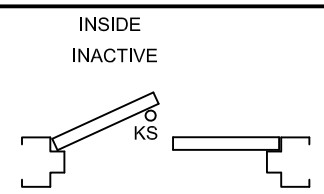
LEFT HAND



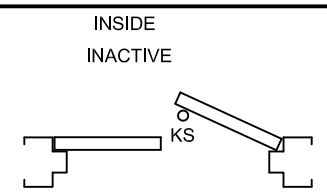
OUTSIDE
RIGHT HAND REVERSE



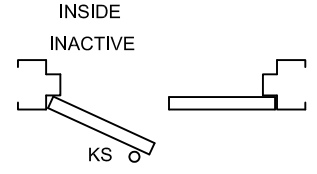
OUTSIDE
LEFT HAND REVERSE



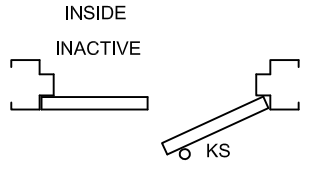
OUTSIDE
PAIR OF DOORS
LH ACTIVE



OUTSIDE
PAIR OF DOORS
RH ACTIVE



OUTSIDE
PAIR OF DOORS
LHR ACTIVE



OUTSIDE
PAIR OF DOORS
RHR ACTIVE

* KS IS THE KEY SIDE OF DOOR (PLEASE CHECK ALL SWINGS TO ENSURE KEY IS ON PROPER SIDE OF DOOR)

FIRE RATING LABELS

A - 3 HOUR
B - 1 1/2 HOUR
C - 45 MINUTE
20M - 20 MINUTE

DOOR MATERIALS

HM - HOLLOW METAL DOOR - HONEYCOMB
IHM - INSULATED HOLLOW METAL DOOR - POLYSTYRENE
SLH - STEEL STIFFENED (LAMINATED-HONEYCOMB)
SLP - STEEL STIFFENED (LAMINATED-POLYSTYRENE)
SWF - STEEL STIFFENED (WELDED-FIBREGLASS)
SCW - SOLID CORE WOOD DOOR
HCW - HOLLOW CORE WOOD DOOR
PLM - PLASTIC LAMINATED

REMOVABLE STOPS

PL - PULL SIDE OF DOOR
PS - PUSH SIDE OF DOOR

ANCHOR TYPES

SS - STEEL STUD ANCHOR
CT - CORRUGATED TAIL ANCHOR
WS - WOOD STUD ANCHOR
EWA - EXISTING WALL ANCHOR
CB - CONCRETE BLOCK WIRE ANCHOR
BA - BASE ANCHOR
WR- WELDED ROD ANCHOR

HARDWARE

PP - PUSH & PULL
RIM - RIM PANIC
VR - VERTICAL ROD
FB - FLUSH BOLT
R/F - REINFORCE
CVR - CONCEALED VERTICAL ROD

DOOR SWINGS

LH - LEFT HAND
LHR - LEFT HAND REVERSE
RH - RIGHT HAND
RHR - RIGHT HAND REVERSE

REVISIONS:

REVISION AS PER THE MEETING ON JULY 20, 2006

NOTES:

FINAL

JOB:

CONTRACTOR:

DRAWN BY: CL JOHNSON

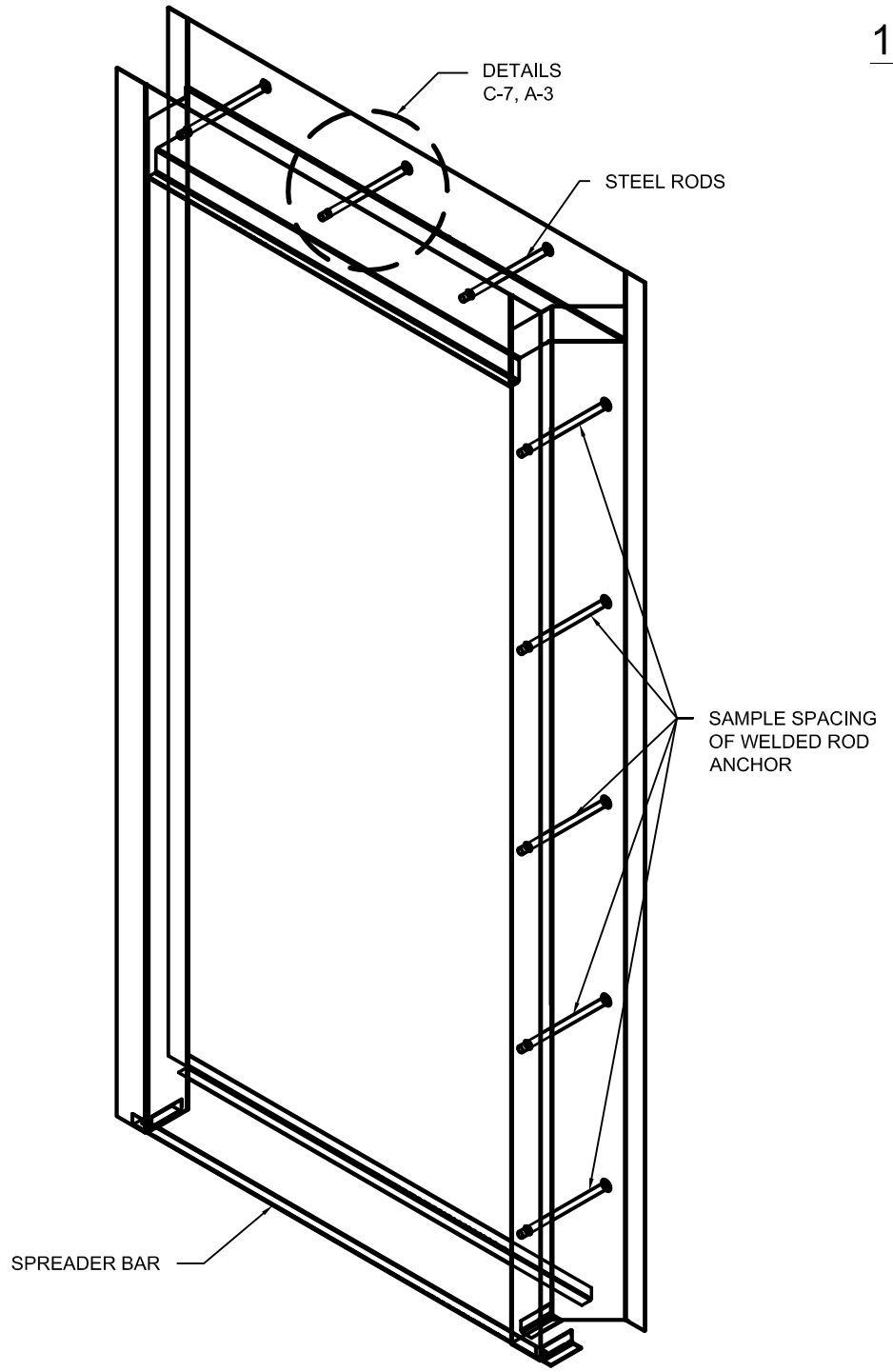
DATE: 9/26/2007

W.O.#:

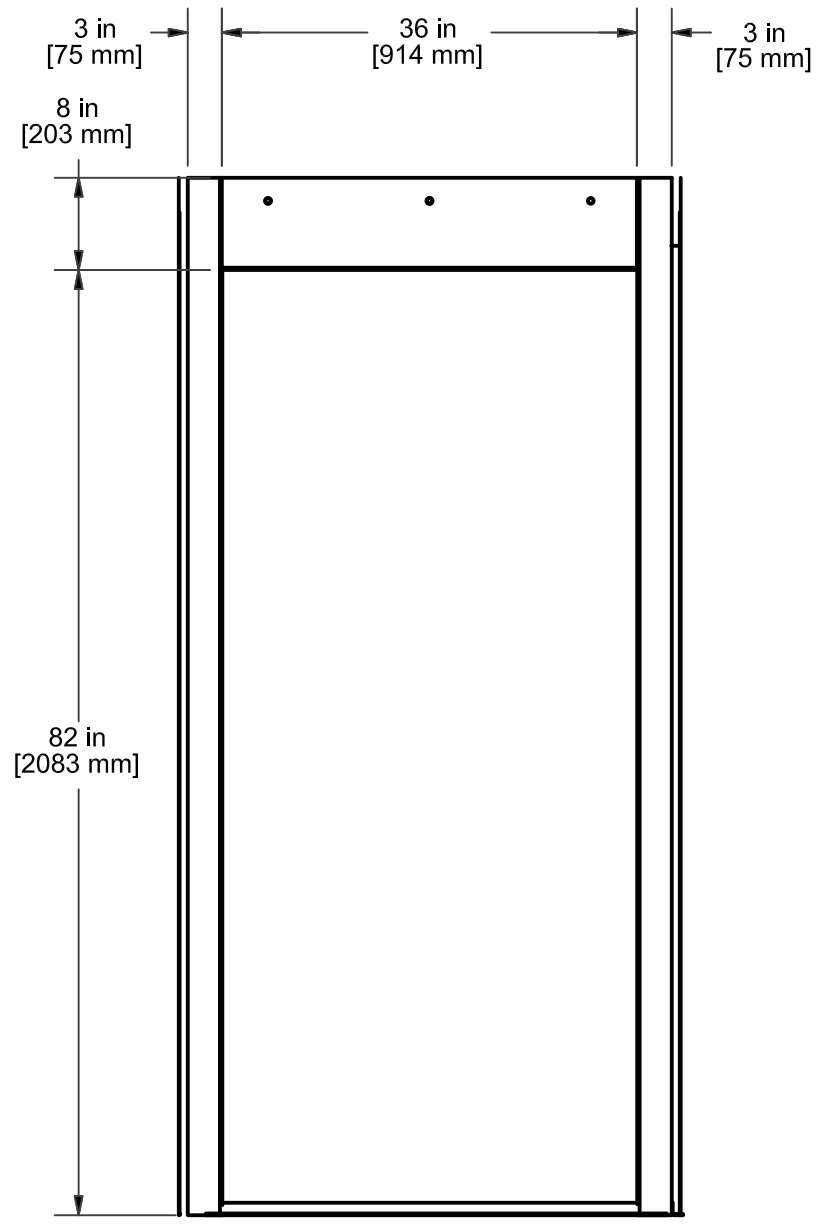
FILE NUMBER:

PG.#: 3

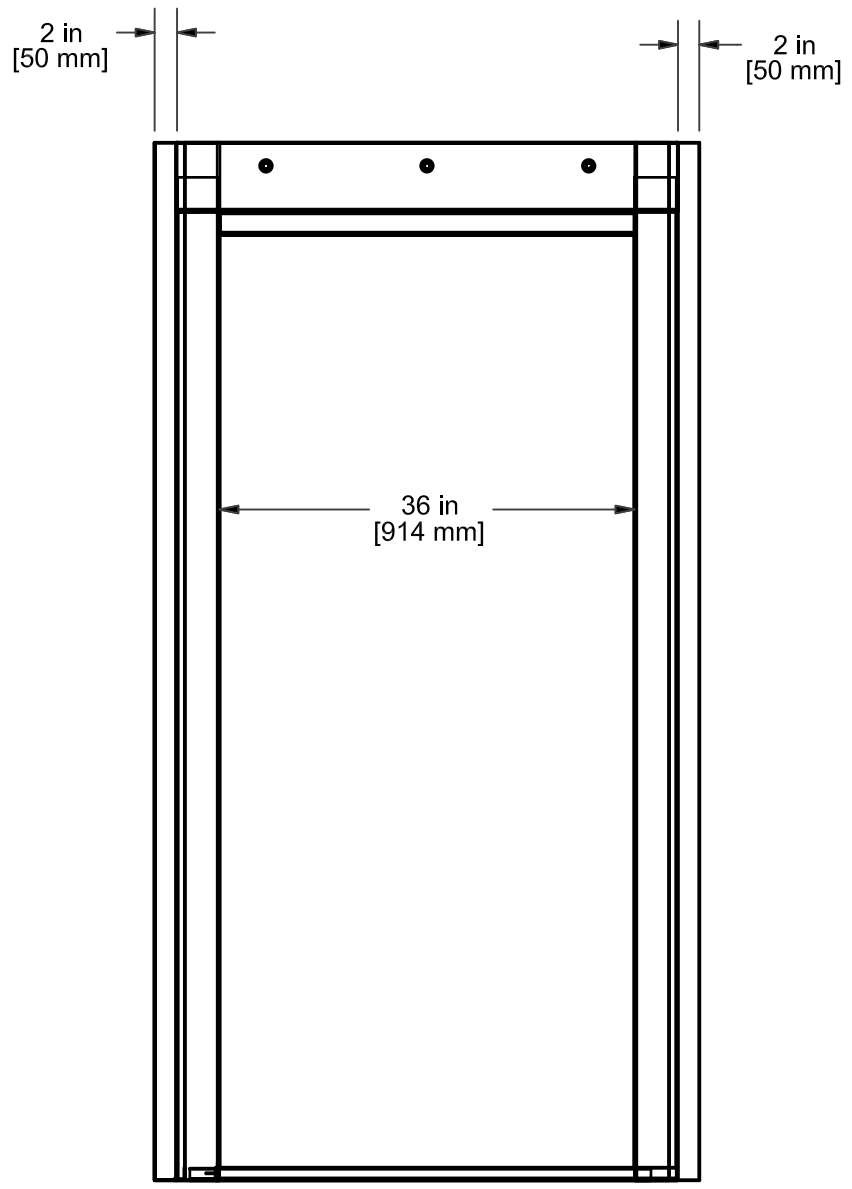
12GA. FRAME FOR SLIDING DOOR



A-4 ISOMETRIC VIEW



B-4 CORRIDOR SIDE

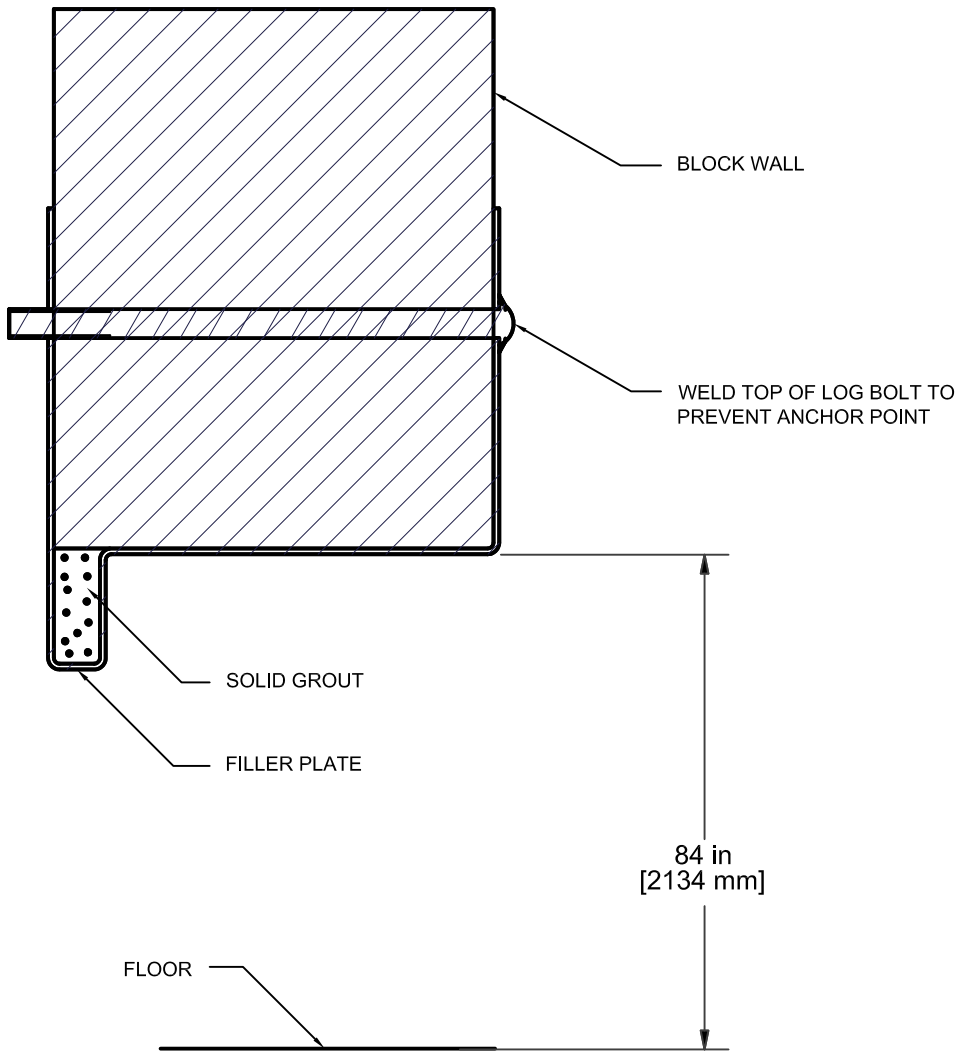


C-4 DETAINEE SIDE

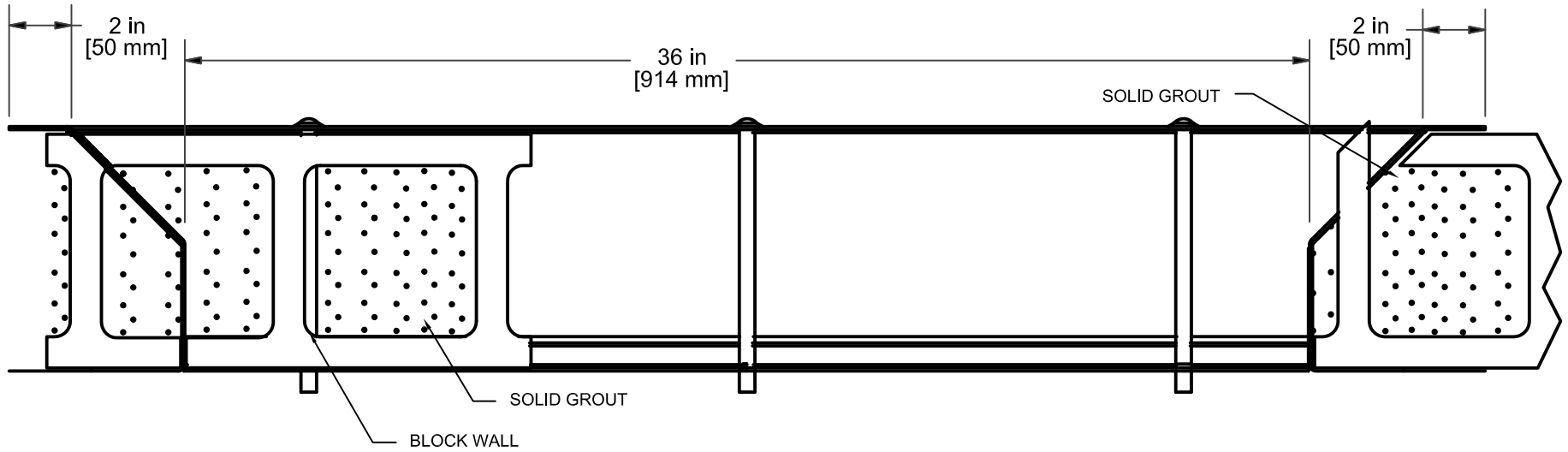
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: PG.#: 4

NOTE: FRAME MUST BE FULLY GROUTED FOR PROPER SLIDING ASSEMBLY INSTALLATION

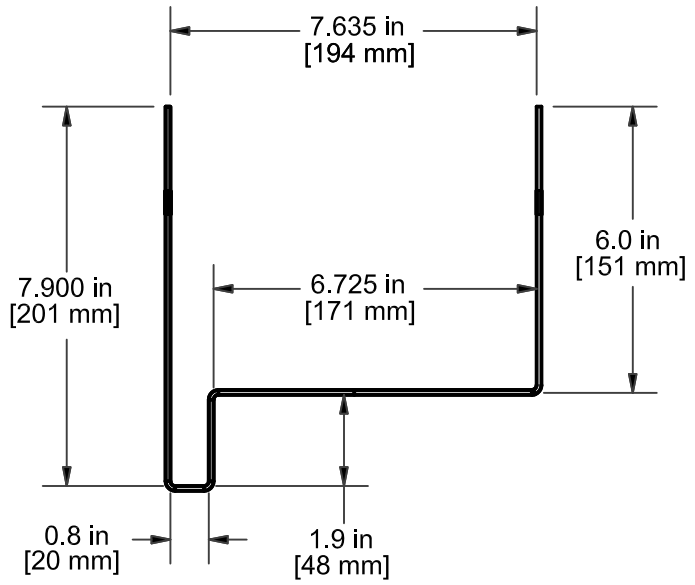
NOTE: OPTIONAL 2" LENGTH X 3/16" [51 x 5 mm] FILLER PLATE CONTINUALLY WELDED TO HEADER AND SIDES OF FRAME.

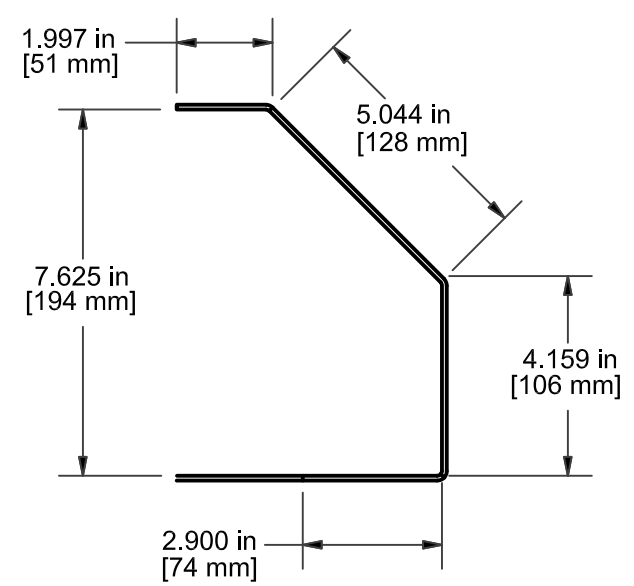


A-5 SECTION THROUGH FRAME



B-5 CROSS SECTION THROUGH JAMBS & HEADER



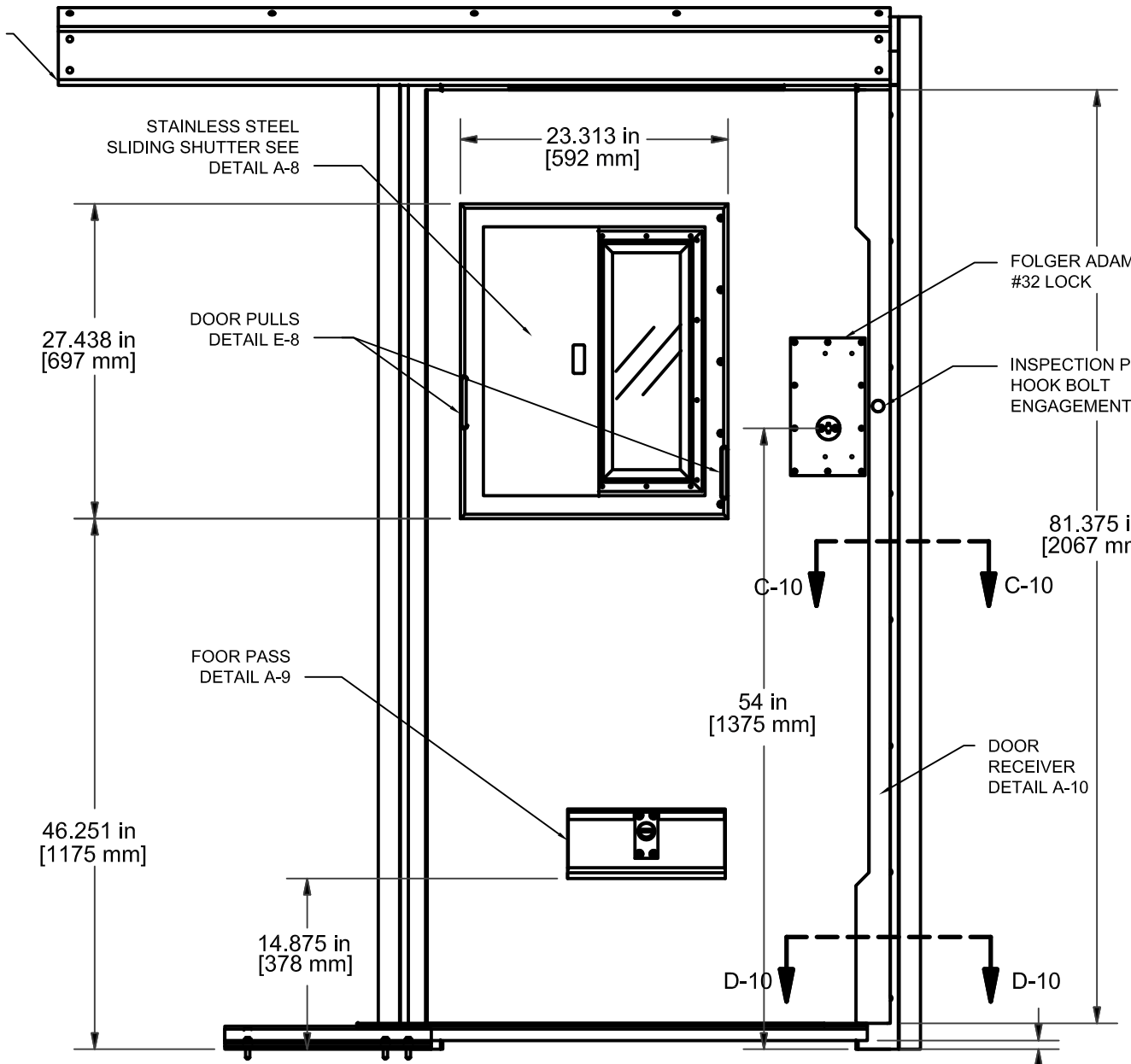


C-5 JAMB PROFILES FOR BENDING

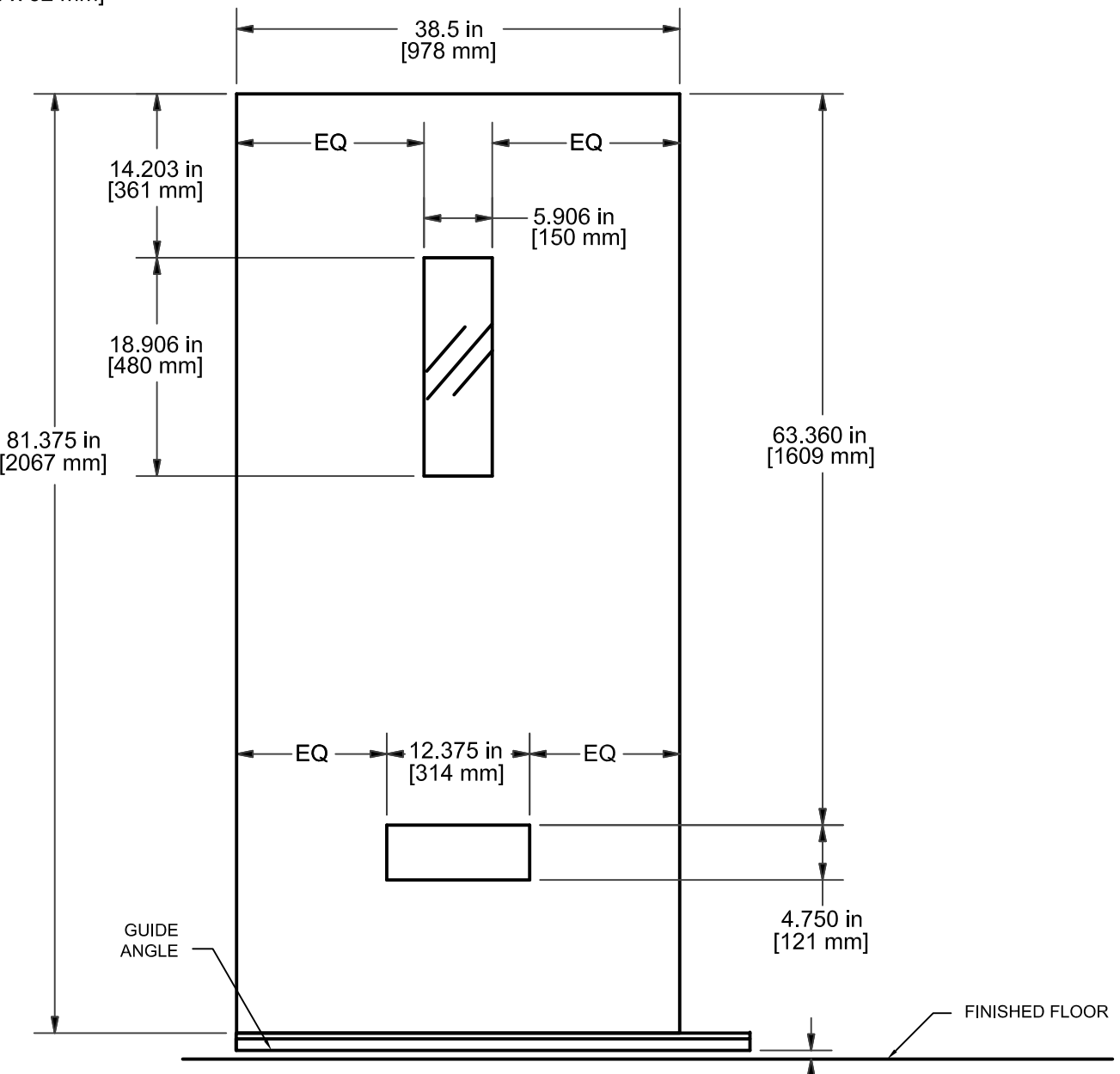
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 5

TYPE A CELL DOOR (SLIDING)

12GA. FRAME & 14GA. STEEL STIFFENED DETENTION DOOR
LEVEL 3 NAAMM 863-98 AND ASTM - F1450-97 PERFORMANCE CRITERIA
FOR STATIC LOAD, RACK, IMPACT, & EDGE CRUSH TESTS
3'-0" x 7'-0" x 2" [914 x 2134 x 52 mm]

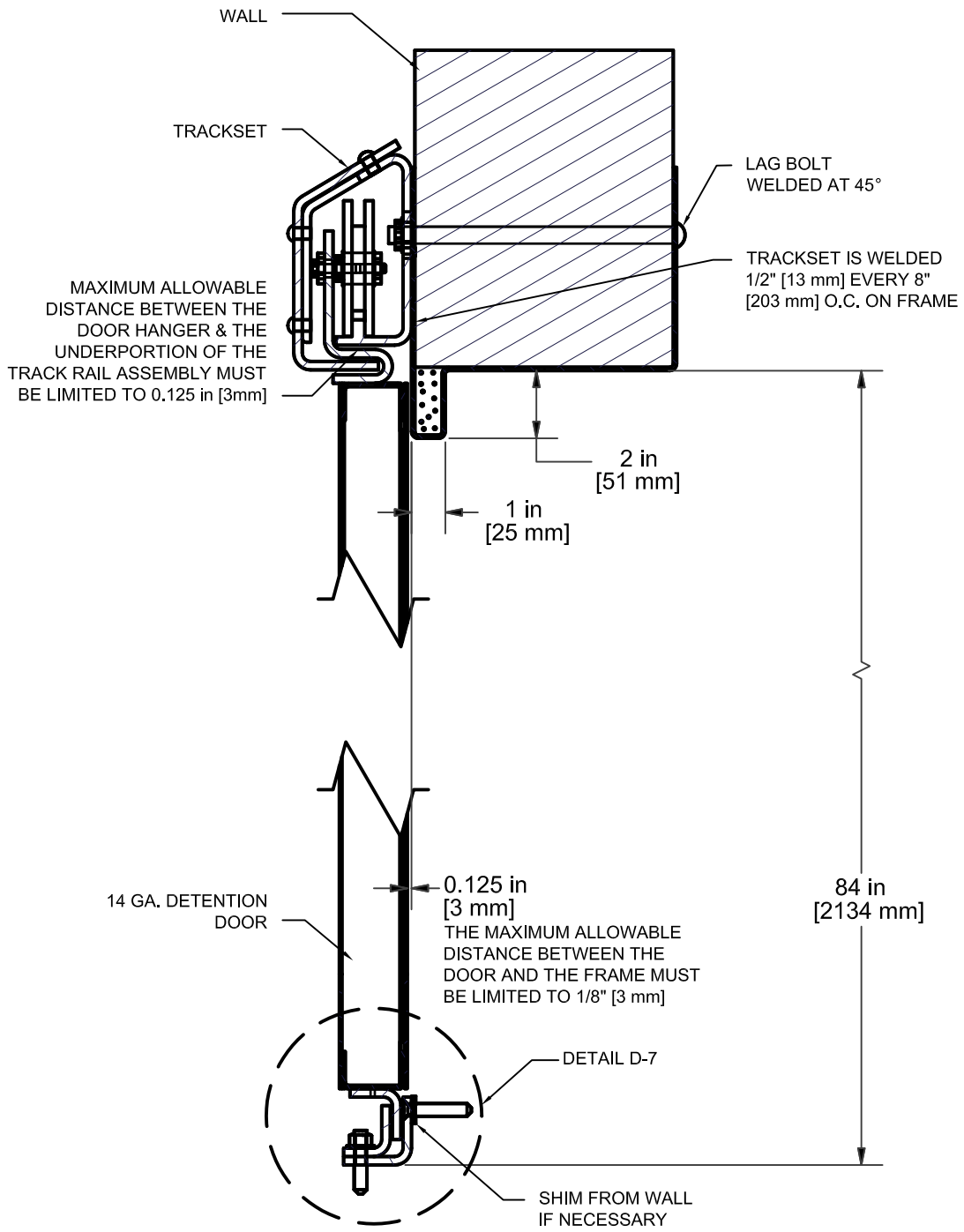


A-6 VIEW FROM CORRIDOR SIDE



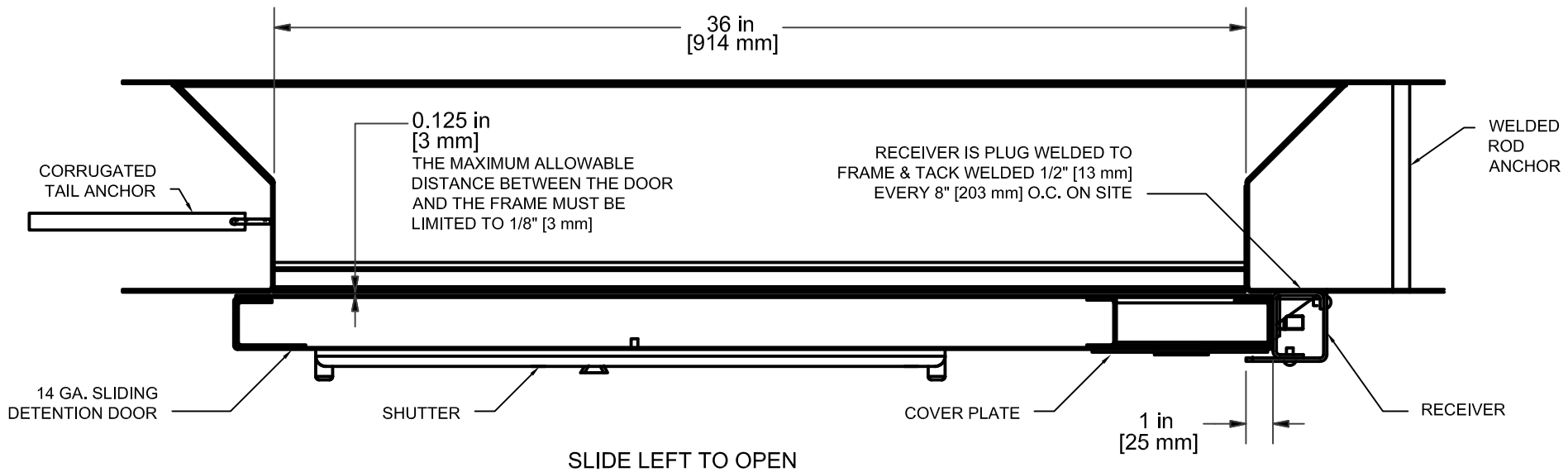
B-6 VIEW FROM DETAINEE SIDE

REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 6



A-7 SECTION THROUGH TRACKSET AND DOOR

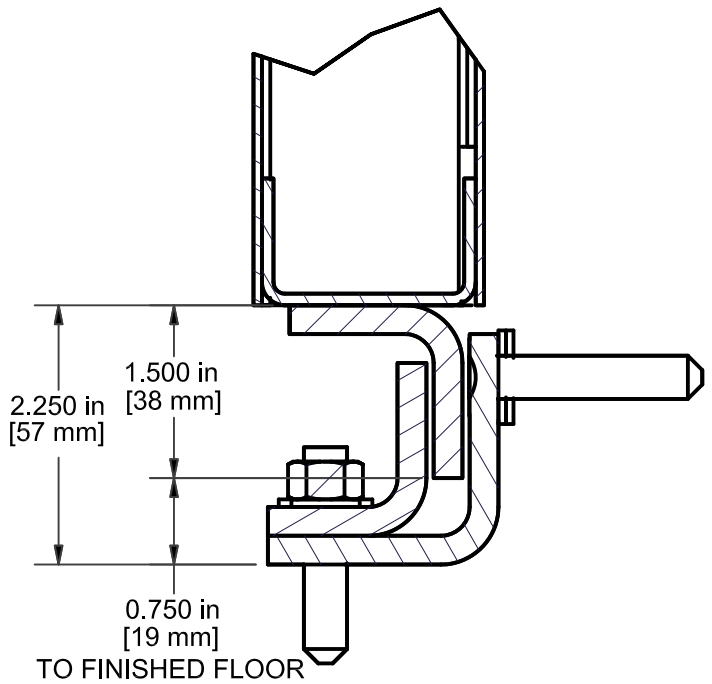
CROSS SECTION THROUGH DOOR AND RECEIVING ENCLOSURE



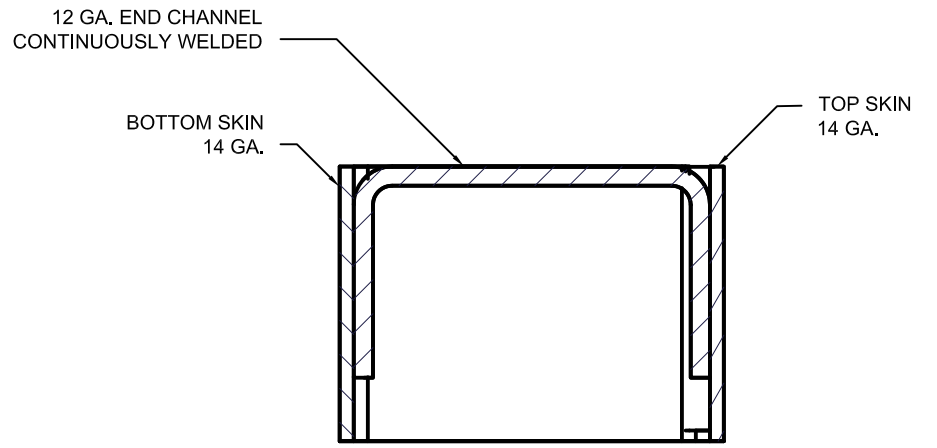
SLIDE LEFT TO OPEN

B-7 CT ANCHOR

C-7 WR ANCHOR

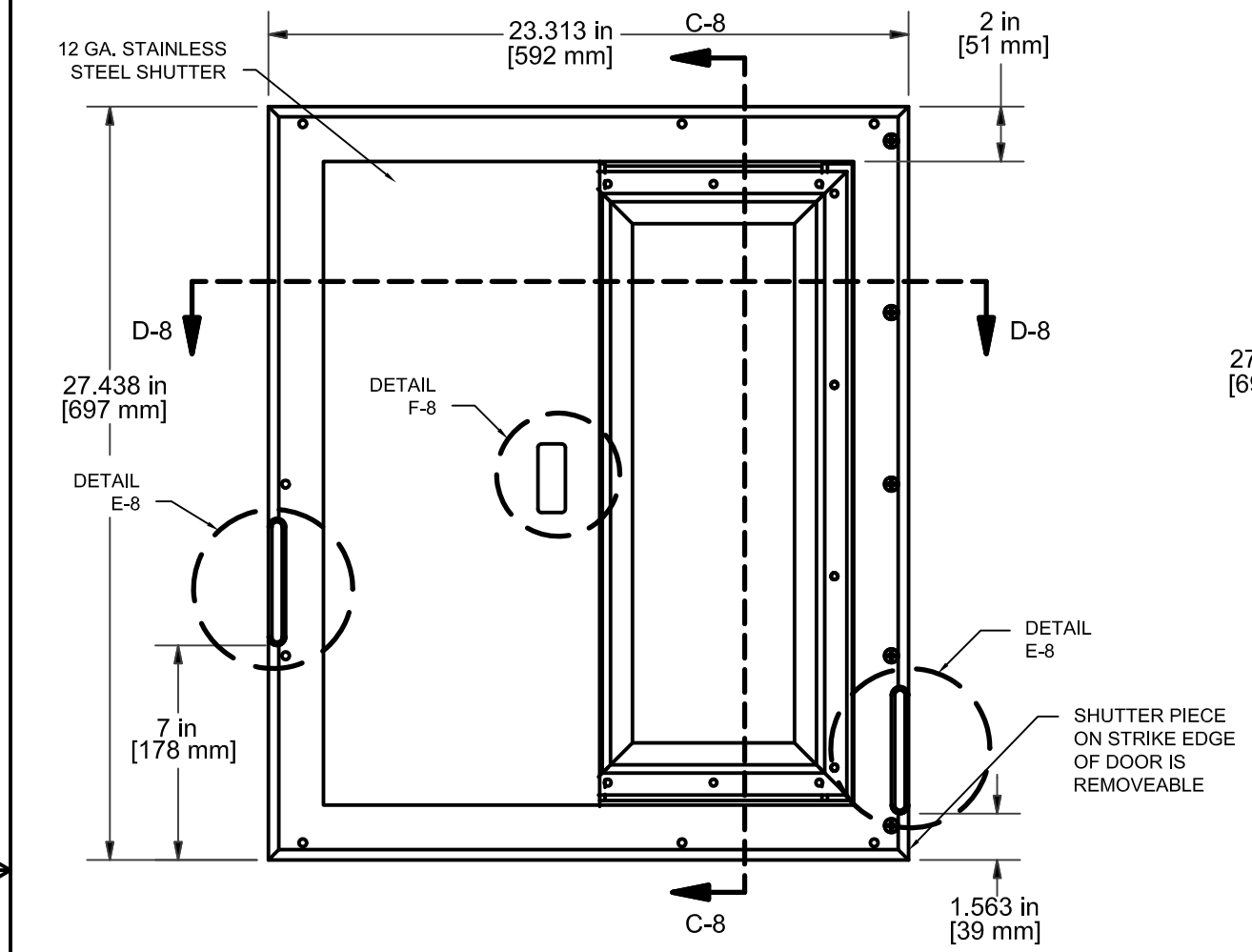


D-7 DETAIL

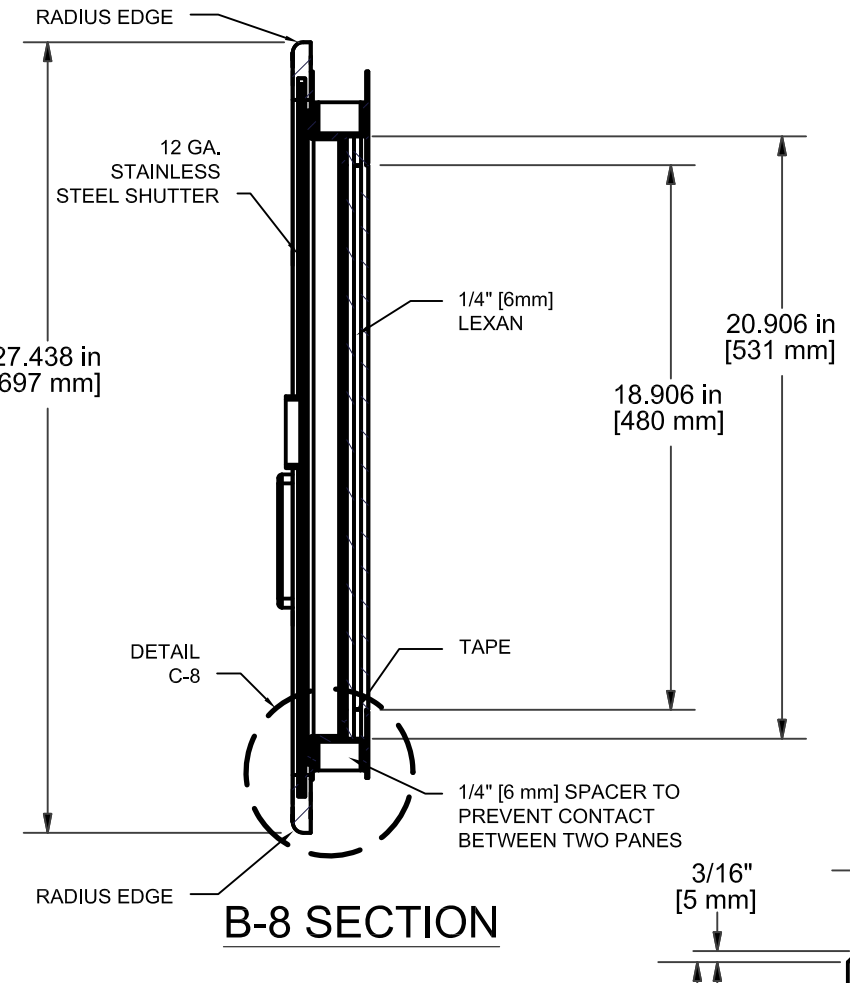


E-7 DETAIL TOP & BOTTOM END CHANNEL

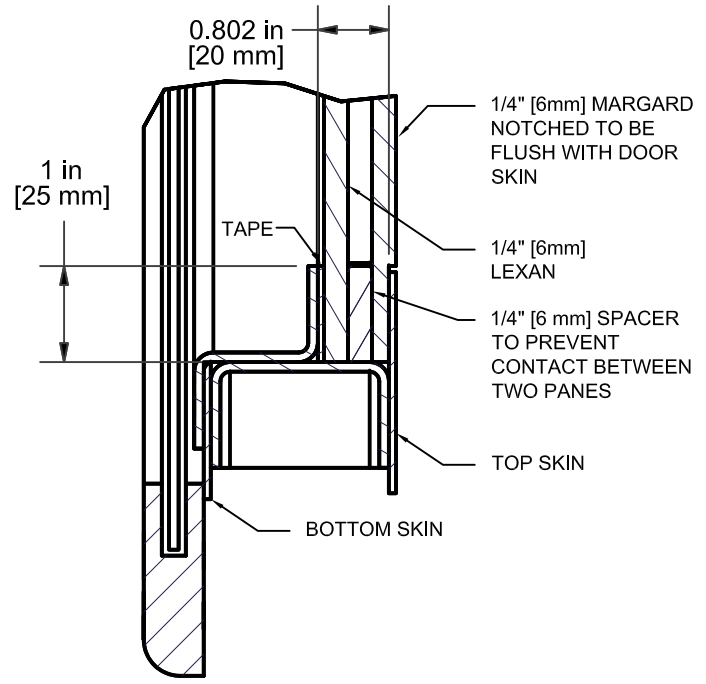
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	SEE A-3 FOR ADDITIONAL ANCHOR OPTIONS	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 7



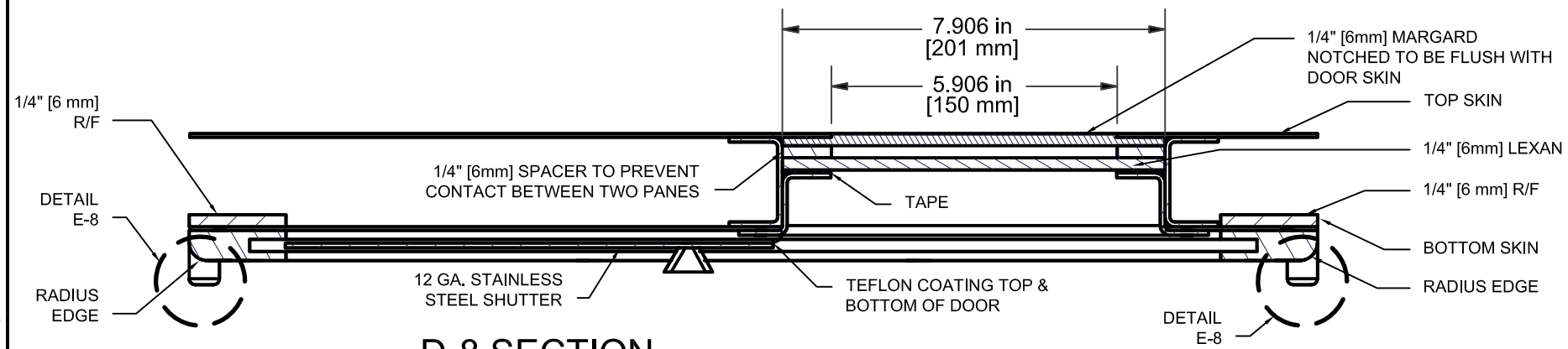
A-8 SLIDING SHUTTER



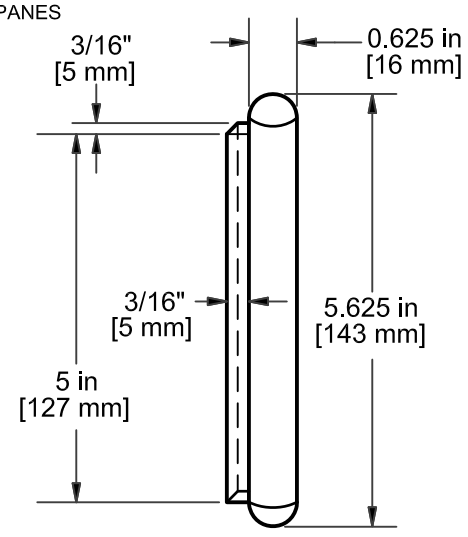
B-8 SECTION



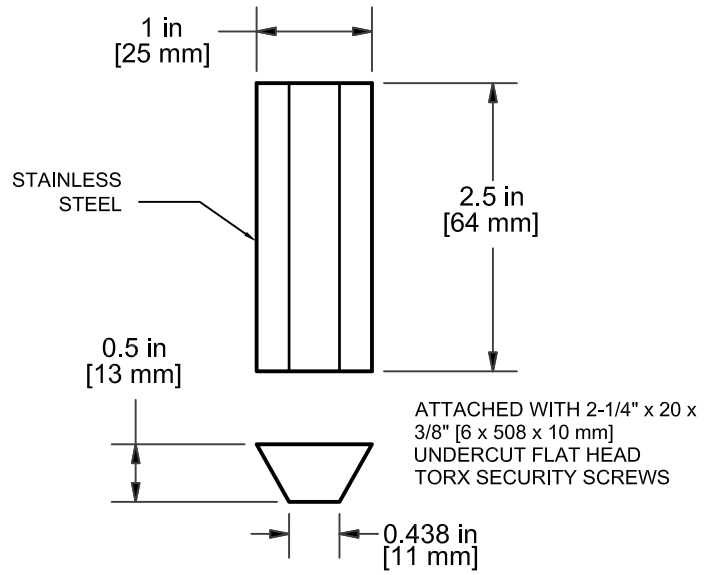
C-8 GLAZING DETAIL



D-8 SECTION

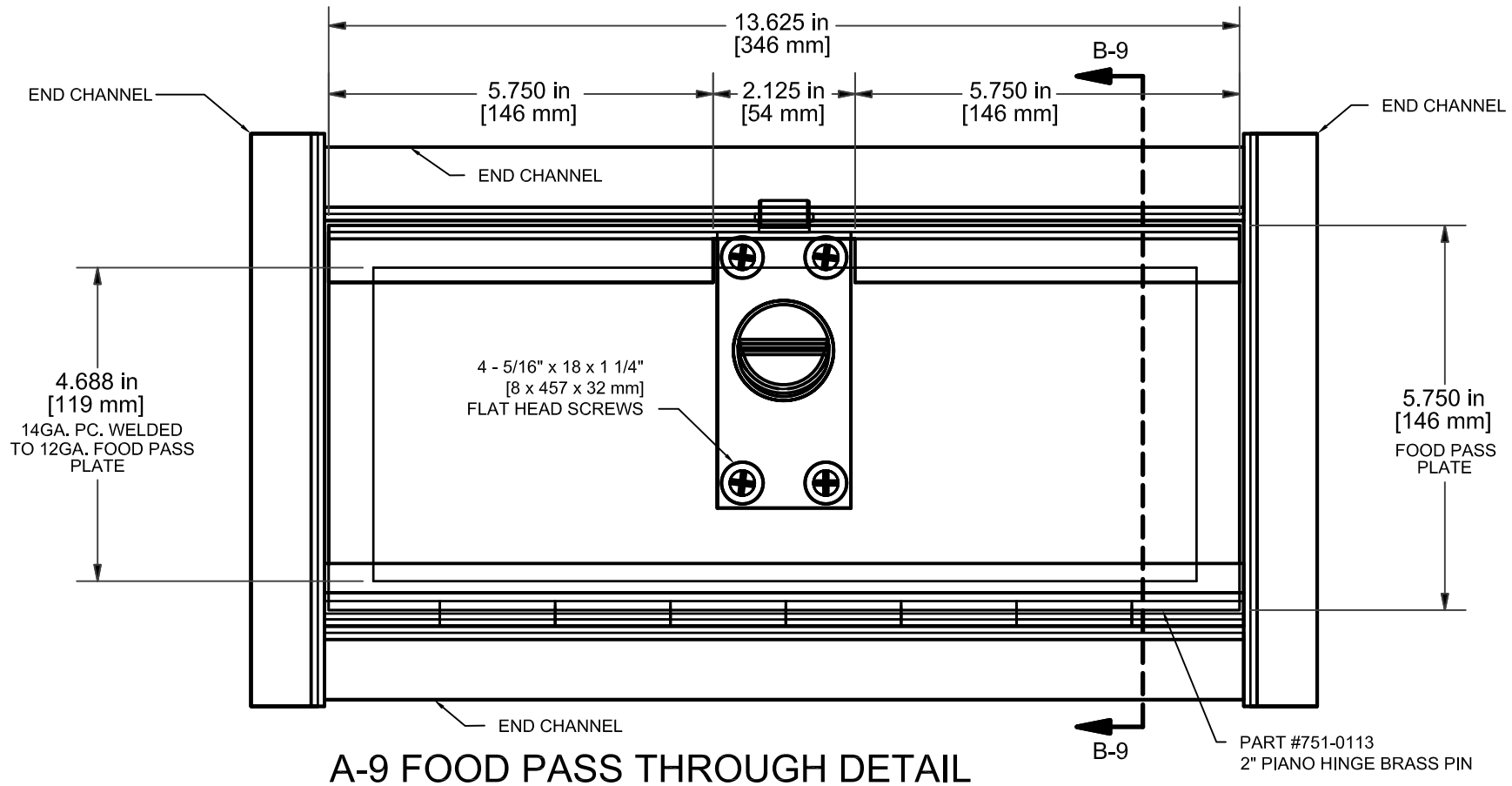


E-8 SLIDING DOOR HANDLE DETAIL

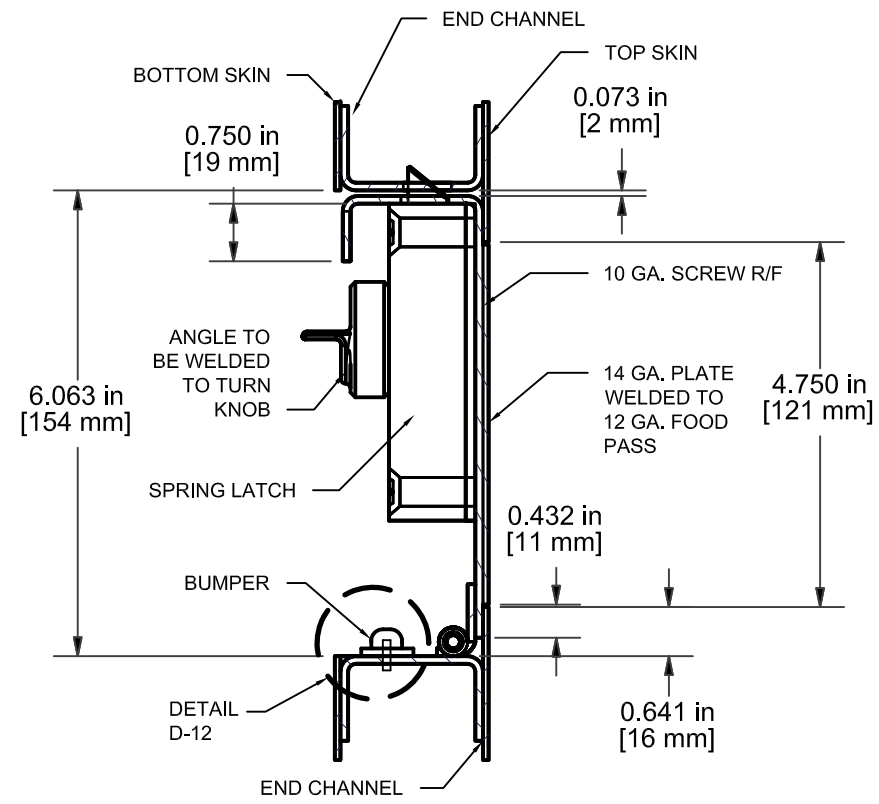


F-8 SHUTTER HANDLE DETAIL

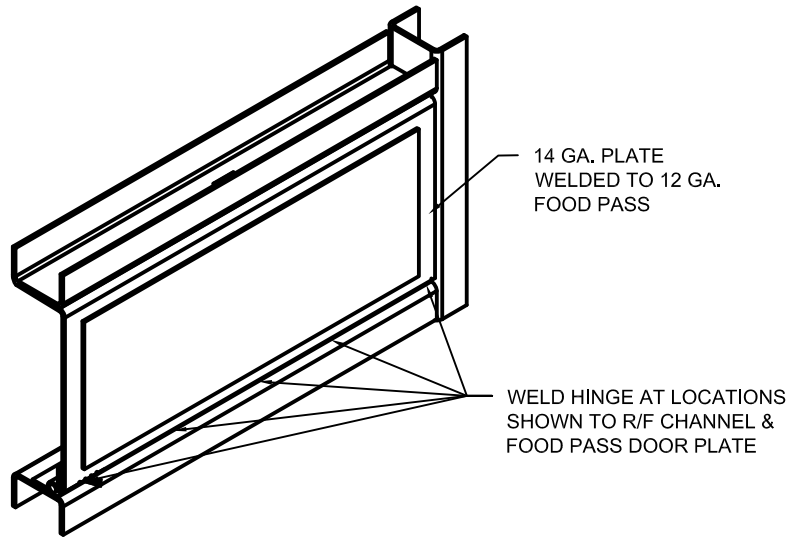
REVISIONS:	NOTES:		JOB:
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:
			DRAWN BY: CL JOHNSON / DATE: 9/26/2007
			W.O.#: / FILE NUMBER: / PG.#: 8



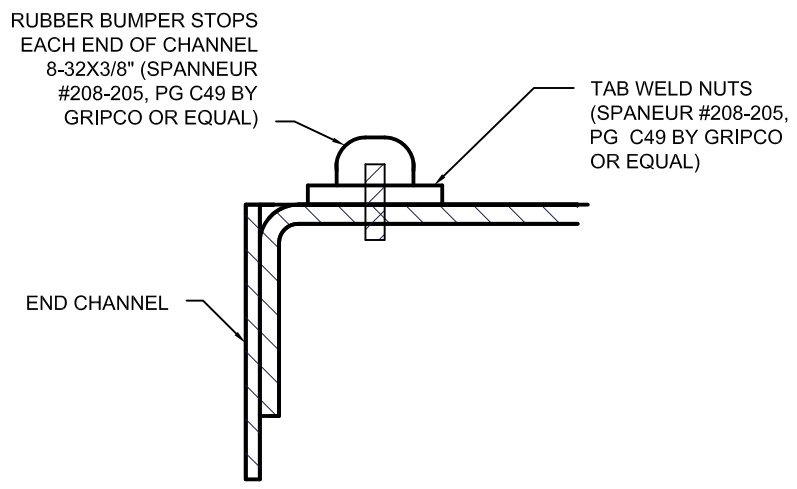
A-9 FOOD PASS THROUGH DETAIL



B-9 SECTION

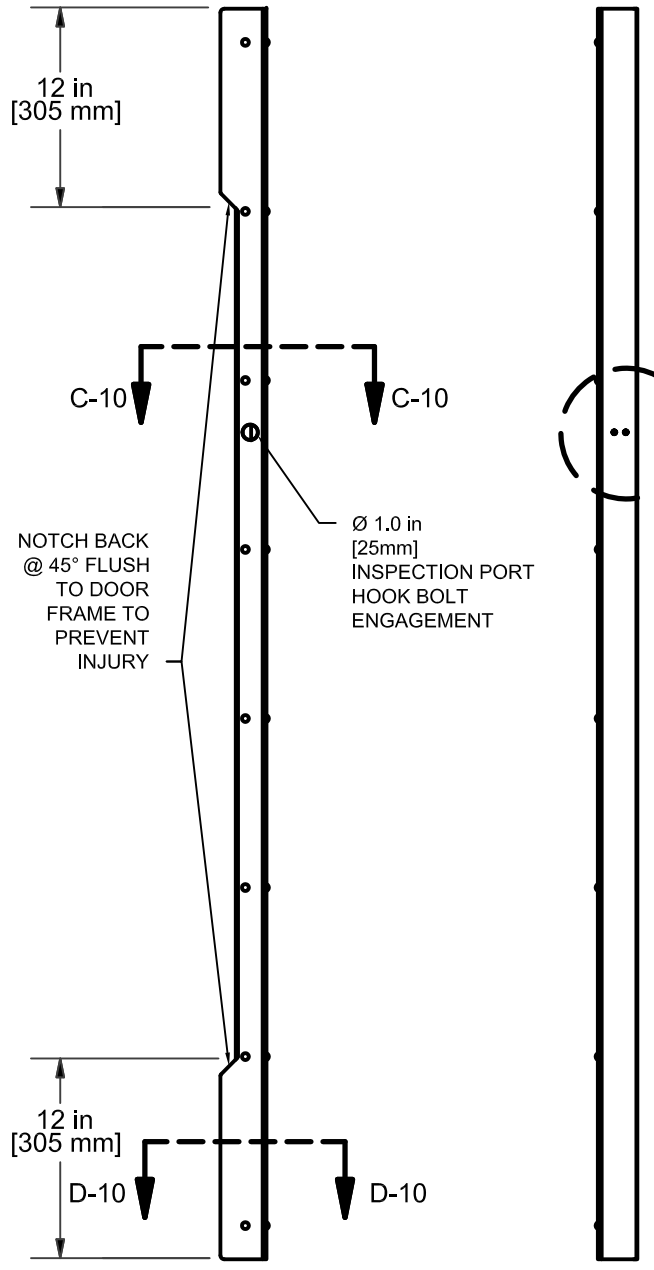


C-9 FOOD PASS THROUGH DETAIL

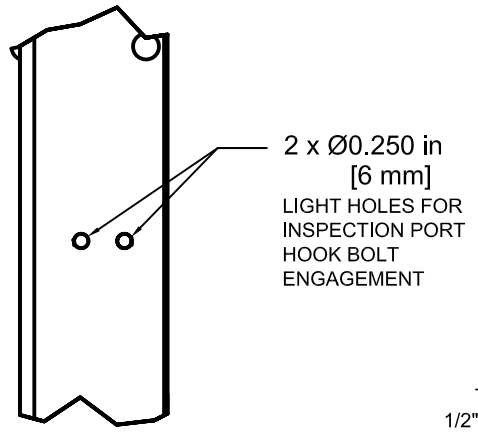


D-12 BUMPER DETAIL

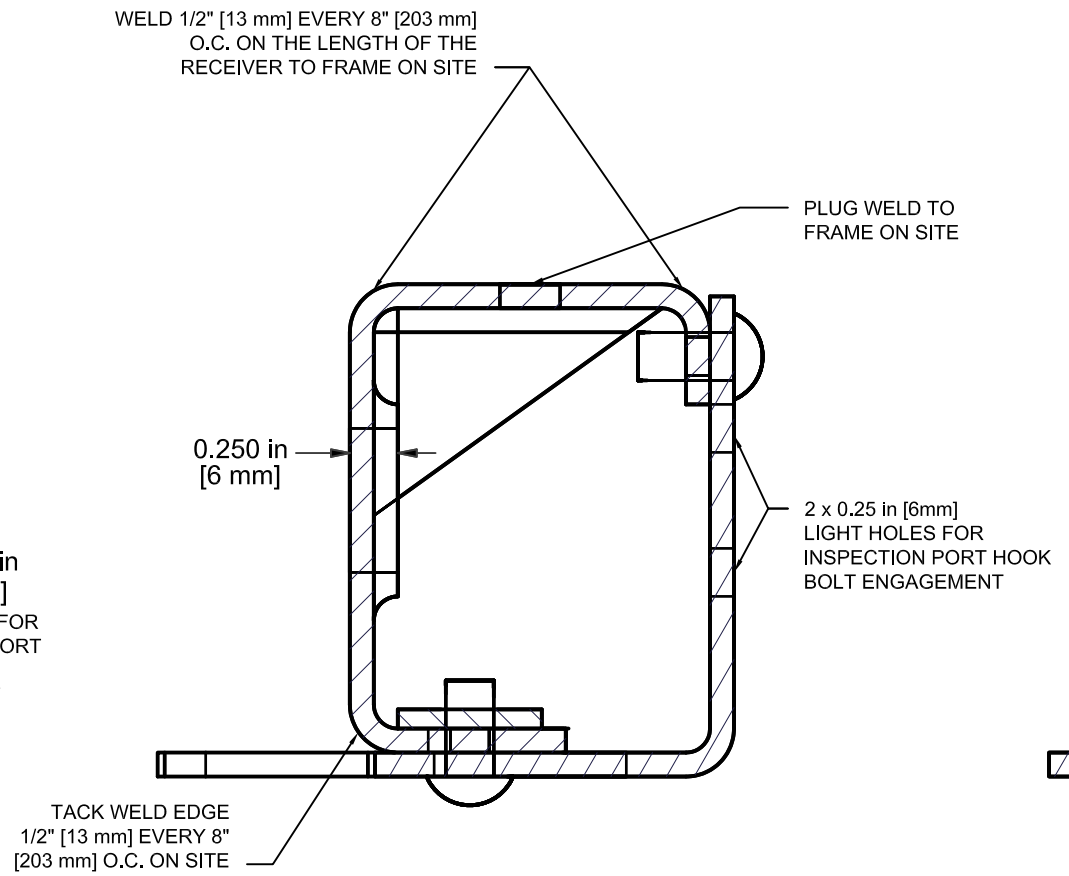
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 9



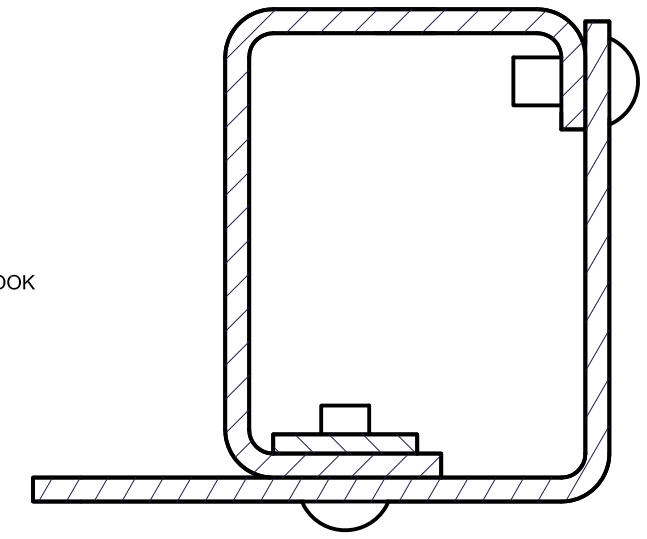
A-10 DOOR RECEIVER



B-10 DETAIL



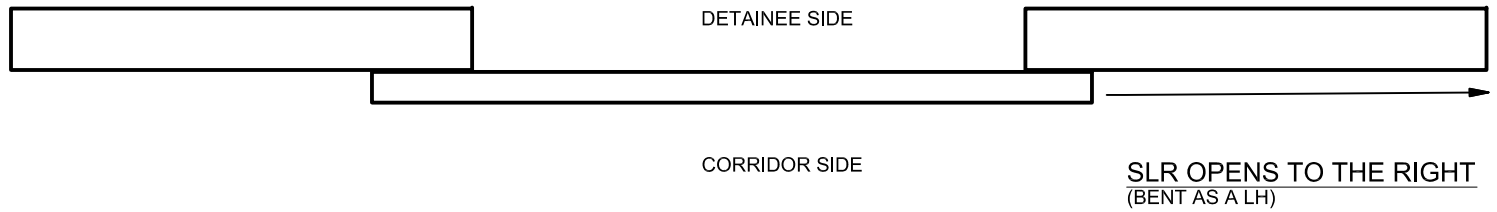
C-10 SECTION THROUGH DOOR RECEIVER



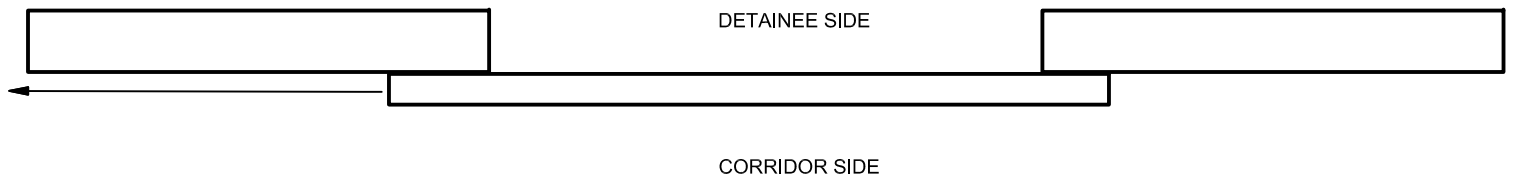
D-10 SECTION THROUGH DOOR RECEIVER

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	REMOVE ALL BURRS AND SHARP EDGES AFTER WELDING	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 10

A-11 SLIDING HANDING SHEET



SLR OPENS TO THE RIGHT
(BENT AS A LH)

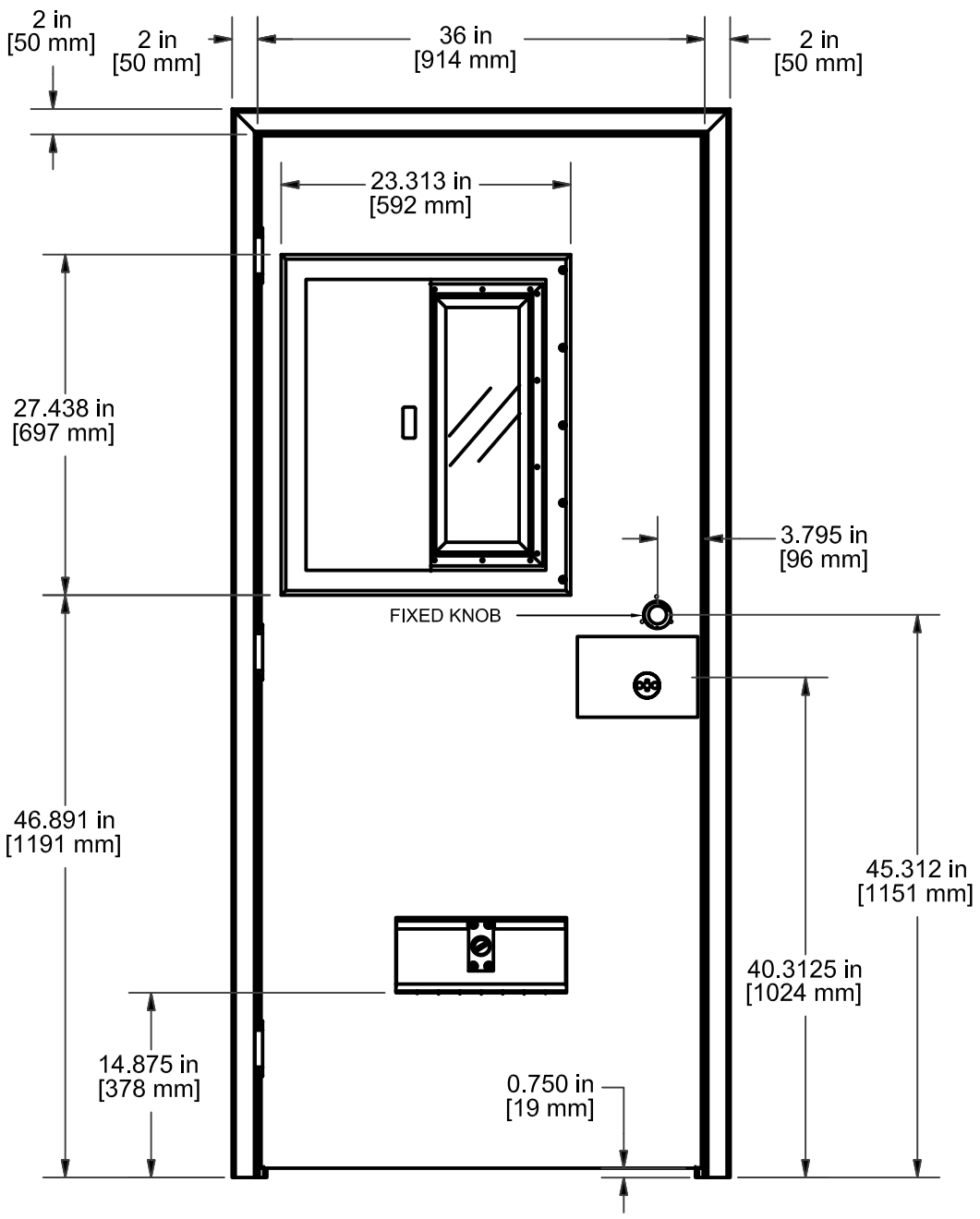


SLL OPENS TO THE LEFT
(BENT AS A RH)

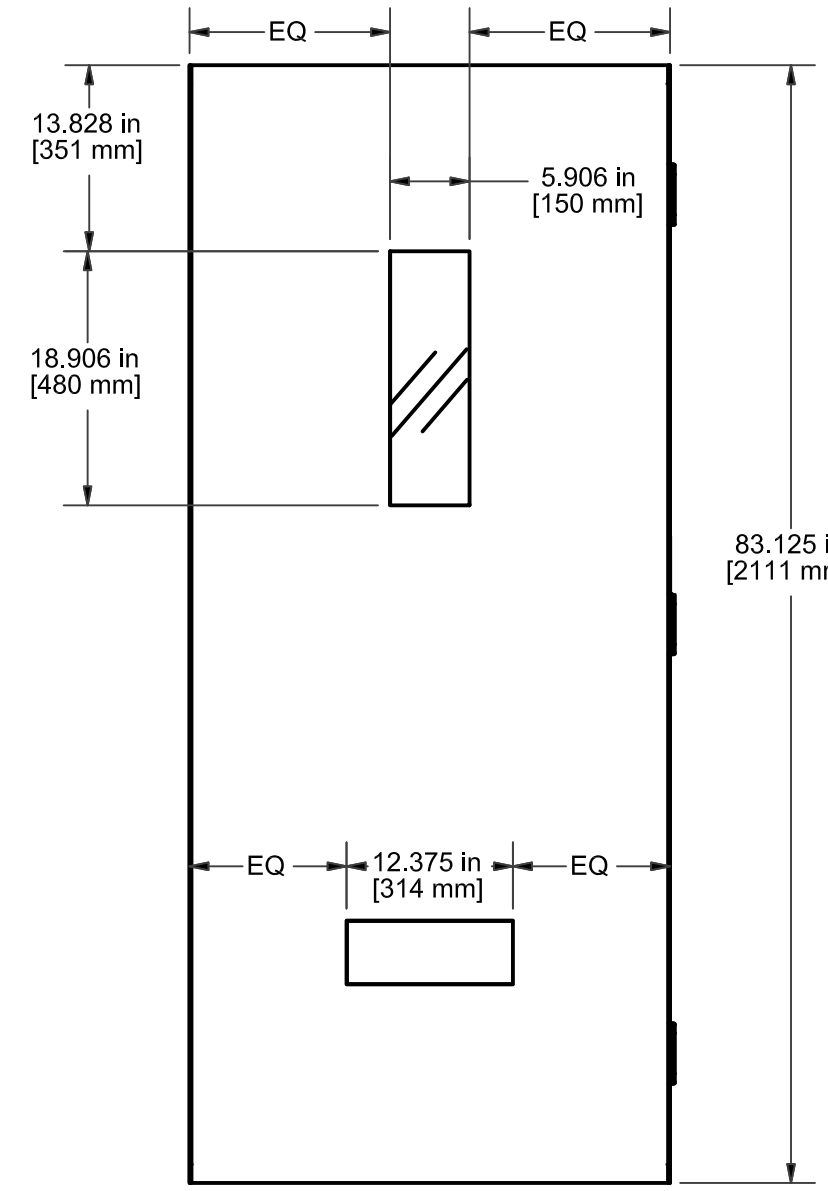
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 11

TYPE B CELL DOOR (SWINGING)

(MAY ALSO BE INSTALLED IN TYPE A CELLS)
12GA. FRAME & 14GA. STEEL STIFFENED DETENTION DOOR
LEVEL 3 NAAMM 863-98 AND ASTM - F1450-97 PERFORMANCE CRITERIA
FOR STATIC LOAD, RACK, IMPACT, & EDGE CRUSH TESTS
3'-0" x 7'-0" x 2" [914 x 2134 x 51 mm]

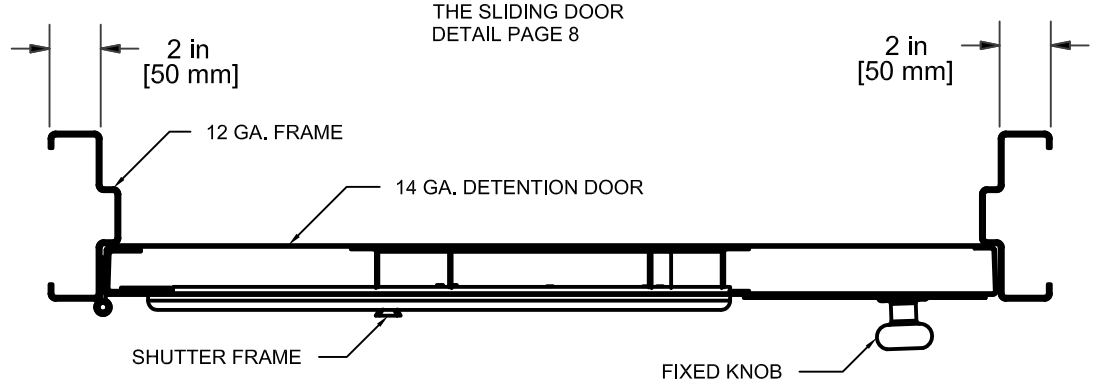


A-12 VIEW FROM CORRIDOR SIDE

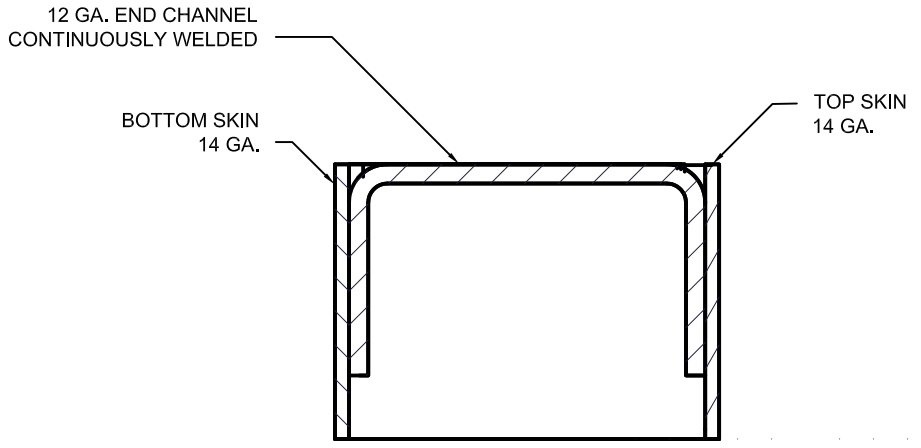


B-12 VIEW FROM DETAINEE SIDE

NOTE: LITE KIT IS THE SAME AS
THE SLIDING DOOR
DETAIL PAGE 8

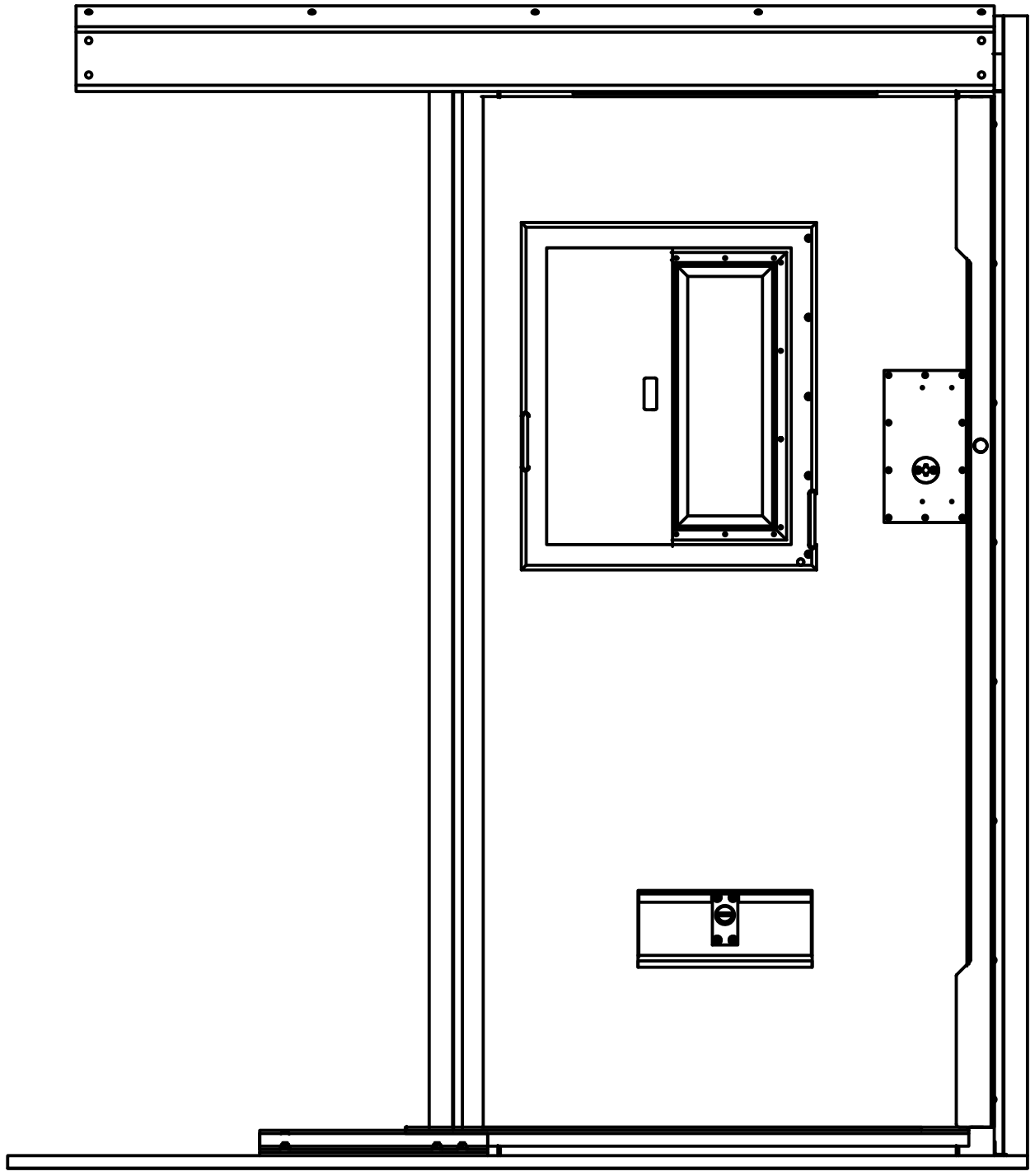


C-12 CROSS SECTION THROUGH
DOOR & FRAME

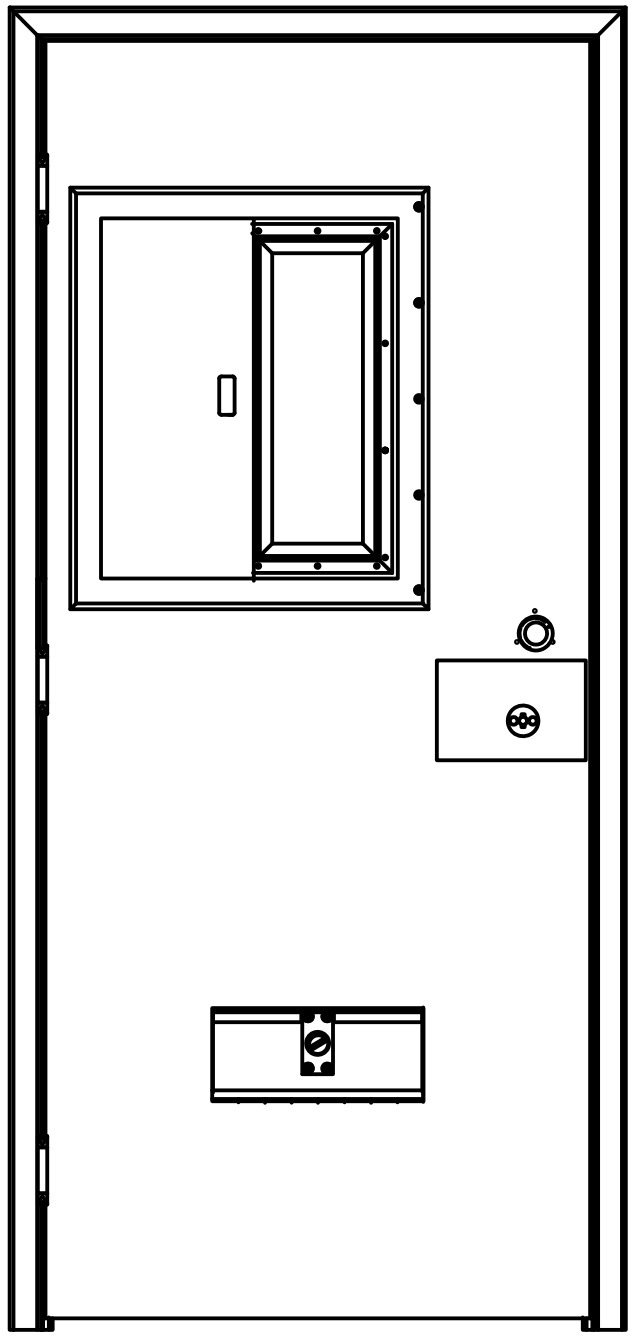


D-12 DETAIL TOP &
BOTTOM END CHANNEL

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 12



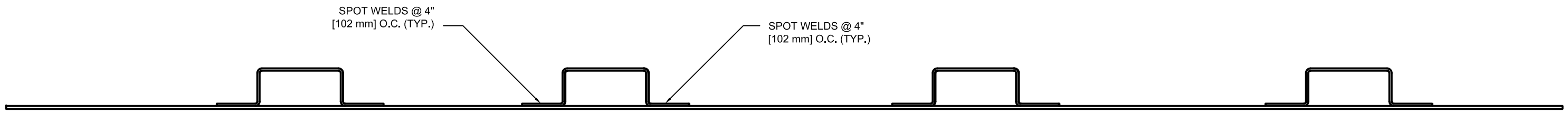
A-13 RCMP SLIDING DOOR



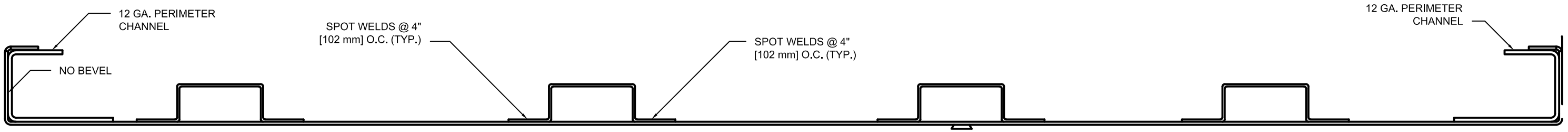
B-13 RCMP SWINGING DOOR

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: PG.#: 13

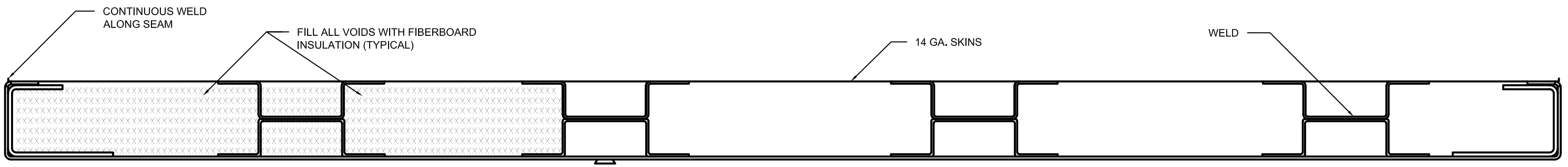
TYPE A CELL DO0R (SLIDING)



A-14 TOP SKIN PROFILE



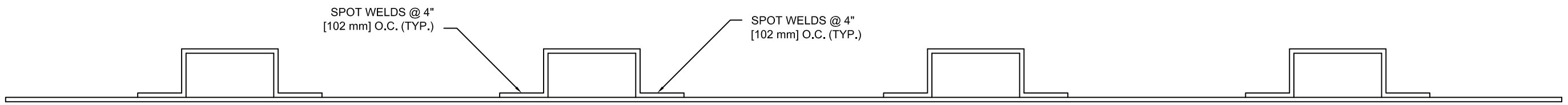
B-14 BOTTOM SKIN PROFILE



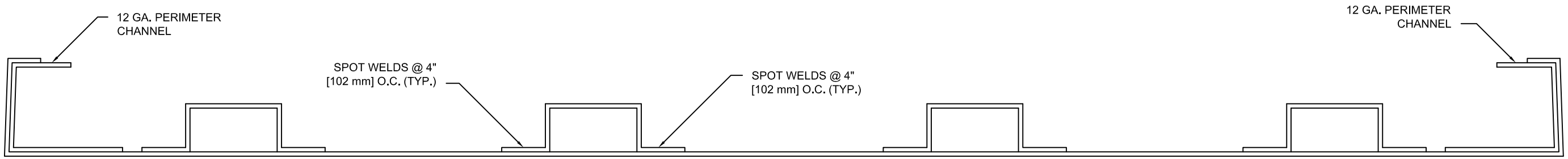
C-14 TOP & BOTTOM SKIN ASSEMBLY PROFILE

REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DOOR IS A SQUARE EDGE AS IT IS SLIDING	FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 14

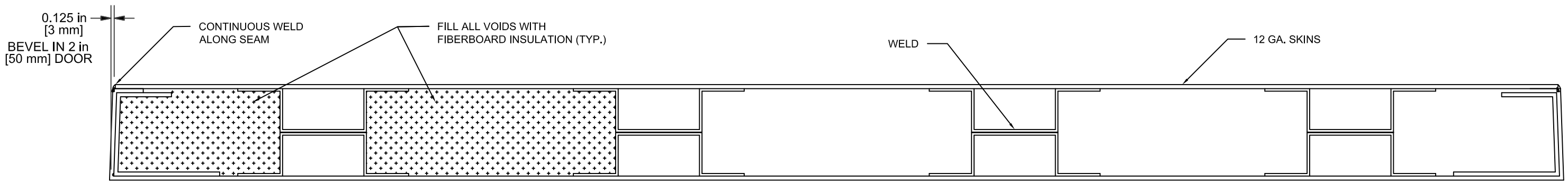
TYPE B CELL DOOR (SWINGING)



A-15 TOP SKIN PROFILE



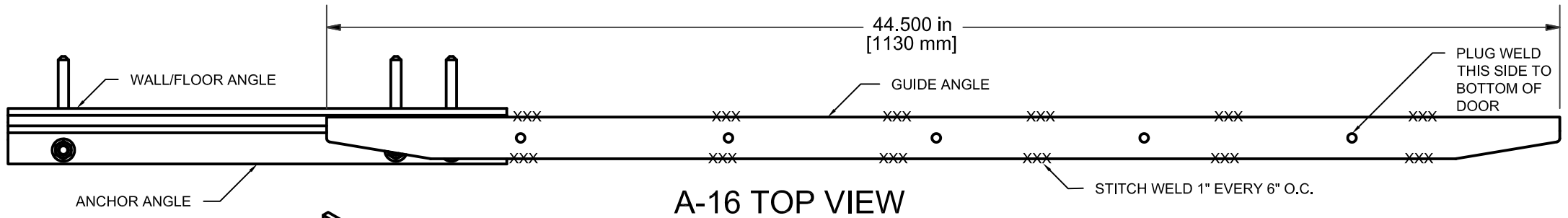
B-15 BOTTOM SKIN PROFILE



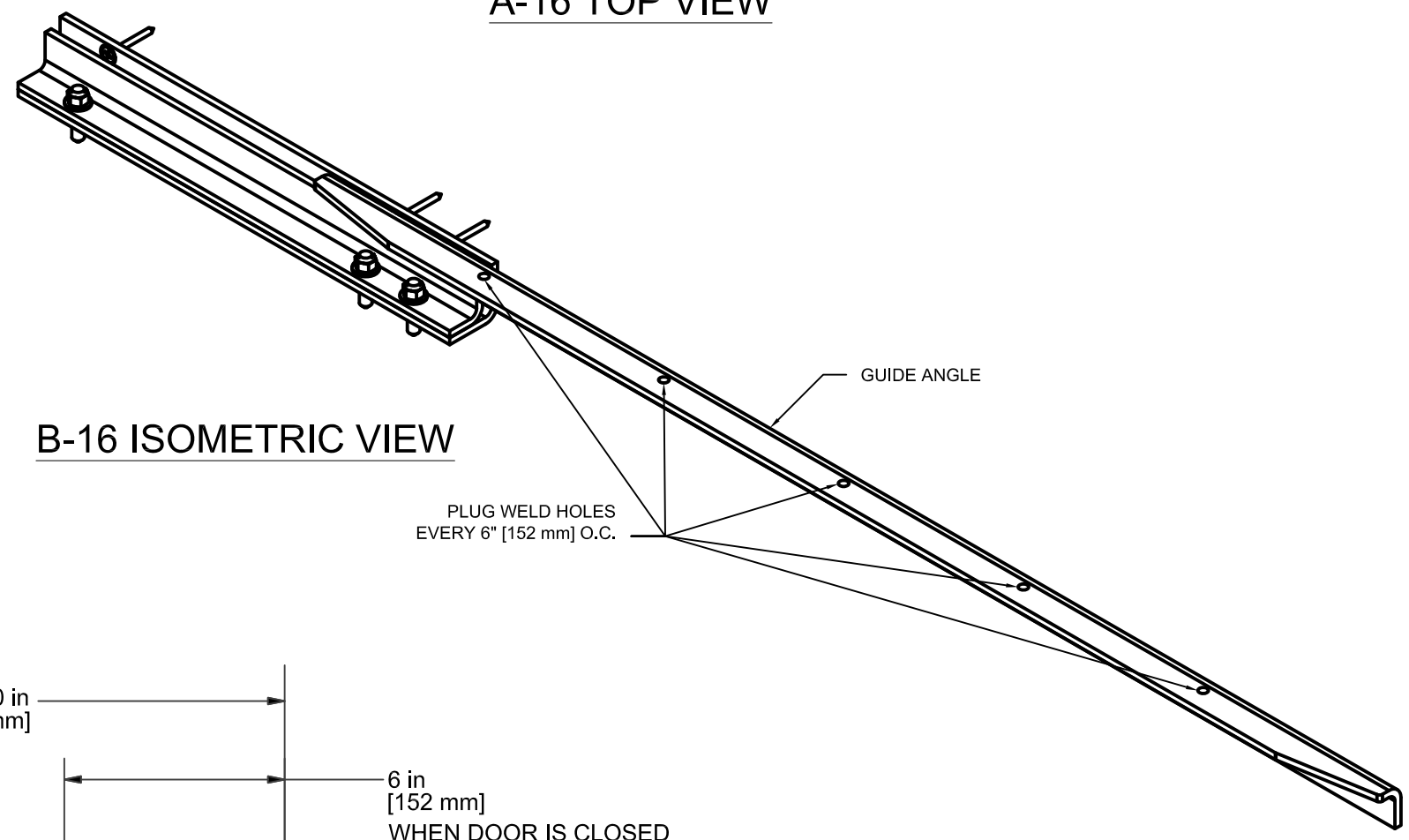
C-15 TOP & BOTTOM SKIN ASSEMBLY PROFILE

REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 15

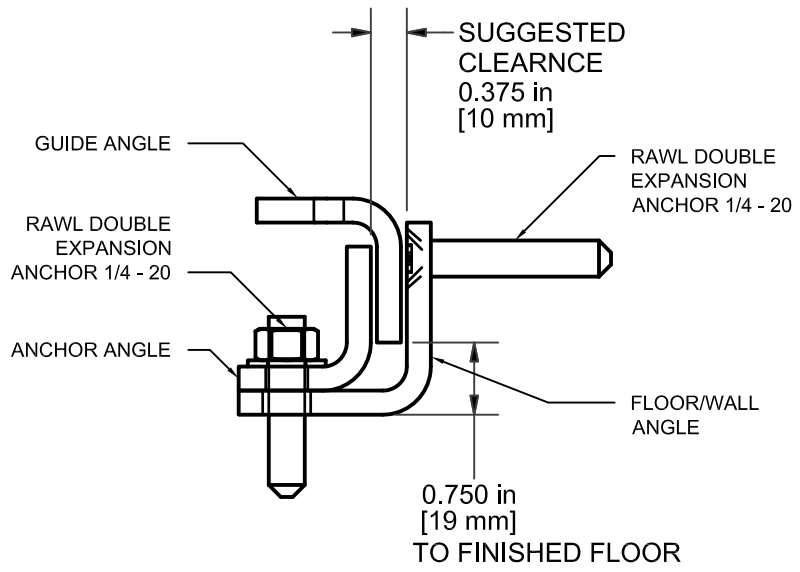
INSTALLATION OF WALL/FLOOR & ANCHOR ANGLE & GUIDE ANGLE



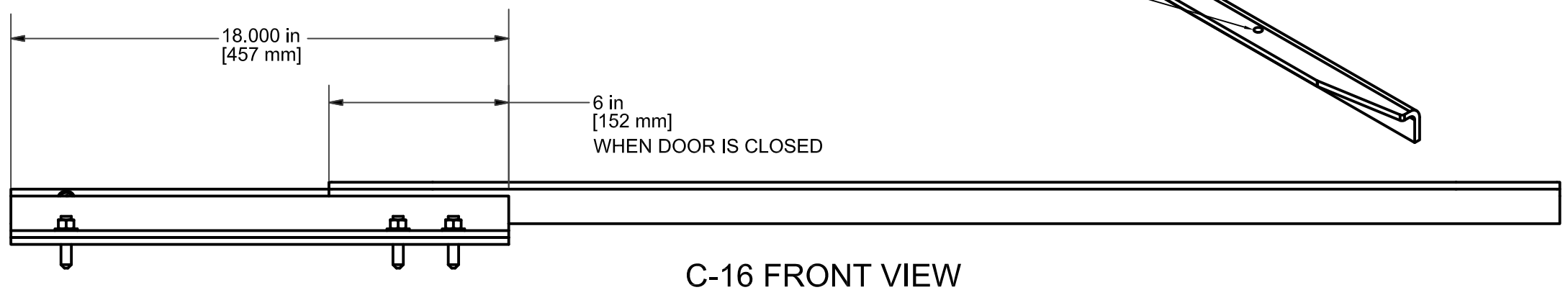
A-16 TOP VIEW



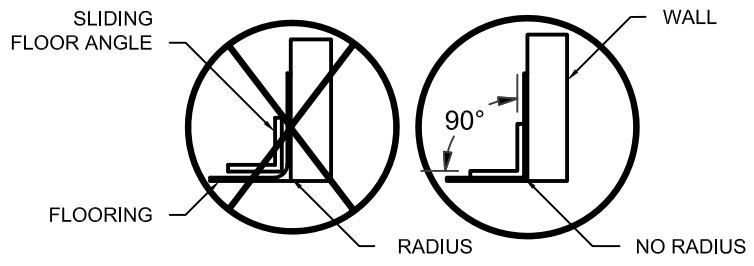
B-16 ISOMETRIC VIEW



D-16 DETAIL



C-16 FRONT VIEW



NOTE: FLOORING IS NOT TO HAVE A RADIUS WHERE IT MEETS THE WALL, FOR SLIDING UNITS.

E-16 FLOORING DETAIL

REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006		FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 16

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 34 63 - Detention Doors & Frames

.3 Section 08 71 00 - Door Hardware

.4 Section 08 80 50 - Glazing

.5 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 ASTM Standards:
- .1 ASTM A480/A480M-14b: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .2 ASTM A653/A653M-13: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM E90-09: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .4 ASTM E336-14: Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.
- .5 ASTM E413-10: Classification for Rating Sound Insulation.

.2 AWS D1.1/D1.1M 2006: Structural Welding Code - Steel.

.3 Canadian Standards Association (CSA International):
- .1 CAN/CSA-G40.20-13: General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA-G40.21-13: Structural Quality Steels.
- .3 CSA W59-13: Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 Canadian Steel Door Manufacturers' Association, (CSDMA).
- .1 Recommended Dimensional Standards, 2000.
- .2 Recommended Selection and Usage Guide - Section 08 11 00, 2009.
- .3 CSDMA Recommended Specifications for Commercial Steel Door and Frame Products - Section 08 11 00, 2009.
- .4 CSDMA Fire Labelling Guide, 2009.

.5 Hollow Metal Manufacturer’s Association (HMMA).
- .1 HMMA 802-92: Manufacturing of Hollow Metal Doors and Frames.
- .2 HMMA 840-07: Installation and Storage of Hollow Metal Doors and Frames.
- .3 HMMA 865-03: Guide Specifications For Swinging Sound Control Hollow Metal Doors and Frames.

.6 ITS/Warnock Hersey Professional Services Ltd. (WHI):

.1 Fire Rating Services, Building Materials and Equipment, Listings (ITS/WH).

.7 National Fire Protection Association (NFPA)
.1 2013 NFPA 80: Standard for Fire Doors and Fire Windows.
.2 NFPA 252: Standard Methods of Fire Tests of Door Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
.1 Indicate door and frame elevations, anchorage types, closure methods, finishes, locations of cut-outs for hardware, arrangement of hardware, frames, required clearances and installation details.

.3 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for acoustic doors and frames and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Test Data:
.1 Submit independent test data from a recognized licenced laboratory indicating the acoustic door assemblies meet the Sound Transmission Class (STC rating) specified in this Section. Include laboratory name, test report number, and date of test.
.2 Submit certification from test laboratory qualified under the National Voluntary Accreditation Program (NVLAP) of the U.S. Bureau of Standards.

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

.6 Installation Instructions: Submit manufacturer's installation instructions.

.7 Samples:
.1 Submit manufacturer's door finish sample, frame corner sample, as well as perimeter acoustic gasket.

.8 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 PERFORMANCE REQUIREMENTS

.1 Doors and frames must have a minimum Sound Transmission Class (STC) rating of 51 and a field test rating of STC 46 or better when tested in situ; in accordance with ASTM E90. Apply labels indicating sound transmission class, to each acoustic door and frame.

1.5 REGULATORY REQUIREMENTS

.1 Install fire labelled steel door and frame products in accordance with NFPA-80 except where otherwise noted. Apply labels indicating fire rated sound transmission class, to each acoustic door and frame.

.2 Test product in conformance with established test procedures for measuring acoustic performance and in particular with ASTM E90 and ASTM E413.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustic doors and frames for incorporation into manual.

1.7 QUALITY ASSURANCE

.1 Perform work to requirements of CSDMA (Canadian Steel Door Manufacturers Association) and HMMA (Hollow Metal Manufacturers Association) standards.

.2 Manufacturer: Minimum 5 years documented experience manufacturing acoustic steel door and frame assemblies.

.3 Installer: use a manufacturer’s trained and approved installer to install all work of this Section.

.4 Pre-installation Meeting: Convene a pre-installation meeting 2 weeks before start of installation of acoustic door and frame assemblies. Require attendance of parties directly affecting work of this section, including Contractor, Departmental Representative, installer, and manufacturer's representative. Review installation and coordination with other work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions and HMMA 840.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect acoustic door assemblies from nicks, scratches, and blemishes.

.3 Protect prefinished surfaces with wrapping.

.4 Replace defective or damaged materials with new.

.5 Handle and protect doors and ancillary equipment to prevent damage.

.6 Weld minimum two temporary jamb spreaders per frame prior to shipment.

.7 Remove doors and frames from wrappings or coverings upon receipt on site and inspect for damage.

.8 Store in vertical position, spaced with blocking to permit air circulation between components.

1.9 COORDINATION

.1 Coordinate installation of anchorages for acoustic door frames.

.2 Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in Concrete or masonry.

.3 Coordinate with hardware trade to ensure the proper preparation and fabrication of doors and frames. Coordinate where holes and grommets are required in framing system to accommodate cabling.

.4 Deliver such items to Project site in time for installation.

2 Products

2.1 ACOUSTIC SWING DOORS & FRAMES

.1 Swing type acoustic door and frame: proprietary construction, tested and engineered as part of a fully operable assembly and including doors, frames, gasketting, hardware, and cam-lift hinges, meeting ASTM E330. STC rating of 51, 45 mm thick steel door, double frame assembly. The following manufacturer's meet the specification:
- .1 Overly Manufacturing Company, telephone (724)-834-7300.
- .2 Krieger Specialty Products, telephone 1-800-251-3396.
- .3 Ambico Ltd., as distributed by RW Architectural Sales Ltd., telephone 403-259-6966.
- .4 Other preapproved product.

.2 Provide doors and frames complete with manufacturer’s hardware and double drop seal, neoprene gaskets and perimeter acoustic seals as required to provide the STC rating of 51.

2.2 MATERIALS

.1 Steel: commercial grade zinc coated steel to ASTM A653/A653M, ZF180.

.2 Reinforcement: To CSA G40.20/G40.21, coating designation to ASTM A653/A653M, ZF75.

.3 Acoustic Composite Core: manufacturer’s proprietary standard, tested as part of a fully operable assembly in accordance with ASTM E90 and E413 to provide STC rating specified.

.4 Blank, reinforce, drill and tap doors and frames for mortised, templated hardware.

.5 Reinforce frames and doors where required for surface mounted hardware.

.6 Provide manufacturer’s proprietary design of frame gasketing system and prepare frames to receive gasketing system.

.7 Provide factory applied, touch up primer at areas where zinc coating has been removed during fabrication.

2.3 ACCESSORIES

.1 Hinges: Cam lift type; manufacturer’s standard.

.2 Primer: Rust inhibitive zinc chromate.

.3 Threshold: Smooth and flush, to provide a seal for door in closed position.

.4 Astragal: To be supplied loose ready for field assembly.

.5 Perimeter and bottom acoustic seals: To provide a seal for door in closed position.

.6 Do not install peep hole door viewers in acoustic doors.

2.4 FABRICATION/GENERAL

.1 Manufacture doors and frames to STC rating of 51, measured in accordance with ASTM E90.

2.5 FABRICATION/WELDED FRAMES

.1 Sheet steel, metal thickness and appropriate to maintain door STC and fire ratings, mitred corners, fully welded seams.

.2 Factory assemble and weld frames.

.3 Accurately mitre and securely weld frames on inside of the profile.

.4 Grind welded joints smooth and to a uniform finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in two (2) temporary jamb spreaders per frame to maintain proper alignment during shipment.

.7 Affix permanent metal nameplates to frame, indicating manufacturer's name, door tag, and STC rating where it will be clearly visible.

2.6 FABRICATION/DOORS

.1 Fabricate swing type, flush doors as indicated on the door schedule.

.2 Sheet steel faces, thickness, design, and core suitable to achieve specified STC performance.

.3 Fabricate doors with acoustic core construction, longitudinal edges, mechanically inter-locked with visible edge seams.

.4 Provide proprietary acoustic composite core as tested by the manufacturer to meet the specified STC rating.

.5 Reinforce doors where surface-mounted hardware is required.

.6 Drill and tap for mortised, templated hardware.

.7 Provide top and bottom of doors with inverted, recessed channels, spot welded to door face and flush, closed top channels.

.8 Astragals: Metal acoustic astragals with integral acoustic seals for double doors.

.9 Affix permanent metal nameplates to door, indicating manufacturer's name, door tag, and STC rating where it will be clearly visible.

2.7 FINISHES

.1 Factory Door Finish: Factory applied zinc chromate primer to be applied to all exposed surfaces, ready to receive finish paint specified in Section 09 91 23.

3 Execution

3.1 INSTALLATION

.1 Install doors and frames in accordance with manufacturer's recommendations and with the reviewed shop drawings, plumb, true, with all hardware, templates, fastenings and accessories, securely anchored to adjacent structure.

.2 Install steel doors and frames to CSDMA and HMMA 840 standards and in accordance with NFPA 80 and UL 10C, and local authority having jurisdiction.

.3 Install fire rated acoustic doors to meet fire ratings indicated and to meet all National Building Code of Canada 2010 requirements.

.4 Utilize welders certified by Canadian Welding Bureau (CWB) for field welding.

.5 Coordinate with masonry, steel stud and gypsum board and concrete wall construction for anchor placement.

.6 Secure anchorage and connections to adjacent construction as indicated on the reviewed shp drawings and to suit adjacent construction.

.7 Set frames plumb, square, level and at correct elevation.

.8 Make allowance for deflection to ensure structural loads are not transmitted to the door frames.

.9 Fit, align and adjust complete door assembly level and plumb, to provide smooth operation.

.10 Adjust operable parts for correct clearances and function.

.11 Install and adjust perimeter and bottom acoustic seals. Adjust seals as required to achieve the required STC rating.

.12 Finish paint in accordance with Section 09 91 23.

3.2 ERECTION TOLERANCES

.1 Installation tolerances of installed frame for squareness, alignment, twist and plumbness are to be no more then +/- 1.5mm in compliance with HMMA 841.

3.3 FIELD QUALITY CONTROL

.1 Provide qualified manufacturer's representative to instruct installers on the proper installation and adjustment of door assemblies.

.2 Provide manufacturer's representative to inspect door installation, and test minimum ten (10) cycles of operation. Correct any deficient doors.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications

.2 Section 09 91 13 - Exterior Painting

.3 Section 09 91 23 - Interior Painting

.4 Division 26 - Electrical Hookup

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A385/A385M-11: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- .3 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A924/A924M-13: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .5 ASTM A1008/A1008M-13: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- .6 ASTM D6386-10: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other construction subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for doors, hardware, and accessories, electrical operators and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.

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

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

.6 Manufacturers Reports:

.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for sectional metal doors for incorporation into manual.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

1.7 QUALITY ASSURANCE

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

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect sectional metal doors, hardware and accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

2 Products

2.1 DESIGN CRITERIA

.1 Design exterior door assembly to withstand wind load as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010, for the Elk Point area with a maximum horizontal deflection of 1/240 of opening width.

.2 Design door panel assemblies with thermal insulation factor 1.25 RSI minimum.

.3 Design door assembly to withstand minimum 100,000 total life cycle.

2.2 MATERIALS

.1 Steel sheet: commercial quality sheet steel to ASTM A653/A653M with Z275 designation zinc coating to ASTM A924/A924M.
- .1 To Secure Bay Doors and Garage Doors: 1.6 mm thick for the exterior door skin and 1.2 mm for the interior door skin.

.2 Primer: polyvinylidene fluoride (PVF2) or to CAN/CGSB-1.181-99.

.3 Insulation: polyurethane foam board with RSI value of 2.46 at 24°C.

.4 Primer: to CAN/CGSB-1.181, for galvanized steel surfaces.

.5 Cable: multi-strand galvanized steel aircraft cable.

2.3 DOORS

.1 Secure Bay Door and Garage Bays:
- .1 Type: fully insulated flush steel sectional.
- .2 Door Sections: 1.6 mm roll formed rails, stiles and muntins faced with 1.6 mm sheet; or 1.6 mm roll formed sections with vertical stiffeners at ends and 305 mm oc maximum at intermediate spacings.
- .3 Insulation: fully insulated.
- .4 Backing: 1.2 mm thick sheet.
- .5 Overall door thickness: 45 mm minimum.
- .6 Fasteners:
  - .1 Door exterior: rivetted to stiles and stiffeners.
  - .2 Door Interior: rivetted to stiles and stiffeners.
- .7 Finish: shop coat primer after fabrication.

.2 Assemble components by means of spot or arc welding or coated rivet system or adhesive and self tapping screws to manufacturer's recommendations.

.3 Apply shop coat of primer after fabrication of door.

2.4 HEAVY DUTY INDUSTRIAL HARDWARE

.1 Track: standard lift, unless low head room hardware is required, with 75 mm size 2.66 mm core thickness galvanized steel track.

.2 Track Supports: 2.3 mm core thickness continuous galvanized steel angle track supports.

.3 Spring counter balance: heavy duty oil tempered torsion spring with manufacturers standard brackets.
- .1 Drum: 200 mm diameter.
- .2 Shaft: 32 mm diameter galvanized steel.

.4 Top roller carrier: galvanized Steel 3.04 mm thick adjustable.

.5 Rollers: full floating grease packed hardened steel, ball bearing 75 mm diameter solid steel tire.

.6 Roller brackets: adjustable, minimum 2.5 mm galvanized steel.

.7 Hinges: heavy duty, 3.04 mm thick as recommended by manufacturer, galvanized.

.8 Cable: 6 mm diameter galvanized steel aircraft cable.

.9 Garage door latching and locking mechanism (no key):
- .1 Cremone bolt function mounted on the inside of a lower section to engage with steel track of each side of door. Provide rigid bar linkage; chain or cable linkage not acceptable.

2.5 OPERATORS/OVERHEAD DOORS

.1 Equip doors for operation by:
- .1 Equip overhead doors for operation by electrical operator, c/w safety manual release.

.2 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval with CSA general type enclosure.

.3 Power supply: 208 V, 3 phase, 60 Hz; 3/4 HP.

.4 Controller units with integral motor reversing starter, 3 heater elements for overload protection, including 3 pushbuttons and control relays as applicable.

.5 Provide a combination roll rubber safety switch for the full length of the bottom rail of the bottom section of door, enabling the door to reverse to open position when coming in contact with an object on the closing cycle.

.6 Control station-radio operated:
- .1 Control operators by a radio receiver controller. The system is to consist of remote radio transmitters with button, for operation of doors, and a radio receiver controller complete with safety manual release.

.2 System: manufactured by Stanley Automatic Openers Ltd., P.O. Box 879, Windsor, Ontario, N9P 6P2. The model number for radio receiver controller is 52-4275 and the model number for the radio transmitter is 51-4556. The appropriate frequency for the operation of the system will be supplied to the successful bidder at a later date. The local supplier of Stanley Automatic in the Province of Alberta are:

Steelcraft Door Products
14820 - 125 Avenue,
Edmonton, Alberta
T5L 3C5
Sims Garage Doors
8238 30th Street S.E.,
Calgary Alberta, T2C 1H8

.3 Supply 3 radio receiver controller units installed as a controllers for three doors. Supply 10 remote radio transmitters plus 3 spares. Transmitters to have two buttons for the activation of at least two doors.

.7 Control station key operated: the operator is to also be controlled by key operated control station. The control switch will offer open, close and stop operation. The switch is to be mounted in the secure bay. The key operated control switch is to be supplied by the Square D Company Ltd., 2487 Kaladar Avenue, Ottawa, Ontario, Model No. KY-296.

.8 Manual safety release: wire cable leading from door panel to drive yoke, when pulled, during power failure, to free door for manual operation.

.9 Door speed: 300 mm per second.

.10 For trolley operators:

.1 Attach operator to door with quick release device to disconnect door from operator in event of power failure.

.11 Control transformer: for 24 V AC control voltage.

2.6 ACCESSORIES

.1 Overhead horizontal track and operator supports: galvanized steel, type and size to suit installation.

.2 Track guards: 5 mm thick formed sheet 1500 mm high track guards.

.3 Pusher springs.

.4 Weatherstripping:

.1 Sill: double contact bulb type extruded neoprene weatherstrip for door sill section, full width.

.2 Jambs and Head: extruded aluminum and arctic grade vinyl weatherstrip for jambs and head, to manufacturer's standard.

.5 Finish ferrous hardware items with minimum zinc coating of 300 g/m^2 to ASTM A123/A123M.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for sectional metal doors installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install doors and hardware in accordance with manufacturer's instructions.

.3 Rigidly support rail and operator and secure to supporting structure.

.4 Touch-up steel doors with primer where galvanized finish damaged during fabrication.

.5 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation. Coordinate electrical hookup to operators. Provide all wiring, conduit, and equipment from beyond the junction box provided by the Electrical Subcontractor, and connect all wiring to the junction box to provide a complete, operational installation. Set motors, controls and operators and wire low-voltage system.

.6 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.

.7 Adjust weatherstripping to form a weather tight seal.

.8 Adjust doors for smooth operation.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
  .1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product within 3 days of review.
  .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Ensure manufacturer's representative is present before and during critical periods of installation and testing.

.4 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work of this Section at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

.1 Remove traces of primer; clean doors and frames.

.2 Clean glass and glazing materials with approved non-abrasive cleaner.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by sectional metal door installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.3 Section 07 21 19 - Foam-In-Place Insulation

.4 Section 07 27 00.01 - Air/Vapour Barrier

.5 Section 07 42 13 - Metal Cladding

.6 Section 07 42 46 - Solid Phenolic Panels

.7 Section 07 42 48 - Cementitious Composite Panels

.8 Section 07 92 00 - Joint Sealing

.9 Section 08 11 16 - Aluminum Doors and Frames

.10 Section 08 80 50 - Glazing

1.2 REFERENCES

.1 AAMA/WDMA/CSA/101/I.S.2/A440-11: North American Fenestration Standard /Specification for Windows, Doors and Skylights.

.2 Aluminum Association (AA):
- .1 Aluminum Design Manual, 2005.
- .2 Welding Aluminum: Theory and Practice.
- .3 Properties of Aluminum Alloys: Tensile, Creep, and Fatigue Data at High and Low Temperatures.

.3 American Architectural Manufacturer's Association (AAMA):
- .1 AAMA 501-05: Methods of Test for Exterior Walls.
- .2 AAMA 501.1-05: Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
- .3 AAMA 501.2-09: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
- .4 AAMA 611-98: Voluntary Specification for Architectural Anodized Aluminum.
- .5 AAMA 1304-04: Voluntary Specifications for Forced Entry Resistance of Side-Hinged Door Systems.
- .6 AAMA 1503-09: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- .7 AAMA 2603-02: Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .8 AAMA AFPA-91: Anodic Finishes/Painted Aluminum.

.9 AAMA CW-RS-1-04: The Rain Screen Principle and Pressure Equalized Wall Design.
.10 AAMA RPC-00: Rain Penetration Control - Applying Current Knowledge.

.4 ASTM Standards:
.1 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A385/A385M-11: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
.3 ASTM D6386-10: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
.4 ASTM E283-04(2012): Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and doors Under Specified Pressure Differences Across the Specimen.
.5 ASTM E330/E330M-14: Standard for testing the Structural Performance of exterior Windows, Curtain Walls, and doors by Uniform Static Air pressure Difference.
.6 ASTM E331-00(2009): Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
.7 ASTM E547-00(2009): Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
.8 ASTM E783-02(2010): Standard Test Method for Field Measurements of Air Leakage Through Installed Exterior Windows and Doors.
.9 ASTM E1105-00(2008): Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
.10 ASTM E1186-03(2009): Standard Practices for Air Leakage Site Detection in Building Envelope and Air Retarder Systems.
.11 ASTM E1233/E1233M-14: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential.
.12 ASTM E1886-13a: Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
.13 ASTM E1996-14a: Standard Specifications for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

.5 NAAMM - National Association or Architectural Metal Manufacturers.

.6 CSA Standards:
.1 CSA-S157-05(R2010): Strength Design In Aluminum.
.2 CSA-S157.1-05(R2010): Commentary on CSA-S157.1-05 Strength Design In Aluminum.
.3 CAN/CSA-G40.21-13: Structural Quality Steels.

.7 CGSB Standards:
.1 CAN/CGSB-1.40-97: Anticorrosive Structural Steel Alkyd Primer.

1.3 PERFORMANCE DRAWINGS AND SPECIFICATIONS

.1 Drawings are diagrammatic and do not purport to identify nor solve completely the problems of thermal or structural movement, air pressure equalization (rain screen), air vapour barrier, thermal barriers, fixings, and anchorages, flatness and stability of facing and moisture disposal.

.2 Drawings do not purport to solve problems at the glass line associated with glass movement, pressure fracture or thermal shock.

.3 Drawings indicate profile and configuration required together with relationship to structural frame and building interior elements.

.4 Drawings contain details which suggest directions for solving some of the major design requirements and the subcontractor may use these details and develop them as he deems best.

.5 Specifications are "performance" type and include the minimum requirements of the curtain wall system, without limiting the contractor to the method of achieving such performance.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: co-ordinate work of this Section with installation of air/vapour barrier placement, flashing placement, components or materials.

.2 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 - Project Meetings. Arrange this meeting only when the representative of the Departmental Representative can attend or alternatively, on a conference call with the Departmental Representative. Methods of operation, and trade responsibility will be resolved. Provide photos to the Departmental Representative, if the Departmental Representative does not attend the site meeting. Site meeting is to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

.3 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions.

.4 Ensure key personnel, site supervisor and subcontractor representatives attend.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall and window components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered in the Province of Alberta.
.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Submit 4 samples 100 mm x 100 mm in size illustrating prefinished aluminum surface, finish, colour, texture.

.5 Delegated Design Submittals:
.1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.

.6 Test Reports:
.1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall and window for incorporation into manual.

1.7 QUALITY ASSURANCE

.1 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Supply one complete window mock-up including intermediate mullion and vision glass light.
.1 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
.2 Mockup to include mullions, muntins, vision glass light and connections to air/vapour barrier. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
.3 Locate mock-up where directed by Departmental Representative.
.4 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
.6 Mock-up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Handle work of this Section in accordance with AAMA CW-10.
.2 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.3 Store and protect aluminum glazed curtain wall and window components from nicks, scratches, and blemishes.
.4 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
.5 Replace defective or damaged materials with new.

1.9 QUALIFICATIONS

.1 Submit for review, Quality Assurance Programs as specified hereunder or as may be required to ensure adequate quality of the completed work.

.2 Contractor’s Engineer’s Qualifications and Requirements:
.1 Engage the services of a Professional Engineer registered in the Province of Alberta and experienced in curtain wall and windows design, to design and be responsible for the structural design, including but not limited to all aluminum and glazing components, fasteners and the like, and performance and installation of all work of this Section and to stamp, seal and sign all shop drawings.

.2 The Contractor’s Engineer is to also carry out periodic site reviews during construction and at completion as specified herein, and submit reports and Letters of Assurances for Professional Design, Field Review and Building Code and Project Criteria Compliance.

.3 The Contractor’s Engineer must be qualified to examine and interpret the structural and Architectural drawings for the purpose of ensuring that the deformations of the building structure, due to any loadings and building tolerances before, during and after erection of the cladding, do not interfere or conflict with the design and erection of the curtain wall and window system.

.4 Design system taking into account new structure. The Contractor’s Engineer who stamps, seals and signs the shop drawings must take into account holding capacity and all other relevant structural capabilities of the new structure when designing the fastening system for the curtain wall and windows.

.5 The Contractor's Engineer who stamps, seals and signs the shop drawings must make regular site visits during the installation of work of this Section and must provide reports for each stage review to the Departmental Representative on the progress of the work and any deviations from the reviewed shop drawings or problems encountered.

.6 Ensure that the Contractor's design Engineer visits the site during the following stages of the project:
- .1 Mock-up fabrication and installation.
- .2 Initial start up phase.
- .3 Mid-way through erection and glazing.
- .4 Installation of doors into curtain wall.
- .5 Final site inspection upon completion of curtain wall, windows and aluminum doors.

.7 Upon completion of the work of this Section the Contractor's Engineer who stamps, seals and signs the shop drawings must provide the Departmental Representative with a Written declaration that all work of this Section has been installed in accordance with the shop drawings and to the satisfaction of the Contractor's Engineer.

1.10 AMBIENT CONDITIONS

.1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.

.2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.11 WARRANTY

.1 For Work of this Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows , 12 months warranty period is extended to 24 months.

2 Products

2.1 SYSTEMS

.1 Description:

.1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with self supporting framing, shop fabricated, factory prefinished, vision glass; related flashings, anchorage and attachment devices.

.2 Assembled system to permit re-glazing of individual glass units from exterior without requiring removal of structural mullion sections.

2.2 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Carefully engineer all members and fastening devices to carry materials specified and also to meet the maximum local wind pressure conditions and suction as defined in the Alberta Building Code 2014 and National Building Code of Canada 2010 for the Elk Point area and all other superimposed loads. Verify at site dimensions of all rough openings prior to fabrication. Use the dynamic approach for wind load analysis. Reinforce curtain wall members with steel sections contained within the aluminum framing member, as required.

.2 Base structural framing on CSA-S157 "Strength Design in Aluminum".

.3 Provide all necessary testing as deemed necessary by the Departmental Representative , to establish superimposed loads on curtain wall and windows.

.4 Construct the system to provide for such expansion and contraction of component materials as will be caused by an ambient temperature range from -40 degrees C to +50 degrees C, without causing harmful buckling, failure of joints seals, undue stress on fasteners, stress on glass, glass breakage or other detrimental effects.

.5 Design the system to accommodate dead load and live load deflections, thermal expansion, elastic shortening and sway, drift and torsion of the building frame and resist seismic forces as required. Design to accommodate the effects of construction sequencing.

.6 Provide framing members with a thermal break so that under the following environmental conditions no condensation on the interior metal will occur:
- .1 20 degrees C interior, -25 degrees C exterior, 25 km/h wind, 25 % R.H.
- .2 Ensure that no condensation forms on any interior surfaces of aluminum members before the exposed area of the sealed unit reaches the dew-point temperature.

.7 Curtain wall and window system must not exceed air infiltration or exfiltration of more than 0.31 $l/s.m^2$ of curtain wall surface area when tested to ASTM E283 at 300 Pa pressure difference.

.8 Where curtain wall framing is used for window framing, conform to CAN/CSA-A440, and meeting the following:
- .1 Air infiltration: Fixed rating.
- .2 Water infiltration: B7 rating.
- .3 Wind load resistance: C5 rating.
- .4 Condensation resistance temperature index: 60.6.

.9 Ensure that no water infiltrates into the building under 20% of design wind load or pressure of 720 Pa (15 psf), whichever is greater, when tested to ASTM E331.

.10 Design fully captured framing system (4 sided capped curtain wall) and window system to perform at 0.35 Btu/hr-ft^2-°F -U-Value. U values to be calculated as per NFRC 100.

.11 Design components and assemblies based on the "Rain Screen Principle" as defined by the National Research Council of Canada.
- .1 Provide all gaskets, baffles, overlaps and seals as required to voids in metal components and voids between metal members and structure, to provide a “Pressure Equalized Rain Screen".
- .2 Provide the air seals to minimize the passage of air through the assembly.

.3 Provide the vapour seals to minimize the passage of vapour through the assembly.
.4 Install baffles to prevent the direct entry of moisture into the assembly.
.5 Provide vents and drain openings between these cavities and the outside, of sufficient cross-sectional area to provide pressure equalization and to drain all moisture from within the assembly to the exterior.
.6 All openings must be effectively baffled or otherwise guarded to minimize direct water entry into the assembly.
.7 Include a moisture management system that will direct any water within the system to the exterior and not permit any standing water within the system for more than 24 hours.

.12 Design members and components to not exceed a deflection, in a direction normal to the plane of the wall, of any metal framing member, when carrying its full design load, of 20 mm or L/175 of its clear span, whichever is less, as a maximum condition in addition to other limitations specified herein.

.13 Design attachments to provide for accurate adjustment and for compensation of structural tolerances and deflections. Design for maximum anticipated structural deflection.

.14 Attach in a manner which will permit replacement of glass, individually or in units during construction or in subsequent usage of the building in such a manner that will not result in a major disturbance to members in adjoining bays.

.15 Assemble, secure, anchor, reinforce, seal make weather tight and air/vapour tight in manner not restricting thermal or wind movements of the cladding. Where possible, conceal sealants and gaskets.

.16 Design curtain wall and window system to be exterior glazed only.

.17 Achieve free and noiseless movement of all components of curtain wall and windows system due to thermal, structural, wind whistles and pressure, vibration harmonics, erection or dead loads, loosening, weakening, or fracturing of attachments or components of system, without strain to glass, buckling of any component, excessive stress to any members or assemblies.

.18 Design assembly to maintain a minimum sound transmission rating of STC 29 measured in accordance with ASTM E413.

2.3 MATERIALS

.1 Alloy: conforming to ASTM B221, tubular extruded aluminum system AA6063 - T5, T54 or T6, with a wall thickness of not less than 2.3 mm.

.2 Sheet aluminum: to ASTM B209, AA 5005-H14, anodizing grade.

.3 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.4 Pressure Plates: provide fibreglass pressure plates to all capped curtain wall, except at expansion joints (where applicable).

.5 Thermal separator: low thermal conductivity inert polymerized material or soft PVC, of quality and size to meet design requirements, compressed to seal between main sections and pressure plates.

.6 Fasteners: Provide aluminum, or 300 series stainless steel or 400 series cadmium plated screws, rivets and fastenings. All fasteners to the exterior of the air barrier must be stainless steel. Fasteners for securing aluminum members to structure: stainless steel, of a size and shape to withstand all stress and superimposed loads.

.7 Glazing Seals (mechanically keyed in gasket): extruded black, closed cell or dense elastomer of durometer appropriate to function. Roll in gasket to apply correct pressure on glass.

.8 Anti-Rotational Channels: PVC channels, minimum 2.1 mm wall thickness, of size to suit glazing rabbet to curtain wall and window framing, one length piece per location. Provide 6 mm diameter weep holes at 400 mm o.c. to allow drainage of moisture.

.9 Setting Blocks and Spacers: 100% silicone type recommended by the manufacturers of a durometer range of 80-90 on setting blocks and 40-50 on spacers. Minimum 2 setting blocks per unit set at quarter points, fabricated to allow for drainage.

.10 Screws for securing aluminum members to structure: stainless steel, of a size and shape to withstand all stress and superimposed loads.

.11 Steel reinforcements and anchor plates: to CAN/CSA-G40.21, Grade 300 W, galvanized after fabrication.

.12 Steel primer: to CAN/CGSB-1.40-97.

.13 Bituminous paint: alkali resistant bituminous paint.

.14 Vertical glass units:
- .1 Glass in exterior lights: sealed unit glazing as specified in Section 08 80 05.
- .2 Glass in entrance lights: tempered glass sealed unit glazing as specified in Section 08 80 05.

.15 Sealant:
- .1 Perimeter sealant and within system: Type 1 as specified in Section 07 92 00.

2.4 COMPONENTS

.1 Aluminum Curtain Wall and Window Framing: thermally broken, flush glazed, 65 mm wide face, curtain wall section, complete with 19 mm deep caps to all horizontal and vertical mullions; using manufacturer's standard components of sizes as indicated on the drawings and reviewed shop drawings.
- .1 Thermally broken with interior tubular section insulated from exterior pressure plate.
- .2 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass.

.3 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.

.4 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

.2 Flashings: 1.29 mm thick aluminum, finish to match curtain wall and widow mullion sections where exposed, secured with concealed fastening method.

.3 Air/Vapour barrier: specified in Section 07 27 00.01 - Air Barrier.

2.5 FABRICATION

.1 Fabricate the assembly in accordance with the Design and Performance Requirements of this Section.

.2 Check and confirm site dimensions prior to preparation of shop drawings. Fabricate work to suit site dimensions.

.3 Provide adequate gauges of metal and methods of construction and reinforcement to meet site conditions, with the requirements of the drawings and specifications as a minimum.

.4 Accurately follow the method of construction, reinforcement, anchorage, details of finish, jointing, and the like, shown on the reviewed shop drawings. Notch required nosing or screw spline to allow continuity of air/vapour barrier membrane tie-ins into the glazing rabbet. File all sharp edges from notching operation to a smooth finish.

.5 Fabricate units where practical in shop, in accordance with the details and reviewed shop drawings. Build units square, true, accurate to size, free from distortion, waves, twists, buckles or other defects detrimental to appearance and performance.

.6 Fabricate metal components of sharply and well defined profiles and of gauges and thicknesses not less than those indicated and required.

.7 Fabricate grid members and modular curtain wall units one storey high or one span high, or as otherwise dictated by interfacing conditions.

.8 Provide complete closed back sections.

.9 When system is designed for shear block joinery, provide tubular extrusion mullion members.

.10 Fit and assemble in the shop, units too large for handling or shipping to check accuracy, disassembled and marked for shipping and field assembly.

.11 Accurately fit intersecting members to flush hairline, weather-tight joints and mechanically interlock together, except where specified or detailed otherwise.

.12 Seal members to maintain integrity of air seals. Ensure all joints are completely sealed to maintain continuity of the air/vapour barrier installation at required locations. Prevent sealant contaminating air/vapour barrier membranes tie-ins.

.13 Provide weep/drain holes, minimum 10 x 50 mm slots, positioned 50 mm from the end of each horizontal, maximum 600 mm spacing, and the lower edge flush with or below the horizontal surface to be drained. Setting blocks are to be located clear of drainage path and from horizontal pressure plates weep holes.

.14 Use manufacturer's standard caps, of sizes as indicated.

.15 Fabricate all brake shapes, flashings, closures, trim and the like, as detailed on the drawings and reviewed shop drawings. Neatly and accurately brake form to sizes and profiles as indicated, in one piece lengths per location. Reinforce as required to prevent oil canning.

.16 Manufacturer's identifications, such as labels and name plates visible on the finished work are not permitted.

.17 Unless otherwise noted, provide concealed fastenings throughout.

.18 Provide vertical expansion and construction joints designed with baffled overlaps with a compressed resilient air seal laid in between the mullion ends. Restrict vertical mullion sleeve connections. Stackable frames are acceptable if engineered accordingly.

.19 Fabricate curtain wall framing to receive aluminum doors and hardware as specified in Section 08 11 16. Provide all adapters as required. Provide continuous 2.7 mm steel back up plate to hinges. Prepare system components to receive hardware as specified in Section 08 71 00 - Door Hardware.

.20 Install strike buckets for dead bolts and barrier free operators at all entrances.

.21 Fabricate curtain wall framing to receive barrier free doors as specified in Section 08 71 00. Door operators are to be built into the frame directly above door. Coordinate electrical hook-up with Division 26. Run all conduits in frames as required for operators.

.22 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.23 Prepare components to receive anchor devices. Install anchors.

.24 Arrange fasteners and attachments to ensure concealment from view.

.25 Reinforce framing members for external imposed loads.

.26 Finishes to all aluminum components:

- .1 Clear anodized finish conforming to Aluminum Association AA-M12C 22A31 specification, class II minimum thickness of 0.10 mm thickness, free from defects and blemishes.
- .2 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
- .3 Concealed steel items: galvanized in accordance with ASTM A123/A123M, 600 gm/m^2.

.4 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.6 SOURCE QUALITY CONTROL

.1 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

.2 Installer qualifications: company specializing in performing the work of this section with minimum 3 years documented experience and approved by manufacturer.

.3 Design structural support framing components to CAN/CSA-S157 under direct supervision of the Contractor’s Professional Structural Engineer as specified in this Section.

.4 Perform welding Work in accordance with CSA W59.2.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall and window installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Verify dimensions, tolerances, and method of attachment with other work.
- .3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
- .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install curtain wall and window system in accordance with manufacturer's instructions.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.5 Use thermal isolation where components penetrate or disrupt building insulation.

.6 Installation is to be complete with all anchors, weatherstripping, flashing, caulking as required to provide a complete and operable installation.

.7 Provide all necessary steel reinforcing required to extruded sections and provide all necessary anchor plates for securing at junctions with other materials as required to withstand all superimposed loading.

.8 Provide structural anchors with three way adjustment. Weld after curtain wall and window alignment. Immediately clean and touch up paint welded areas after welding operation.

.9 Anchor frames so that no distortion will result nor the fastenings seriously stressed from expansion and contraction of the metal.

.10 Anchor component parts to transmit wind loads and other stresses to the anchorage system. Install anchors to transmit uniformly distributed loads through the structure at each floor.

.11 Exposed anchorage angles are permitted in areas where they can be concealed (e.g. by a convector cabinet), otherwise use concealed connectors.

.12 Secure by concealed means, except concealed fasteners cannot be used. Provide stainless steel "Robertson" oval-headed countersunk type screws to all exposed fastenings where concealed fastenings cannot be used; evenly and neatly located in approved manner; be finished to match surface on which they occur.

.13 Use screw splines wherever possible for attachment of stops to curtain wall and windows.

.14 Extend vertical mullions to underside of structure as required. Connect to underside of structure using slotted connections where there are no horizontal members at underside of structure. Connect to structure using slotted connections to allow for movement and to prevent structural loads from being transmitted to the curtain wall and windows.

.15 Erect and secure work plumb, square, level, straight and securely attached to adjacent construction surrounding openings provided, and at proper elevations and in alignment with adjacent work.

.16 Provide all necessary expansion joints in members as required to allow aluminum sections to expand and contract without damaging the glass or glazing assemblies. Restrict or limit the use of vertical mullion sleeve connections at top of curtain wall and window frames.

.17 Apply a heavy brush coat of alkaline resistant bituminous material or alkaline resistant bituminous paint to all aluminum framing clips, anchors, or loose parts in contact with concrete, mortar, plaster, or dissimilar material including dissimilar metals.

.18 Supply and install all necessary aluminum sheet brake shapes and flashing required to complete the installation. Install flashing at the head of all aluminum curtain wall and windows, entrances, and elsewhere as required to provide a weather tight installation.

.19 Straighten components so that glazing and expansion rabbets will be square, flat, plumb and true. Draw up fixed supporting connections to safe tension to avoid future shifting of glass-clad wall components. Adjust sliding connections to permit necessary relative motion between elements.

.20 Do not bridge the thermal break between the interior and exterior sections of the frames with a metal which will destroy the thermal separation provided.

.21 Assess each component for appearance and colour and consider any variations when arranging components for assembly. Abrupt variations in appearance and colour will not be permitted.

.22 Accurately install doors in prepared openings. In order to assure a rigid installation and withstand the intended use, install the necessary amount of reinforcing anchors, bolts, or other required fastening devices.

.23 Cut back all shims, and the like, and leave space clean between framing and surrounding materials for sealants and air/vapour barrier materials.

.24 Where there is a glazing unit installed in a frame, and the other side of the frame is against a solid wall, or wherever there is no glazing installed in a glazing rabbet, install a continuous anti-rotational channel in to rabbet to prevent rotation of pressure plate when tightened down, and to facilitate clamping in of air/vapour barrier membrane. Mechanically fasten in place at 300 mm o.c. as indicated, after membrane has been installed and channel has been fitted into place.

.25 Install Work to the following tolerances:

.1 Do not exceed 3 mm in 3 metres of length deviation from true vertical and horizontal position in any member nor exceed 6 mm deviation in total run in any line.

.2 Do not exceed 1.5 mm maximum offset from true alignment at joints between abutting members in line end-to-end.

.26 Be aware of and take into account in the design, manufacture and installation of the aluminum curtain wall, windows and glazing, the effect of acceptable tolerances in adjacent work.

.27 Install one mechanical fastener (safety screw) to each horizontal and vertical glazing caps to prevent separation if they become dislodged and to prevent sliding on the pressure plate.

.28 Provide vertical expansion and construction joints designed with aluminum baffled overlaps and sealed with a durable air seal material in the plane of the air barrier between the mullion ends at all joints expansion joints.

.29 Seal all metal-to-metal joints in accordance with manufacturer's instructions to provide a weather and water tight assembly. Seal all internal joints between vertical and horizontal members and joints in horizontal or vertical members not otherwise sealed in the shop during fabrication, with sealant to ensure continuity of air/vapour barrier at all joints.

.30 Coordinate installation of aluminum doors and hardware with Sections 08 11 16 - Aluminum Doors and Frames and Section 08 71 00 - Door Hardware.

.31 Coordinate installation of access control system on aluminum doors where indicated, with Division 28.

.32 Ensure that the completed installation is free from objectionable noise, rattles, wind whistles and noise due to thermal movement.

.33 Install sills at ground floor level by latching onto clips secured to substrate to prevent lift off.

.34 Prior to the installation of the finish caps, provide additional torque to all pressure plates fasteners and confirm that stipulated torque requirements are met. Provide confirmation to Departmental Representative that required torque are constant.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 SEALS AND INSULATION

.1 Notwithstanding any trade scope definitions for work for aluminum curtain wall and windows, the curtain wall and window installer must connect the air/vapour barrier membrane to the aluminum curtain wall and window frames and seal to maintain the continuity of the air/vapour seal around curtain wall and window openings.

.2 Co-operate with the installer of the air/vapour barrier membrane to obtain continuity of the air/vapour seal when clamped into the glazing rebate. Fix the air seal membrane at mullion glazing rebate with continuous anti-rotational spacer and pressure plate to ensure continuous compression of vapour barrier prior to sealing. Ensure that the installation is fully sealed at jamb/head corners. Coordinate with Section 07 27 00.01. Seal air/vapour barrier membrane tie-in to adjacent air/vapour membranes and the like as specified in Section 07 27 00.01.

.3 Co-operate with the installer of the air/vapour barrier membrane to obtain continuity of the air/vapour seal when clamped with gasket to curtain wall and entrances. Fix the air/vapour barrier membrane a glazing surface of frame, between glazing gasket and spacer and fasten in place with clips. Ensure that the installation is fully sealed at jamb/head corners. Coordinate with Section 07 27 00.01.

.4 Ensure that all glazing rabbet are free of any sealant materials where the air seal membrane are to be connected. Do not install air/vapour barrier materials, such as self-adhered membrane over excess sealant residue from the curtain wall and window fabrication or installation.

.5 Ensure that glass units make tight contact with gaskets, and gaskets make tight contact with frames. This is the building air/vapour seal at the glazed openings.

3.5 PERIMETER SEALANT

.1 Provide sealant specified herein as backing materials to workmanship and installation techniques described in detail in Section 07 92 00.

.2 Apply sealant to joints between metal to metal components and metal frames to adjacent building materials around full perimeter.

.3 Use skilled mechanics thoroughly trained and competent in the use of sealing materials and of pressure operated equipment. Apply sealant with gun having proper nozzle size. Provide backer rod as required to achieve proper sealant joint configuration ratio.

3.6 GLAZING

.1 Perform glazing as specified in Section 08 80 05.

.2 Labels showing glass manufacturer's identity, type of glass, thickness and quality are required on each piece of glass. Labels must remain on glass until glazing has been reviewed and accepted.

.3 After installation, mark glass with an "X" by using tape or removable paste which will not affect glass or leave marks upon final cleaning.

3.7 FIELD QUALITY CONTROL

.1 Inspection by independent testing agency will monitor quality of installation and glazing.
- .1 Test system to: AAMA 501.
- .2 Evaluate installed system by thermo-photographic scan.

.2 Manufacturer's Field Services:
- .1 Obtain written report from manufacturer of curtain wall, windows and glazing verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
- .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Ensure manufacturer's representative of curtain wall, windows and glass is present before and during critical periods of installation and testing.
- .4 Schedule site visits to review Work at stages listed:
  - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
  - .2 Frequency: as specified in item 1.9.2.6 of this Section.
  - .3 Upon completion of Work, after cleaning is carried out.

3.8 CLEANING

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

.2 Remove protective material from prefinished aluminum surfaces.

.3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

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

3.9 PROTECTION

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

.2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 08 34 73 - Acoustic Doors & Frames

.3 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 ASTM International:
- .1 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A1008/A1008M-15: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenalble.
- .3 ASTM A1011/A1011M-14: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy,High-Strength Low-Alloy with Improved Formability. and Ultra-High Strength.
- .4 ASTM ASTM B117-11: Standard Practice for Operating Salt Spray (Fog) Apparatus.
- .5 ASTM D1735-14: Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus.
- .6 ASTM E90-09: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- .7 ASTM E336-14: Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
- .8 ASTM E413-10: Classification for Rating Sound Insulation.

1.3 PERFORMANCE REQUIREMENTS

.1 Acoustically rated window assemblies must have a minimum Sound Transmission Class (STC) ratings that meet or exceed the values scheduled in the contract documents, when tested in accordance with ASTM E90. Apply labels indicating sound transmission class, to each acoustically rated window assembly.

.2 Install window assemblies to have a field-tested Noise Isolation Class (NIC) rating that meets or exceeds the following values:
- .1 NIC 41 for STC-46 windows

1.4 SYSTEM DESCRIPTION

.1 Design requirements: Acoustical window assemblies include frames, glass and the gasketing system required to achieve specified performance requirements.

.2 Performance requirements: Sound Transmission Coefficient rating of STC 46 for installed assembly, when tested as an assembly in accordance with ASTM E90 and ASTM E413.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for acoustic window assemblies, glazing and integral blind units and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Indicate window opening criteria, elevations, sizes, type; identify and detail cutouts. Indicate integral blinds and hardware.

.4 Quality assurance submittals:
.1 Test Reports:
.1 Certified laboratory reports, performed in accordance with ASTM E90 and ASTM E413, from independent testing laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) supporting compliance of assemblies to specified requirements.

.2 Certificates:
.1 Contractor's certification that:
.1 Products of this Section, as provided, meet or exceed specified requirements.
.2 Manufacturer of products of this Section meets specified qualifications.

.3 Manufacturer's instructions: Printed installation instructions for each component.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustic windows for incorporation into manual, including:
.1 Warranty documents, executed by manufacturer in Owner's name.
.2 Operation and maintenance data for assembly components.
.3 Certified statement of manufacturer's authorized representative, as specified in FIELD QUALITY CONTROL Article of PART 3 of this Section.
.4 Certified test reports of independent testing agency, as specified in FIELD QUALITY CONTROL Article of PART 3 of this Section.

1.7 QUALITY ASSURANCE

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

.2 Qualifications:
.1 Manufacturer: Minimum five (5) years-documented experience producing systems specified in this Section.
.2 Installer: Minimum five (5) years documented experience producing systems specified in this Section, and approved by manufacturer.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect acoustic window assemblies from damage.
.3 Protect prefinished surfaces with wrapping.
.4 Replace defective or damaged materials with new.

.4 Store frames in accordance with requirements of HMMA 840.

.5 Remove wraps or covers from frames upon delivery at the building site; clean and touch-up scratches or disfigurement caused by shipping or handling promptly with rust inhibitive primer.

.6 Store windows on planks or dunnage in a dry location; store in a vertical position spaced by blocking.

.7 Store units covered to protect them from damage, but permitting air circulation.

2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 The following manufacturers are acceptable for use on this project:
.1 Overly Door Company, Greensburg, PA 15601.
.2 Krieger Steel Products, 4880 Gregg Road, Pico Rivera CA 90660; Telephone 562-695-0645, FAX 562-692-0146
.3 Ambico Ltd,, 1120 Cummings Avenue, Ottawa, Ont. K1J 7R8, TELEPHONE: (613) 746-4663, FAX (800) 465-8561.
.4 Other preapproved product.

.2 Unless otherwise specified for an individual product or material, supply all products specified in this Section from the same manufacturer.

2.2 MATERIALS

.1 Steel sheet: One of the following:
- .1 Cold-rolled steel sheet conforming to ASTM A1008/A1008M, commercial quality.
- .2 Hot-rolled steel sheet conforming to ASTM A1011/A1011M, pickled and oiled, commercial quality.

.2 Galvanized steel sheet: ASTM A653/A653M, commercial quality, minimum G60 zinc coating.

.3 Acoustical material: Manufacturer's standard for required STC rating.

.4 Primer: Meeting ASTM B117 salt spray for 150 hours, and ASTM D1735 water fog test for organic coatings for 200 hours.

.5 Glazing:
- .1 To patrol corridor side: Conforming to CAN/CGSB-12.1-M90, 14.3 mm thick, laminated tempered acoustic glazing.
- .2 To interview side: double sealed glazing consisting of 6 mm clear tempered acoustic glass conforming to CAN/CGSB-12.1-M90 on both sides of integral horizontal louvred blinds. Glazing to have a 19.8 mm space to accommodate 12.7 mm slats. Blinds to be Blinds are to be manually operated with a knob operator; as manufactured by OEM shades Inc., or preapproved product.
  - .1 Acceptable Manufacturer:
    - .1 Ventilite model SL 20 A as manufactured by Prelco Thermalite Inc. Colour as selected by the Departmental Representative
    - .2 Other preapproved product.
    - .3 Locate winder on the prisoner side.

2.3 COMPONENTS

.1 Frames: Fabricate in accordance with reviewed shop drawings, and as follows:
- .1 Frames for interior use: Fabricate from steel sheet, minimum 1.9 mm (14 gauge) base metal thickness.
- .2 Form frame members straight, and of uniform profile through lengths, as welded units with integral trim, of sizes and profiles indicated.
  - .1 Weld contact edges of joints closed tight.
  - .2 Miter perimeter trim faces and weld continuously.
  - .3 Provide frames with 2 purging ports as indicated on the reviewed shop drawings.
- .3 Stops:
  - .1 Where integral stops are indicated, form minimum 16 mm in depth.
  - .2 Planted stops to be butt stop joints.

.4 When shipping limitations so dictate, fabricate frames for large openings in sections designed for assembly in the field; install alignment plates or angles, of same material and gauge as frame, at each joint.

.5 Jamb anchors:
- .1 Fabricate of same material as frame material; weld anchors inside each jamb for wall anchorage.

.2 Provide anchor types for indicated adjacent wall construction:
.1 Frames for installation in masonry walls: Adjustable jamb anchors, 1.52 mm (16 gauge), T-shape type.

.6 Plaster guards: Fabricate from minimum 0.76 mm (22 gauge) steel; weld in place at hardware mortises on frames to be set in plaster, masonry, or concrete openings.

.2 Glass and Glazing:
.1 Supply laminated Acoustical glass in the thickness required to meet the STC ratings. The manufacturer will supply the materials.

2.4 FINISHES

.1 Shop priming for window frames:
.1 After fabrication, fill and sand tool marks and surface blemishes on both faces and both vertical edges smooth and free from irregularities.
.2 Treat for paint adhesion, then apply primer to all accessible surfaces; allow to cure prior to shipment.

3 Execution

3.1 Examination

.1 Verification of conditions:
.1 Prior to installation, check and correct frames for size, squareness, alignment, twist and plumb.
.2 Verify openings are in accordance with reviewed shop drawings.

.2 Installer's examination:
.1 Have installer of this Section examine conditions under which construction activities of this Section are to be performed, then submit written notification if such conditions are unacceptable.
.2 Transmit two copies of installer's report to Departmental Representative within 24 hours of receipt.
.3 Beginning construction activities of this Section before unacceptable conditions have been corrected is prohibited.
.4 Beginning construction activities of this Section indicates installer's acceptance of conditions.

3.2 INSTALLATION

.1 Install units in accordance with reviewed shop drawings and manufacturer's printed installation instructions; in addition, install steel components in accordance with HMMA 840.

.2 Oversize assemblies:
.1 Weld field joints in accordance with AWS D1.1 and approved shop drawings.
.2 Finish exposed field welds smooth; touch-up with rust inhibitive primer.

.3 Fill voids between concealed side of frame and adjacent wall construction with dense fiberglass or lightweight gypsum plaster in accordance with approved shop drawings or manufacturer's printed installation instructions.

.4 Finish surfaces having abrasion damage smooth; touch-up with rust inhibitive primer.

.5 Install glass & gasketing systems in accordance with manufacturer's printed instructions.

.6 Field painting is specified in Section 09 91 23 - Interior Painting.

3.3 FIELD QUALITY CONTROL

.1 Conform to the requirements of Section 01 29 83 - Payment Procedures for Testing Laboratory Services for the services of independent testing agency to:
- .1 Test acoustic window assemblies in accordance with ASTM E336.
- .2 Issue certified report-documenting compliance of installed borrowed lite assemblies to specified acoustical performance requirements.

.2 Notify Departmental Representative a minimum of four (4) calendar days prior to scheduled testing dates.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00 - Architectural Woodwork

1.2 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
  .1 ANSI/BHMA A156.9-2010, Cabinet Hardware.
  .2 ANSI/BHMA A156.11- 2011, Cabinet Locks.
  .3 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
  .4 ANSI/BHMA A156.18-2012, Materials and Finishes.
  .5 ANSI/BHMA A156.20-2006 (R2012), Strap and Tee Hinges and Hasps.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for cabinet hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Hardware List:
  .1 Submit contract hardware list.
  .2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.

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

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cabinet hardware for incorporation into manual.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:
- .1 Store materials off ground, indoors and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect cabinet hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping.
- .4 Replace defective or damaged materials with new.

2 Products

2.1 HARDWARE ITEMS

.1 Use one manufacturer's product for all similar items.

2.2 CABINET HARDWARE

.1 Cabinet hardware: to ANSI/BHMA A156.9, designated by letter B and numeral identifiers as listed below.
- .1 Hinges: concealed self closing hinge, 115°, complete with mounting plates. For doors over 900 mm high use 3 hinges per leaf. For doors over 1500 mm high, use 4 hinges per leaf; finish 26D.
- .2 Pulls: surface mounted pull, Brushed Stainless steel "D" pulls, 96 mm c.c., 106 mm long, 10 mm diameter, 35 mm high.
- .3 Catches: magnetic touch or secret panel catch, finished to 26D.
- .4 Shelf rests and standards: shelf rest installed in holes spaced at 13 mm apart, Zinc finish, length to suit, with matching shelf rests.
- .5 Drawer slides for bottom file drawers: Full extension, heavy duty, minimum 68 kg. load capacity, zinc finish, complete with steel ball bearings.
- .6 Drawer slides for all other drawers: Full extension, medium duty, minimum 45 kg. load capacity, zinc finish, complete with steel ball bearings.

.2 Cabinet locks: to ANSI/BHMA A156.11, as listed below.
- .1 Door or drawer locks: half mortised into back of door or drawer, heavy duty type.
- .2 Cylinders: key into keying system as directed.
- .3 Finished to 26D.

2.3 MISCELLANEOUS HARDWARE

.1 Auxiliary hardware: to ANSI/BHMA A156.16, as listed below.
- .1 Garment hooks: Chrome plated, 2 hook type, c/w 4 anchor screws.

.2 Closet shelf supports: heavy duty support with brace for shelf and closet rod, wrought steel, finished to 603 (zinc plated),2.3 mm heavy wall steel tube, 33.3 mm (15/16") outside diameter .

2.4 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Use fasteners compatible with material through which they pass.

2.5 KEYING

.1 Cabinet locks to be master keyed as directed. Submit keying schedule for approval.

.2 Supply keys in duplicate for every lock in this Contract.

.3 Supply 3 master keys for each master key group.

.4 Stamp keying code numbers on keys and cylinders.

.5 Install key cabinet where indicated.

3 Execution

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements. Coordinate with Section 06 40 00 - Architectural Woodwork.

.3 Install key control cabinet and establish key control set-up.

3.2 ADJUSTING

.1 Adjust cabinet hardware for optimum, smooth operating condition.

.2 Lubricate hardware and other moving parts.

.3 Adjust cabinet door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.
.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 DEMONSTRATION

.1 Keying System Setup and Cabinet:
.1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
.2 Place file keys and duplicate keys in key cabinet on their respective hooks.
.3 Lock key cabinet and turn over key to Departmental Representative.

.2 Maintenance Staff Briefing:
.1 Brief maintenance staff regarding:
.1 Proper care, cleaning, and general maintenance of projects complete hardware.
.2 Description, use, handling, and storage of keys.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by cabinet and miscellaneous hardware installation.

END OF SECTION

DOOR GLAZING TYPES

GL-1 DOUBLE INSULATED UNIT 6mm CLEAR TEMPERED FOR EXTERIOR DOORS C/W SECURITY FILM ON SURFACE #4
GL-2 2 SHEETS 6mm LAMINATED SAFETY GLASS W/ 0.030 PVB INTERLAYER CLEAR
GL-3 6mm CLEAR TEMPERED GLASS
GL-4 DOUBLE INSULATED UNIT 6mm CLEAR TEMPERED FOR ACOUSTIC RATED DOORS
GL-5 SOUND CONTROL WINDOW C/W INTERNAL BLINDS

DR_SCH-00 DOOR SCHEDULE

	DOOR									FRAME			OPENING					
	CLEAR DIM.		NO. OF	PANEL WIDTH									FIRE		STC	LOCK	HDWR	
NO.	W	H	PANELS	PANEL 1	PANEL 2	THCK	TYPE	MAT'L	FINISH	TYPE	MAT'L	FINISH	LABEL	GLAZ	RATING	FUNCTION	SET	COMMENTS
101.1	900	2200	1	900	0	45	FL	AL	ANOD		AL	ANOD	N/A	GL-1	N/A	F13	001	EXTERIOR SAFETY FILM
101.2	919	2206	1	919	0	45	FL	AL	ANOD		AL	ANOD	N/A	GL-1	N/A	F13	002	INTERIOR SAFETY FILM
103.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F07	003	ACCESS CONTROL BY DETACHMENT STAFF; REMOTE RELEASE DOOR REMAIN LOCKED WHEN DEADBOLT IS THROWN
104.1	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F15	004	KEYED ON RECEP. SIDE; PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION
104.2	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F13	005	PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION
105.1	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F07	006	PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION
106.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F04	007	
107A.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F15	008	KEYED ON RECEP. SIDE; PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION
108.1	900	2150	1	900	0	45	D2	HMI	PT-2/PT-8	2	PSF	PT-2/PT-8	N/A	N/A	N/A	F15	009	PT-2 INTERIOR; PT-8 EXTERIOR
109.1	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F13	005	PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION; KEYED ON ROOM SIDE
110.1	900	2150	1	900	0	45	HL	SCW	PT-2	1	PSF	PT-2	N/A	GL-3	N/A	F04	010	
112.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	45	N/A	N/A	F15	011	NONREMOVABLE PINS ON REVERSE HAND DOOR; WEATHER STRIPPING REQUIRED FOR NON-RATED SMOKE SEPARATION
114.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F15/F15K	012	NONREMOVABLE PINS ON REVERSE HAND DOOR; WEATHER STRIPPING REQUIRED FOR NON-RATED SMOKE SEPARATION

Stantec
325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision YYYY.MM.DD

Title
DOOR SCHEDULE 08 71 00.01

Project No. 144202690
Reference Sheet
Figure No. DR_SCH-00

DR_SCH-01 DOOR SCHEDULE

NO.	DOOR									FRAME			OPENING			LOCK FUNCTION	HDWR SET	COMMENTS
	CLEAR DIM.		NO. OF PANELS	PANEL WIDTH		THCK	TYPE	MAT'L	FINISH	TYPE	MAT'L	FINISH	FIRE LABEL	GLAZ	STC RATING			
	W	H		PANEL 1	PANEL 2													
115A.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F07	013	NONREMOVABLE PINS ON REVERSE HAND DOOR
115B.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F15/F15K	014	NONREMOVABLE PINS ON REVERSE HAND DOOR
116.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F15	015	
116.2	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F15	015	
116.3	900	2200	1	900	0	45	F	HMI	PT-2/PT-8	4	PSF	PT-7/PT-8	N/A	N/A	N/A	F15	016	PT-2 INTERIOR; PT-8 EXTERIOR, MECHANICAL LOUVRE WITHIN TRANSOM
116.4	2400	3000	1	2440	0	45	OH	STI	GALV	N/A	N/A	N/A	N/A	N/A	N/A	SEE HRDW SCHD	017	
116D.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F15	047	
118.1	900	2150	1	900	0	45	HL	HM	PT-2	1	PSF	PT-2	N/A	GL-3	N/A	F01	018	
118.2	900	2150	1	900	0	45	D2	HMI	PT-2/PT-8	2	PSF	PT-7/PT-8	N/A	N/A	N/A	F15	019	PT-2 INTERIOR / PT-8 EXTERIOR
120.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F15K	020	NONREMOVABLE PINS ON REVERSE HAND DOOR
121.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	45	N/A	N/A	F07	021	
122.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F07	022	PT-2 INTERIOR
123.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	023	
123.2	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	023	
124.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	024	
124.2	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	024	
125.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	023	
125.2	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F01	023	
126.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F13	025	
127.1	900	2150	1	900	0	45	F	SCW	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F15	026	CYLINDER ON ROOM SIDE
127.2	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F07	027	PROVIDE ACOUSTIC SEALS ON DOOR AND THRESHOLD FOR ACOUSTIC ATTENUATION, CYLINDER ON ROOM SIDE
130.1	900	2150	1	900	0	45	D3	HM	PT-7/PT-2	2	PSF	PT-7	90	N/A	N/A	F14K	028	TWO VIEWERS FROM BOTH SIDES; PT-7 CELL SIDE; PT-2 OPERATIONS SIDE; PROVIDE WEATHER STRIPPING
131.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	N/A	N/A	N/A	F07	029	WEATHER STRIPPING REQUIRED FOR NON-RATED FIRE SEPARATION
132.1	900	2150	1	900	0	45	F	HM	PT-2	2	PSF	PT-2	90	N/A	N/A	F07	030	WEATHER STRIPPING REQUIRED
133.1	900	2150	1	900	0	45	F	HM	PT-2	1	PSF	PT-2	45	N/A	N/A	F15	031	NONREMOVABLE PINS ON REVERSE HAND DOOR; WEATHERSTRIPPING REQUIRED FOR NON-RATED SMOKE SEPARATION
134.1	900	2150	1	900	0	45	F	HMA	PT-2	1	PSF	PT-2	N/A	N/A	STC 46	F15	032	
136.1	900	2150	1	900	0	45	D3	HMI	PT-7/PT-8	2	PSF	PT-7/PT-8	N/A	N/A	N/A	F14K	033	TWO VIEWERS FROM BOTH SIDES; PT-7 INTERIOR; PT-8 EXTERIOR
136.2	900	2150	1	900	0	45	D3	HM	PT-7	2	PSF	PT-7	90	N/A	N/A	F14K	034	TWO VIEWERS FROM BOTH SIDES; WEATHER STRIPPING REQUIRED
136.3	800	1950	1	800	0	45	F	HM	SWC-1	1	PSF	PT-2	-	-	N/A	F18	035	CHASE ACCESS DOOR; RECESS USING BUTT FRAME; FINGER PULL DUMMY TRIM
136.4	800	2150	1	800	0	45	F	HM	SWC-1	1	PSF	PT-2	-	-	N/A	F18	035	CHASE ACCESS DOOR; RECESS USING BUTT FRAME; FINGER PULL DUMMY TRIM

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision YYYY.MM.DD

Title
DOOR SCHEDULE 08 71 00.01

Project No. 144202690
Reference Sheet
Figure No. DR_SCH-01

DR_SCH-02 DOOR SCHEDULE

NO.	DOOR									FRAME			OPENING			LOCK FUNCTION	HDWR SET	COMMENTS
	CLEAR DIM.		NO. OF PANELS	PANEL WIDTH		THCK	TYPE	MAT'L	FINISH	TYPE	MAT'L	FINISH	FIRE LABEL	GLAZ	STC RATING			
	W	H		PANEL 1	PANEL 2													
140.1	978	2134	1	978	0	51	D1	HM	PT-7	3	PSF	PT-7	N/A	N/A	N/A	BY OTHERS	036	DETENTION DOOR AND FRAME; SS SLIDING SHUTTER; FOLGER ADAM #32 LOCK; FOOD PASS; DOOR PULLS
141.1	978	2134	1	978	0	51	D1	HM	PT-7	3	PSF	PT-7	N/A	N/A	N/A	BY OTHERS	036	DETENTION DOOR AND FRAME; SS SLIDING SHUTTER; FOLGER ADAM #32 LOCK; FOOD PASS; DOOR PULLS
142.1	978	2134	1	978	0	51	D1	HM	PT-7	3	PSF	PT-7	N/A	N/A	N/A	BY OTHERS	036	DETENTION DOOR AND FRAME; SS SLIDING SHUTTER; FOLGER ADAM #32 LOCK; FOOD PASS; DOOR PULLS
144.1	900	2200	1	900	0	45	F	HMI	PT-7/PT-8	4	PSF	PT-7/PT-8	N/A	N/A	N/A	F14K	037	NRP; VIEWER; PT-7 INTERIOR; PT-8 EXTERIOR, MECHANICAL LOUVRE WITHIN TRANSOM
144.2	3000	2900	1	3050	0	45	OH	STI	GALV	N/A	N/A	N/A	N/A	N/A	N/A	SEE HRDW SCHD	038	MANUAL OVERRIDE ON OVERHEAD DOOR SECURED WITH APPROVED PADLOCK; KEYED SAME AS SECURE BAY
146.1	900	2150	1	900	0	45	D4	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F07	039	POLYCARBONATE VIEWPORT
147.1	900	2150	1	900	0	45	F	HMA	PT-7	2	PSF	PT-7	N/A	N/A	STC 46	F14	040	
148.1	900	2150	1	900	0	45	F	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F07K	041	WEATHER STRIPPING REQUIRED FOR NON-RATED FIRE SEPARATION
149.1	900	2150	1	900	0	45	D4	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F18	042	VEWPORT WITH SLIDING COVER, FINGER PULL/ DUMMY TRIM
150.1	900	2150	1	900	0	45	F	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F07	043	WEATHER STRIPPING REQUIRED FOR NON-RATED FIRE SEPARATION
151.1	900	2150	1	900	0	45	F	HMA	PT-7	5	PSF	PT-7	N/A	GL-5	STC 46	F18	044	FINGER PULL DUMMY TRIM
152.1	900	2150	1	900	0	45	F	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F07K	045	WEATHER STRIPPING REQUIRE FOR NON-RATING FIRE SEPARATION
154.1	900	2150	1	900	0	45	F	HM	PT-7	2	PSF	PT-7	N/A	N/A	N/A	F01K	046	
201.1	900	900	N/A	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		ROOF ACCESS HATCH
DG101.1	900	2150	1	900	0	45	F	HMD	PT-8	2	PSF	PT-8	NA	NA	N/A	F15	048	HEAVY DUTY CLOSER
DG101.2	3050	2700	1	2700	0	45	OH	ST	PT-8	N/A	NA	NA	NA	NA	N/A	SEE HRDW SCHD	049	

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project

GOVERNMENT OF CANADA

NEW BUILDING

Revision

YYYY.MM.DD

Title

DOOR SCHEDULE 08 71 00.01

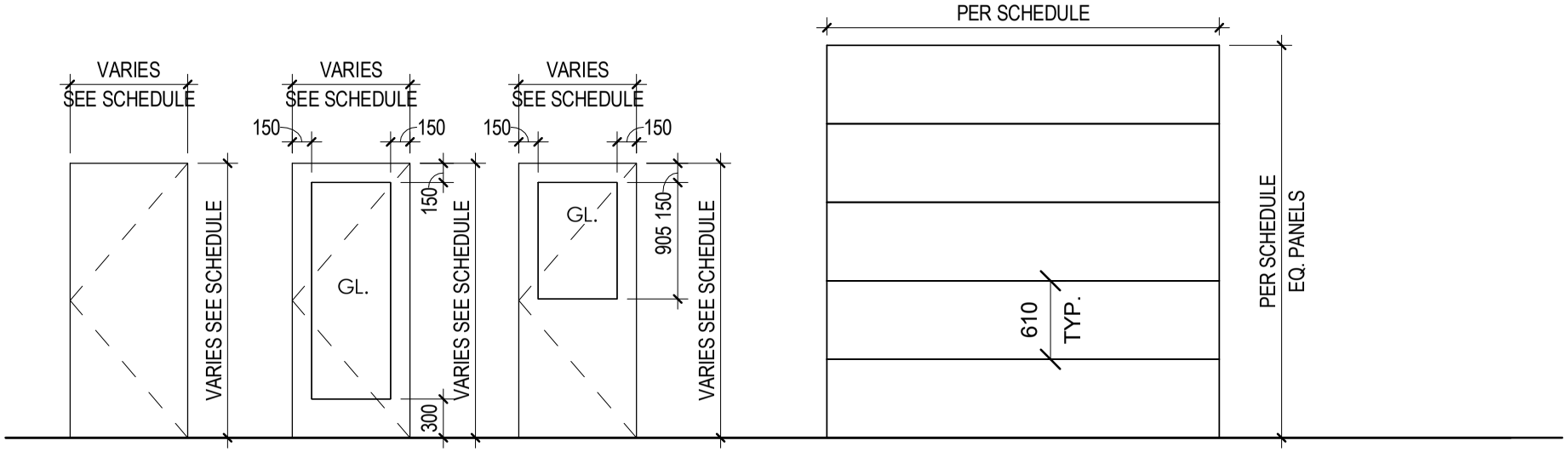
Project No.

144202690

Reference Sheet

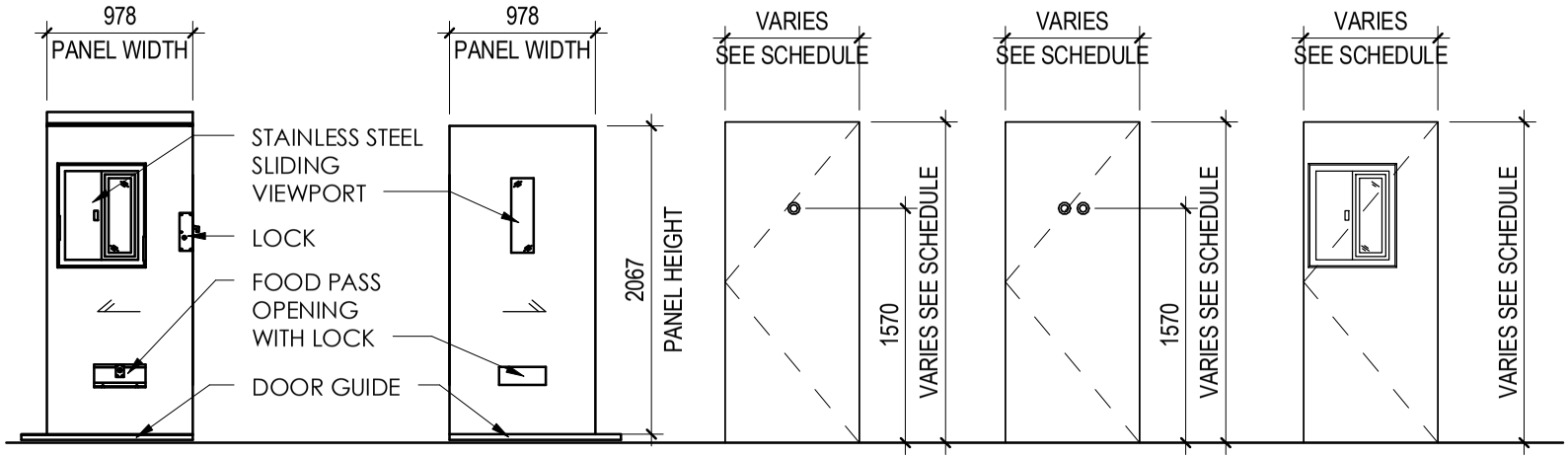
Figure No.

DR_SCH-02



F FL HL OH

*WHERE GLAZING IS NOTED (GL.) SEE DOOR SCHEDULE FOR GLAZING TYPES



D1 COORIDOR SIDE 12GA HMD

D1 CELL SIDE 12GA HMD

D2 1.2 CRS HMD DOOR VIEWER

D3 1.2 CRS HMD 2X DOOR VIEWER

D4 1.2 CRS HMD VIEWPORT WITH SLIDING COVER

Stantec
325 - 25 ST SE /
CALGARY, AB T2A 7H8

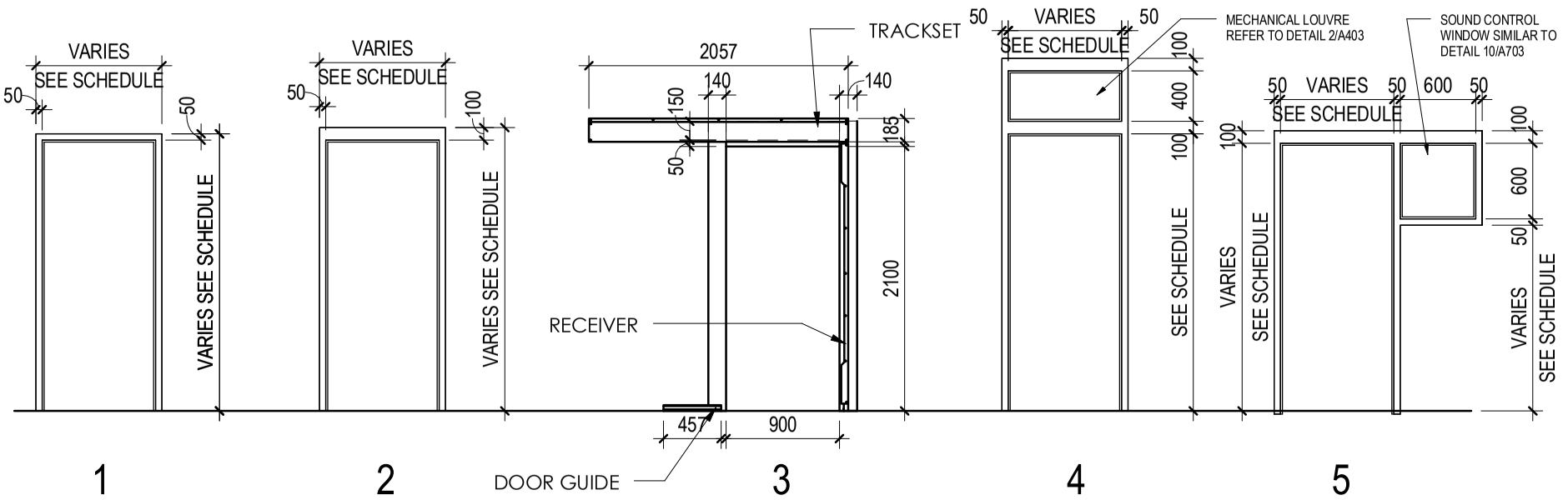
Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Title
DOOR PANEL TYPES 08 71 00.01

Revision | YYYY.MM.DD

Project No. 144202690 | Reference Sheet | Figure No. DR_SCH-10



Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Title
DOOR FRAME TYPES 08 71 00.01

Revision	YYYY.MM.DD

Project No.	Reference Sheet	Figure No.
144202690		DR_SCH-11

HARDWARE SET 001

1 Single Door 101.1 From Exterior To 101			LHR
900mm x 2200mm x 45mm		Alum. Dr. & Fr.	
3	Butts	CB199 114mm x 101mm NRP SEC.ST	630
1	Lockset (F13)	L9456L-03B	626
1	Abloy Cylinder	CY415T	26D
1	Electric Strike	1006 DB x 2004M x 2005M3 x 24VDC	630
1	Automatic Door Operator		4100LE AL
1	Overhead Stop	104S	630
1	Key Switch	653-0405 x ATS x L2	630
2	Jamb Mount Actuators	CM-25/4	32D
1	Threshold	S473A x 900mm	AL
1	Sweep	967C x 900mm	AL
1	Set Weathwerstrip	By Frame Supplier	
1	Power Supply	PS902 x 900BBK x 900KL	

Wire the key switch to the exterior jamb mount actuator. This will act as the on/off switch to the automatic door operator during and after hours.
Ensure the door has 150mm lock stiles to accommodate the mortise lock

HARDWARE SET 002

1 Single Door 101.2 From 101 To 102A			LHR
900mm x 2200mm x 45mm		Alum. Dr. & Fr.	
3	Butts	CB168 114mm x 101mm NRP	630
1	Lockset (F13)	L9456L-03B	626
1	Abloy Cylinder	CY415T	26D
1	Electric Strike	1006 DB x 2004M x 2005M3 x 24VDC	630
1	Automatic Door Operator		7100LE AL
1	Overhead Stop	104S	630
1	Key Switch	653-0405 x ATS x L2	630
2	Jamb Mount Actuators	CM-25/4	32D

Wire the key switch to the vestibule jamb mount actuator. This will act as the on/off switch to the automatic door operator during and after hours.
Ensure the door has 150mm lock stiles to accommodate the mortise lock
Use same power supply from door 101.1

HARDWARE SET 003

1 Single Door 103.1 From 102A To 103 LHR
900mm x 2150mm x 45mm SCWD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP DEL SCUSH	689
1	Electric Strike	1006LB x 2004M x 2005M3 x 24VDC	630
1	Kick Plate	K10A-400mm x 860mm	32D
1	Power Supply	PS902 x 900-BBK x 900-KL	

Access Controlled By Staff Member

HARDWARE SET 004

1 Single Door 104.1 From 102A To 104 LH
900mm x 2150mm x 45mm HMDA x PSF STC46 Acoustic Door

3	Butts	CB168 114mm x 101mm	652
1	Lockset (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP DEL	689
1	Kick Plate	K10A-400mm x 860mm x D/S Tape	32D
1	Floor Stop	S113	626
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599C x 1/900mm x 2/2150mm	AL
1	Threshold	S105A x 900mm	AL

Install cylinder on reception/waiting room side

HARDWARE SET 005

1 Single Door 104.2 From 104 To 109 LHR
1 Single Door 109.1 From 107A To 109 LH
900mm x 2150mm x 45mm HMDA x PSF STC46 Acoustic Door

6	Butts	CB168 114mm x 101mm	652
2	Locksets (F13)	L9456L-03B	626
2	Abloy Cylinders	CY415T x Cam To Suit	626
2	Closers	1461Reg.	689
2	Kick Plates	K10A-900mm x 860mm x D/S Tape	32D
2	Floor Stops	S113	26D
2	Door Bottoms	521C x 900mm	AL
2	Sets Seal	599C x 1/900mm x 2/2150mm	AL
2	Thresholds	S105A x 900mm	AL

Door 104.2 – Install cylinder on multi-purpose room side
Door 109.1 – install cylinder on corridor side

HARDWARE SET 006

1 Single Door 105.1 From 102A To 105 RH
900mm x 2150mm x 45mm HMDA x PSF STC46 Acoustic Door

3	Butts	CB168 114mm x 1-01mm	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP DEL	689
1	Kick Plate	K10A-400mm x 860mm x D/S Tape	32D
1	Floor Stop	S113	26D
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599C x 1/900mm x 2/2150mm	AL
1	Threshold	S105A x 900mm	AL

HARDWARE SET 007

1 Single Door 106.1 From 102A To 106 LH
900mm x 2150mm x 45mm SCWD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F04)	L9050L- 03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D

HARDWARE SET 008

1 Single Door 107A.1 From 102A To 107C LH
900mm x 2150mm x 45mm SCWD x PSF

3	Butts	CB168 114mm x 101mm	652
1	Lockset (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP EDA DEL	689
1	Kick Plate	K10A-900mm x 860mm	32D
1	Wall Stop	S123	26D

Install cylinder on reception/waiting room side

HARDWARE SET 009

1 Single Door 108.1 To Exterior From 107C 900mm x 2150mm x 45mm		IHMD x PSF	RHR
3	Butts	CB199 114mm x 101mm NRP SEC.ST	630
1	Lockset (F15)	L9485L 03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-900mm x 860mm	32D
1	Door Viewer	DS238	26D
1	Threshold	S473A x 900mm	AL
1	Door Sweep	967C x 900mm	AL
1	Set Weatherstrip	DS77C x 1/900mm x 2/2150mm	AL
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 010

1 Single Door 110.1 From 107C To 110 900mm x 2150mm x 45mm		SCWD x PSF	RH
3	Butts	CB179 114mm x 101mm	652
1	Lockset (F04)	L9050L- 03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Kick Plate	K10A-900mm x 860mm	32D
1	Wall Stop	S123	26D

HARDWARE SET 011

1 Single Door 112.1 From 113 To 112 900mm x 2150mm x 45mm		HMD x PSF	RH
3	Butts	CB179 114 x 101mm NRP	652
1	Locksets (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 012

1 Single Door 114.1 From 108 To 114 RH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114 x 101mm NRP	652
1	Lockset (F15/F15K)	L9485L-03B/42B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 013

1 Single Door 115A.1 From 108 To 115A LH
900mm x 2150mm x 45mm HMD x PSF 90 Min.

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP DEL Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 014

1 Single Door 115B.1 From 115A To 115B LH
900mm x 2150mm x 45mm HMD x PSF 90 Min.

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F15/15K)	L9485L-03B/42B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 DEL	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D

HARDWARE SET 015

1 Single Door 116.1 From 116E To 108 RHR
1 Single Door 116.2 From 116B To 116E
900mm x 2150mm x 45mm HMD x PSF 90 Min.

6	Butts	CB168 114mm x 101mm NRP	652
2	Locksets (F15/F15K)	L9485L-42B/03B x Less “Do Not Disturb Indicator”	626
2	Abloy Cylinders	CY415T x Cam To Suit	626
2	Closers	4040XP EDA	689
2	Kick Plates	K10A-400mm x 860mm	32D
2	Floor Stops	S113	26D
2	Thresholds	S473A x 900mm	AL
2	Door Sweeps	967C x 900mm	AL
2	Sets Weatherstrip	DS78A x 1/900mm x 2/2150mm	AL

HARDWARE SET 016

1 Single Door 116.3 Exterior from 116A LHR
900mm x 2150mm x 45mm IHMD x PSF

3	Butts	CB199 114mm x 101mm NRP SEC.ST	630
1	Lockset (F15)	L9485L 03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-900mm x 860mm	32D
1	Threshold	S473A x 900mm	AL
1	Door Sweep	967C x 900mm	AL
1	Set Weatherstrip	DS78A x 1/900mm x 2/2150mm	AL
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 017

1 Single Door 116.4 From Exterior to 116A
2440mm x 3048mm x 45mm Overhead Door

1	Padlock	PL330	652

Balance Of Hardware By Door Supplier

HARDWARE SET 018

1 Single Door 118.1 To 118 From Corridor 1089 LHR
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm NRP	652
1	Lockset (F01)	L9010-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP EDA	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 019

1 Single Door 118.2 To Exterior From 118 LHR
900mm x 2150mm x 45mm IHMD x PSF

3	Butts	CB199 114mm x 101mm NRP SEC.ST	630
1	Lockset (F15)	L9485L 03B x Less “Do Not Disturb Indicator”	626
1	Cylinder	CY415T	626
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Threshold	S473A x 900mm	AL
1	Sweep	967C x 900mm	AL
1	Set Weathwerstrip	DS78A x 1/900mm x 2/2150mm	AL
1	Door Viewer	DS238	26D
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 020

1 Single Door 120.1 From 108 To 120 LH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F15K)	L9485L-42B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 021

1 Single Door 121.1 From 120 To 121 LH
900mm x 2150mm x 45mm HMD x PSF 45 Min.

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 RW/PA	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 022

1 Single Door 122.2 From 118 To 122 RH
900mm x 2150mm x 45mm IHMD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F07)	L9080L 03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 RW/PA	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 023

1 Single Door 123.1 From 108 To 123A LH
1 Single Door 123.2 From 123A To 123 RH
1 Single Door 125.1 From 108 To 125A RH
1 Single Door 125.2 From 125A To 125 LH
900mm x 2150mm x 45mm SCWD x PSF

12	Butts	CB168 114mm x 101mm	652
4	Push Plates	K11A-3	630
4	Pulls	4012-2	630
4	Closers	4041 DEL	689
4	Kick Plates	K10A-900mm x 860mm	32D
4	Wall Stops	S123	26D

HARDWARE SET 024

1 Single Door 124.1 From 123A To 124 RH
1 Single Door 124.2 From 125A To 124 LH
900mm x 2150mm x 45mm SCWD x PSF

6	Butts	CB168 114mm x 101mm	652
2	Passage Sets (F01)	L9010-03B	626
2	Closers	4040XP Reg.	689
2	Kick Plates	K10A-900mm x 860mm	32D
2	Wall Stops	S123	26D
2	Auto Door Bottoms	633C x 900mm	AL
2	Sets Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 025

1 Single Door 126.1 From 108 To 126 RH
900mm x 2150mm mx 45mm SCWD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F13)	L9456L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D

HARDWARE SET 026

1 Single Door 127.1 To 127 From 108 LHR
900mm x 2150mm x 45mm SCWD x PSF

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 027

1 Single Door 127.2 From 105 To 127 — LH
900mm x 2150mm x 45mm HMD x PSF STC46 Acoustic Door

3	Butts	CB168 114mm x 101mm NRP	
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4041 DEL	689
1	Kick Plate	K10A-400mm x 900mm x D/S Tape	32D
1	Floor Stop	S113	26D
1	Door Viewer	DS238	26D
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599C x 1/900mm x 2/2150mm	AL
1	Threshold	S105A x 900mm	AL

HARDWARE SET 028

1 Single Door 130.1 To 130 From 136 — LHR
900mm x 2150mm x 45mm HMD x PSF 90 Min.

3	Butts	STSCB199 114mm x 101mm SYS/NRP	630
1	Lockset (F14K)	L9466L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Abloy Cylinder	CY402 x Cam To Suit	26D
1	Closer	4040XP EDA	689
1	Kick Plate	K10-900mm x 860mm	32D
1	Floor Stop	S113	26D
2	Door Viewers	DS238	626
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 029

1 Single Door 131.1 From 130 To 131 — LH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F07)	L9080L- 03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 Reg.	689
1	Kick Plate	K10A-400mm x 860mm	26D
1	Wall Stop	S123	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 030

1 Single Door 132.1 From 130 To 132 RH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm NRP	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	26D
1	Closer	1461DEL	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 031

1 Single Door 133.1 From 130 To 133 RH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114 x 101mm NRP	652
1	Locksets (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Wall Stop	S123	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 032

1 Single Door 134.1 From 130 To 134 LH
900mm x 2150mm x 45mm HMD x PSF STC46 Acoustic Door

3	Butts	CB168 114mm x 101mm	652
1	Lockset (F15)	L9485L-03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4041 DEL	689
1	Kick Plate	K10A-400mm x 860mm x D/S Tape	32D
1	Floor Stop	S113	626
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599 x 1/900mm x 2/2150mm	AL

HARDWARE SET 033

1 Single Door 136.1 Exterior From 136			RHR
900mm x 2150mm x 45mm		IHMD x PSF	
3	Butts	CB199 114mm x 101mmm NRP SEC.ST	630
1	Locksets (F14K)	L9466L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Abloy Cylinder	CY402 x Cam To Suit	26D
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-900mm x 860mm	32D
1	Threshold	S473A x 900mm	AL
1	Door Sweep	967C x 900mm	AL
1	Set Weatherstrip	DS78A x 1/900mm x 2/2150mm	AL
2	Door Viewers	DS238	626
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 034

1 Single Door 136.2 From 144 To 136			LH
900mm x 2150mm x 45mm		HMD x PSF 90 Min.	
3	Butts	STSCB199 114mm x 101mm SYS/NRP	630
1	Lockset (F14K)	L9466L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Abloy Cylinder	CY402 x Cam To Suit	26D
1	Closer	4040XP EDA	689
1	Kick Plate	K10F-900mm x 860mm	32D
1	Floor Stop	S113	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL
2	Door Viewers	DS238	626

HARDWARE SET 035

1 Single Door 136.3 To 136 From Mechanical Chase			LHR
1 Single Door 136.4 To 136 From Mechanical Chase			LHR
810mm x 2100mm x 45mm		HMD x PSF	
6	Butts	CB179 114mm x 101mm NRP	652
2	Deadbolts (F18)	L9464L	626
2	Abloy Cylinders	CY402T x Cam To Suit	626
2	Cylinder Finger Pulls	H407	26D

HARDWARE SET 036

1 Single Door 140.1 From 136 To 140
1 Single Door 141.1 From 136 To 141
1 Single Door 142.1 From 136 To 142
900mm x 2200mm x 51mm Sliding Detention Door and Frame

Complete Hardware By Detention Door Supplier

HARDWARE SET 037

1 Single Door 1441.1 To Exterior From 144 LHR
900mm x 2150mm x 45mm IHMD x PSF

3	Butts	CB199 114mm x 101mmm NRP SEC.ST	630
1	Locksets (F14K)	L9466L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Abloy Cylinder	CY402 x Cam To Suit	26D
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-900mm x 860mm	32D
1	Threshold	S473A x 900mm	AL
1	Door Sweep	967C x 900mm	AL
1	Set Weatherstrip	DS78A x 1/900mm x 2/2150mm	AL
1	Door Viewer	DS238	626
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 038

1 Single Door 144.2 From Exterior To 144
3050mm x 3050mm x 45mm Overhead Door

1	Padlock	PL330	652
2	Abloy Cylinders	CY403 x 31 x Cam To Suit	626
2	Key Switches	653-0505-NS x ATS x L2	626

Balance Of Hardware By Door Supplier

HARDWARE SET 039

1 Single Door 146.1 From 136 To 146 — RH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Lockset (F07K)	L9080L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4041 DEL SCUSH	689
1	Kick Plate	K10A-400mm x 860mm	26D

HARDWARE SET 040

1 Single Door 147.1 From 136 To 147 — LH
900mm x 2150mm x 45mm HMD x PSF STC46 Acoustic Door

3	Butts	CB168 114mm x 101mm	652
1	Abloy Cylinder	CY402T x Cam To Suit	26D
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Lockset (F14K)	L9466L-42B	626
1	Closer	4040XP Reg.	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-400mm x 860mm x D/S Tape	32D
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599C x 1/900mm x 2/2150mm	AL

HARDWARE SET 041

1 Single Door 148.1 From 136 To 148 — RH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F07K)	L9080L- 42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 SCUSH	689
1	Kick Plate	K10A-400mm x 860mm	26D
1	Auto Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 042

1 Single Door 149.1 From 136 From To 149 — RHR
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm NRP	652
1	Deadbolt (F18)	L9464L	626
1	Abloy Cylinder	CY402T x Cam To Suit	626
1	Cylinder Finger Pull	H407	26D
1	Overhead Stop	104S	630

HARDWARE SET 043

1 Single Door 150.1 To 136 From 150 LHR
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm NRP	652
1	Lockset (F07)	L9080L-03B	626
1	Abloy Cylinder	CY415T x Cam To Suit	26D
1	Closer	1461SCUSH	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 044

1 Single Door 151.1 To 136 From 151 RHR
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm NRP	652
1	Abloy Cylinder	CY402T x Cam To Suit	26D
1	Lockset (F18)	L9464L	626
1	Closer	4040XP EDA	689
1	Overhead Stop	104S	630
1	Cylinder Finger Pull	H407	26D
1	Kick Plate	K10A-400mm x 900mm x 860mm	32D
1	Door Bottom	521C x 900mm	AL
1	Set Seal	599C x 1/900mm x 2/2150mm	AL
1	Threshold	S105A x 900mm	AL

HARDWARE SET 045

1 Single Door 152.1 From 136 To 152 LH
900mm x 2150mm x 45mm HMD x PSF

3	Butts	CB168 114mm x 101mm	652
1	Lockset (F07K)	L9080L-42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4040XP DEL Reg.	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D
1	Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 046

1 Single Door 154.1 From 153 To 154 — LH
900mmx 2150mm x 45mm HMD x PSF

3	Butts	CB179 114mm x 101mm	652
1	Passage Set (F01K)	L9010-42B	626
1	Closer	4041 DEL	689
1	Kick Plate	K10A-400mm x 860mm	32D
1	Floor Stop	S113	26D

HARDWARE SET 047

1 Single Door 116D.1 To 116.B From 116.D — RHR
900mm x 2150mm x 45mm HMD x PSF Rated

3	Butts	CB179 114mm x 101mm NRP	652
1	Lockset (F07K)	L9080L- 42B	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	1461 SCUSH	689
1	Kick Plate	K10A-400mm x 860mm	26D
1	Auto Door Bottom	633C x 900mm	AL
1	Set Seal	DS77C x 1/900mm x 2/2150mm	AL

HARDWARE SET 048

1 Single Door DG101.1 To Exterior From DG101 — LHR
900mm x 2150mm x 45mm IHMD x PSF

3	Butts	CB199 114mm x 101mm NRP SEC.ST	630
1	Lockset (F15)	L9485L 03B x Less “Do Not Disturb Indicator”	626
1	Abloy Cylinder	CY415T x Cam To Suit	626
1	Closer	4041 EDA	689
1	Overhead Stop	104S	630
1	Kick Plate	K10A-900mm x 860mm	32D
1	Threshold	S473S x 900mm	AL
1	Door Sweep	967C x 900mm	AL
1	Set Weatherstrip	769A x 1/900mm x 2/2150mm	AL
1	Astragal	W-7 x 2150mm	600

Ensure that the astragal is installed using non-removable screws, rivets and/or carriage bolts, bolted from the interior.

HARDWARE SET 049

1 Single Door DG101.2 From Exterior To DG101
3050mm x 2700mm x 45mm Overhead Door

Complete Hardware By Door Supplier

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 11 16 - Aluminum Doors and Frames

.3 Section 08 14 16 - Flush Wood Doors

.4 Section 08 34 63 - Detention Doors and Frames

.5 Section 08 34 73 - Acoustic Doors and Frames

.6 Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows

1.2 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.1 - 2013 Butts and Hinges.
- .2 ANSI/BHMA A156.2 - 2011 Bored and Preassembled Latches.
- .3 ANSI/BHMA A156.3 - 2014 Exit Devices.
- .4 ANSI/BHMA A156.4 - 2008 Door Controls - Closers.
- .5 ANSI/BHMA A156.5 - 2014 Cylinders and Imput Devices for Locks.
- .6 ANSI/BHMA A156.6 - 2010 Architectural Door Trim.
- .7 ANSI/BHMA A156.7 - 2009 Template Hinge Dimensions.
- .8 ANSI/BHMA A156.8 - 2010 Door controls - Overhead Holders.
- .9 ANSI/BHMA A156.10 - 2011 Power-Operated Pedestrian Doors.
- .10 ANSI/BHMA A156.13 - 2012 Mortise Locks and Latches.
- .11 ANSI/BHMA A156.14 - 2013 Sliding and Folding Door Hardware.
- .12 ANSI/BHMA A156.15 - 2011 Closer/Holder/Release Devices.
- .13 ANSI/BHMA A156.16 - 2013 Auxiliary Hardware.
- .14 ANSI/BHMA A156.18 - 2012 Materials and Finishes.
- .15 ANSI/BHMA A156.19 - 2013 Power Assist and Low Energy Operators.
- .16 ANSI/BHMA A156.21 - 2014 Thresholds.
- .17 ANSI/BHMA A156.22 - 2012 Door Gasketing Systems.
- .18 ANSI/BMHA A156.23 - 2010 Electromagnetic Locks.
- .19 ANSI/BHMA A156.25 - 2013 Electrified Locking Devices.
- .20 ANSI/BHMA A156.26 - 2012 Continuous Hinges.
- .21 ANSI/BHMA A156.28 - 2013 Master Keying Systems.
- .22 ANSI/BHMA A156.29 - 2012 Exit Locks, Exit Locks with Exit Alarms, Exit Alarms, Alarms for Exit Devices.
- .23 ANSI/BHMA A156.30 - 2014 High Security Cylinders.
- .24 ANSI/BHMA A156.31 - 2013 Electric Strikes and Frame Mounted Actuators.
- .25 ANSI/BHMA A156.115 - 2014: Hardware Penetration in Steel Door and Steel Frames.

.2 National Fire Protection Association:

.1 2013 NFPA 80: Standard for Fire Doors and Fire Windows.
.2 ANSI/NFPA 101 - Life Safety Code 2009.
.3 ANSI/NFPA 105 - Smoke and Draft Control Door Assemblies 2010.

.3 Door Hardware Institute:
.1 Recommended Locations for Architectural Hardware - Standard Steel Door & Frames 2004.
.2 Recommended Locations for Architectural Hardware - Flush Wood Doors 1993.
.3 Door & Hardware Institute Sequence Format for Hardware Schedule - 1996.

.4 Codes:
.1 ABC - Alberta Building Code 2014 edition.
.2 NBCC - National Building Code of Canada 2010 edition.

.5 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
.1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Hardware List:
.1 Submit contract hardware list.
.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
.3 All hardware schedules including key controls must be reviewed and signed off by Protective Technical Services Section to ensure continuity of security and hardware compatibility with existing division hardware.

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

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.5 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:

.1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Tools:
.1 Supply 2 sets of wrenches for door closers and locksets and fire exit hardware.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

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

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Note: special orders from outside of Canada may require up to 12 weeks delivery time. Ensure such special orders are made to meet the construction schedule.

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

.4 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.5 Storage and Handling Requirements:
.1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect door hardware from nicks, scratches, and blemishes.
.3 Protect prefinished surfaces with wrapping.
.4 Replace defective or damaged materials with new.

2 Products

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 Locks and latches:
.1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.

.2 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section. Use high security cylinders conforming to ANSI/BHMA A156.30 where indicated.
.3 Knobs and Lever handles: plain design.
.4 Roses and Escutcheons: round.
.5 Normal strikes: box type, lip projection not beyond jamb.
.6 Cylinders: key into keying system as directed. Do not use locks or cylinders having core removable functions.
.7 Finished: as indicated in the hardware schedule.

.2 Butts and hinges:
.1 Butts and hinges: to ANSI/BHMA A156.1, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.

.3 Exit devices: to ANSI/BHMA A156.3, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.1 Auxiliary items: door co-ordinator, type 21, for pairs of doors with overlapping astragals.

.4 Door Closers and Accessories:
.1 Door controls (closers): to ANSI/BHMA A156.4, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.2 Door controls - overhead holders: to ANSI/BHMA A156.8, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.3 Closer/holder release devices: to ANSI/BHMA A156.15, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.4 Door co-ordinator: grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.

.5 Door Operators:
.1 Power-operated pedestrian doors: to ANSI/BHMA A156.10.
.2 Power assist and low energy power operated doors: to ANSI/BHMA A156.19.

.6 Auxiliary locks and associated products: to ANSI/BHMA A156.5, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.1 Latch bolt and dead bolt: as indicated in the hardware schedule. Key into keying system as directed.
.2 Cylinders: type as indicated in the hardware schedule, for installation in deadlocks provided with special doors as listed in Hardware Schedule. Key into keying system as directed.

.7 Architectural door trim: to ANSI/BHMA A156.6, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.
.1 Door protection plates: kick plate, 1.27 mm thick stainless steel, bevelled edges; sizes and finish as indicated in the hardware list.
.2 Push plates: type 1.27 mm thick stainless steel, bevelled edges, sizes and finish as indicated in the hardware schedule.

.8 Auxiliary hardware: to ANSI/BHMA A156.16, grade, manufacturers, product numbers and finishes as listed in the hardware schedule appended to this Section.

.9 Door bottom seal: heavy duty, door seal of extruded aluminum frame and solid closed cell neoprene weather seal, recessed in door bottom, closed ends, adjustable.

.10 Thresholds: widths as indicted x full width of door opening, extruded aluminum mill finish, serrated surface, with thermal break of rigid PVC, with vinyl door seal insert.

.11 Weatherstripping:
- .1 Head and jamb seal:
  - .1 Extruded aluminum frame and vinyl hollow closed cell neoprene insert, clear anodized finish.
- .2 Door bottom seal:
  - .1 Extruded aluminum frame and vinyl sweep, clear anodized finish.

.12 Astragal: adjustable, extruded aluminum frame with vinyl insert, finished to match doors; full length astragals, installed using non-removable screws, rivets or carriage bolts, bolted from the interior. Partial astragals, install using carriage bolts, bolted from interior

.13 Barrier Free Pneumatic Door Operator:
- .1 Heavy duty pneumatically assisted door closer, capable of multi-door operation, complete with actuators, control boxes, pneumatic tubing and compressed air source.
- .2 Self contained control box/compressor combination for independent operation of two door leaves.
- .3 Control boxes: complete with electric strike relay.
- .4 Mount operators on either push or pull sides of doors as required to place them inside rooms.
- .5 Actuation of operators by motion detectors.
- .6 Electrical box and actuator: Hardwired low voltage actuator with stainless steel 114 mm round plate, engraved blue filled with handicap symbol. Box 51 mm wide x 102 mm high x 50 mm deep single gang electrical box, flush mounted in wall, locations indicated.
- .7 Supply switched line voltage to control box. Locate switch adjacent to box.
- .8 Supply low voltage wiring to each actuator and 6 mm diameter air tubing to each operator.
- .9 Mount control box in location as directed by Departmental Representative.

.14 Door viewers: installed 1.57 m above the floor level; one of the following:
- .1 Loxem 190 as manufactured by VSI Hardwre Industrys and available from Taymour Industries, 1170 William Street, Vancouver B.C.
- .2 Madison No. 20 R35, as manufactured by Madison Products Company Limited, 550 Sheppard Avenue, Unit 25, Agincourt, Ontario.
- .3 Ives No, 698B3 as manufactured by Leigh Metal Products Ltd., 101 Brookside Street, London, Ontario N6A 4Y3.

2.3 MISCELLANEOUS HARDWARE

.1 Indexed key control system: to ANSI/BHMA A156.5.

.2 Wall Mounted Cabinet: Cabinet with hinged-panel door equipped with key holding panels and pin-tumbler cylinder door lock. Locate where directed by the Departmental Representative.

.3 Capacity: Able to hold keys for 150 percent of the number of locks.

.4 Permanent Tags: Key system identity.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Use screwless escutcheon plates on exterior doors and doors in high security areas.

.5 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.6 Use fasteners compatible with material through which they pass.

.7 Fasteners in secure area must be security type. All cell locks are to be installed in tamperproof security machine screws, available form A-Line Distributors of Edmonton.

2.5 KEYING

.1 Provide BLANK keys in duplicate for every lock in this Contract, except for cell door locks where a total of four working keys are required.

.2 To order and purchase the restricted Departmental Representative cylinders/keys in IIFF profile, supplier shall request a "Purchase Authorization" letter from Kevin Hanniman or Dean Lynchuk (Departmental Representative "K" Division) to the Alberta Abloy representative, Ted Tetreau.

.3 Provide six pin design cylinders keyed to 000000. Forward cylinders prepaid to Departmental Representative, “K” Division Headquarters PTSS, attention Dean Lynchuk, 11140 - 109th Street, Edmonton, Alberta. Cylinders having removable cores MUST NOT BE USED.

.4 Keyways to be Abloy cylinders and Padlocks - No Alternatives.

.5 Hardware supplier will supply a sufficient number of unrestricted keyway cylinders to the Contractor to secure the perimeter of the building and one storage room. The Contractor will return the cylinders to the supplier upon turnover of the building.

3 Execution

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Install key control cabinet.

.7 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.2 SECURITY SYSTEM INSTALLATION INSTRUCTIONS

.1 Install electric strikes, consoles, and switches according to manufacturer’s instructions.

.2 Tag all wires and label each connection in tabular form indicating unit, location, lead, sig name, colour, pin and marker.

.3 Commission system ensuring all doors function properly and according to approved schematics.

3.3 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.
.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.5 DEMONSTRATION

.1 Keying System Setup and Cabinet:
  .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
  .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
  .3 Lock key cabinet and turn over key to Departmental Representative.

.2 Maintenance Staff Briefing:
  .1 Brief maintenance staff regarding:
    .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    .2 Description, use, handling, and storage of keys.
    .3 Use, application and storage of wrenches for door closers, locksets and fire exit hardware.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.7 SCHEDULE

.1 As attached to the end of this Section

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 - Metal Doors and Frames

.2 Section 08 11 16 - Aluminum Doors and Frames

.3 Section 08 41 13 - Wood Doors

.4 Section 08 44 13 - Glazed Aluminum Curtain Wall & Windows

.5 Section 08 87 00 - Glazing Surface Films

.6 Section 08 87 53 - Security Films

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C542-05(2011): Standard Specification for Lock-Strip Gaskets.
- .2 ASTM C1036-11e1: Standard Specification for Flat Glass.
- .3 ASTM C1048-12e1: Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- .4 ASTM C1172-14: Standard Specification for Laminated Architectural Flat Glass.
- .5 ASTM C1281-14: Standard Specification for Preformed Tape Sealants for Glazing Applications.
- .6 ASTM C1396-07(2014): Standard Specification for Secondary Edge Sealants for Structurally Glazed Insulating Glass Units.
- .7 ASTM C1401-14: Standard Guide for Structural Sealant Glazing.
- .8 ASTM D790-10: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .9 ASTM D1003-13: Standard Test Method for Haze and Luminous Transmittance of Plastics.
- .10 ASTM D1929-14: Standard Test Method for Determining Ignition Temperature of Plastics.
- .11 ASTM D2240-05(2010): Standard Test Method for Rubber Property - Durometer Hardness.
- .12 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.
- .13 ASTM E2190-10: Standard Specification for Insulating Glass Unit Performance and Evaluation.
- .14 ASTM F1233-08(2013): Standard Test Method for Security Glazing Materials and Systems.

.2 American National Standards Institute (ANSI).
- .1 ANSI/ASTM E330/E330M-14: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.2 ANSI Z97.1-2009: Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90: Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.3-M91: Flat, Clear Float Glass.
- .3 CAN/CGSB-12.4-M91: Heat Absorbing Glass.
- .4 CAN/CGSB-12.8-97: Insulating Glass Units.
- .5 CAN/CGSB-12.8-97 (Amendment): Insulating Glass Units.
- .6 CAN/CGSB-12.12-M90: Plastic Safety Glazing Sheets.
- .7 CAN/CGSB-12.20-M89: Structural Design of Glass for Buildings.

.4 Canadian Standards Association (CSA International).
- .1 CSA A440.2-14/A440.3-14: Fenestration energy performance/User guide to CSA A440.2-14: Fenestration energy performance.
- .2 CSA Certification Program for Windows and Doors 2000.

.5 Glass Association of North America (GANA).
- .1 Glazing Manual and Laminated Glass Design Manual.

.6 SIGMA:
- .1 SIGMA TM-3000 Vertical Glazing Guidelines.

.7 Insulated Glass Manufacturer's Alliance (IGMA).

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:
- .1 Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010 for the Elk Point area as measured in accordance with ANSI/ASTM E330. Determine if heat strengthened glass or annealed glass is required to meet performance requirements.
- .3 Limit glass deflection to 1/200 or the flexural limit of glass, whichever is least, with full recovery of glazing materials.
- .4 Ensure air leakage complies with the MNECB mandatory requirements. Where there is a discrepancy between the requirements specified in this Section or related Sections such as Aluminum Curtain Wall and Windows, and the MNECB mandatory requirements, the most stringent requirements govern.
- .5 Differential Shading: Design glass to withstand thermal stresses induced by differential shading within individual lites of glass.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
  .1 Verify project requirements.
  .2 Review installation and substrate conditions.
  .3 Co-ordination with other building subtrades.
  .4 Review manufacturer's written installation instructions and warranty requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
  .1 Submit for review and acceptance of each unit.
  .2 Samples will be returned for inclusion into work.
  .3 Submit four (4) 300 mm x 300 mm size samples of each type of glazing and sealed unit.

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

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  .1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
  .2 Submit shop inspection for glass.
  .3 Low-Emitting Materials.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.7 QUALITY ASSURANCE

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

.2 The sealed unit glazing fabricator must be certified by the primary coated glass manufacturer and must provide a copy of such certification to the Departmental Representative prior to commencement of Work of this Section.

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Include glazing in mockups of glazed aluminum curtain wall and windows, specified in Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows.
.3 Mock-up will be used:
.1 To judge quality of work, substrate preparation, operation of equipment and material application.
.2 For testing to determine compliance with performance requirements.
.4 Locate where directed.
.5 Allow 24 hours for inspection of mock-up before proceeding with work.
.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Accepted mock-up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect glazing and frames from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.9 AMBIENT CONDITIONS

.1 Ambient Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 WARRANTY

.1 For Sealed units specified in this Section, 12 months warranty period is extended to 24 months.

2 Products

2.1 MATERIALS

.1 Flat Glass:
.1 Float Glass: float glass conforming to CAN/CGSB-12.3-M91, thickness as determined by opening size or wind/suction loads, whichever is more restrictive, but not less than 6 mm thick.

.2 Tempered Safety glass: to CAN/CGSB-12.1-M90, type 2, class 2, category 2, clear tempered float glass, with the exception that maximum allowable roller wave distortion (distance between peak and valley of roller wave) is not to exceed 1/1000 inch; thickness as determined by opening size or wind/suction loads, whichever is more restrictive, but not less than 6 mm thick. Install with roller wave distortion parallel to bottom edge of glass as installed.

.3 Laminated glass: two panes of 6 mm clear float glass with 0.75 mm thick polyvinyl butyral interlay, conforming to CAN/CGSB-12.1-M90, type 1, class B, category II; total thickness 13 mm.

.4 Heat Absorbing Glass (for use in sealed unit glazing): to CAN/CGSB-12.4-M91, thickness as determined by opening size or wind/suction loads, whichever is more restrictive, but not less than 6 mm thick, class A - annealed generally, class C - tempered where required by the Alberta Building Code 2014 and National Building Code of Canada 2010, tint 3 blue/green tinted float glass.

.5 Silvered mirror glass: 6 mm thick.
- .1 Type 1B-float glass for high humidity use.
- .2 Tint: Clear.
- .3 Edges: Flat polished edge. Seal edges to prevent chemical or atmospheric penetration of backing.

.6 Polycarbonate glazing: to CAN/CGSB-12.12-M90, clear polycarbonate and acrylic sheet 19.7 mm thick, Flexural strength not less than 13,500 psi, consisting of 3 ply clear extruded polycarbonate sheet and acrylic sheet to the following construction:
- .1 3.2 mm thick polycarbonate with a marguard surface.
- .2 L.R. resin interlayer.
- .3 12.7 mm thick acrylic sheet.
- .4 L.R. resin layer.
- .5 3.2 mm thick polycarbonate layer with marguard surface.
- .6 Type: Lexan "Lexgard Laminate MP-750".

.

.7 Low emissivity (LOW E) glass, 6 mm thick blue/green tinted heat absorbing glass. Note: performance requirements are for low E coating on clear glass.
- .1 Metallic coating: soft, sputtered.
- .2 Visible Light transmittance: 70%.
- .3 Shading co-efficient: 0.45.
- .4 U-Value: winter 0.29 maximum, summer 0.27 maximum.

.2 Insulating Glass Units:

.1 Insulating glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.

.1 Glass:

.1 Exterior lite: 6 mm thick blue/green tinted float glass with low-E coating on 2nd surface. Where required by the ABC, use tinted tempered glass with low-E coating on 2nd surface.

.2 Interior lite: 6 mm clear float glass generally, tempered where required by the ABC.

.3 Note: to exterior doors and sidelights, provide glazing as specified, except using tempered glass.

.2 Inter-cavity space thickness: with low conductivity spacers 13 mm between inner and outer lites.
.3 Glass coating: surface number 2, low "E".
.4 Inert gas fill: argon.
.5 Performance:
.1 Visible Light Tranmittance: 61%
.2 U Value:
.1 Winter Night time: 0.29
.2 Summar Day-time: 0.27
.3 Shading Coefficient: 0.37
.4 Solar Heat Gain Co-efficient: 0.31
.5 Light to Solar Gain: 1.91

.3 Glazing Surface Film: in accordance with Section 08 87 00 - Glazing Surface Films.

.4 Plastic Film: in accordance with Section 08 87 53 - Security Films.

.5 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.2 ACCESSORIES

.1 Setting blocks: silicone, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area, 100 mm long x 9.5 mm thick x 6 mm high.

.2 Spacer shims: neoprene or silicone, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:100% solids, ribbon form extruded polyisobutylene - butyl type, 10-15 durometer hardness, paper release, colour to match adjacent surfaces, size to suit opening.

.4 Gaskets to curtain wall and windows: as specified in Section 08 44 13 - Glazed Aluminum Curtain Wall and Windows.

.5 Gaskets to aluminum doors and interior vestibule aluminum framing: as specified in Section 08 11 16 - Aluminum Doors and Frames.

.6 Glazing Points, and wire spring clips: corrosion resistant, manufacturer's standard.

.7 Foam tape: for interior glazing. Approved low-density foam tape.

.8 Fasteners for polycarbonate glazing: type 316 stainless steel screws and bolts.

.9 Sealant: conforming to CAN/CGSB-19.13-M87, silicone sealant for frameless glazing, colour to be clear.

.10 Mirror clips: concealed stainless steel type to suit mirror thickness.

.11 Mirror adhesive: chemically compatible with mirror coating and wall substrate.

.12 Speaking Port: 3.18 mm stainless steel, with satin finish, disc shaped speaker port clamped to glass with rubber rings, 135 mm outside diameter, with 5 mm diameter speaking holes staggered and non-aligned. Acceptable product: Chubb OP-44 or preapproved product.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
- .1 Verify that openings for glazing are correctly sized and within tolerance.
- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- .3 Visually inspect substrate in presence of Departmental Representative.
- .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

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.

.3 Prime surfaces scheduled to receive sealant.

3.3 GLASS INSTALLATION GENERALLY

.1 Perform work in accordance with GANA Glazing Manual and Laminated Glass Design Manual and IGMA - Standards Manual.

.2 Do not glaze when ambient or surface temperatures are less than 10°C. Glazing rebates, stops and glass must be dry, free from ice, frost slick, grease, oil, dust, rust, or other matter detrimental to adhesion of tape, glazing compounds and sealants.

.3 Employ skilled workers in this trade to install glass in strict accordance with manufacturer's directions to produce a first-class installation.

.4 Accurately cut glass to fit openings and provide for glass expansion in accordance with manufacturer's recommendations.

.5 Inspect each piece of glass prior to installation. Do not install any pieces which are improperly sized or have damaged edges, scratches, abrasion, or any other evidence of damage or defects.

.6 Ensure all surfaces in contact with glazing materials are properly prepared prior to glazing.

.7 Ensure that glass is free from contact with frames and stops.

.8 Use glazing gaskets as specified in Section 08 44 13 for all glazing to curtain wall and windows, and 08 11 16 for aluminum doors and all non-thermally broken vestibule framing.

.9 Glaze interior wood doors and metal doors, and metal frames with glazing tape on both sides. Use glazing tape both sides with wired glass.

.10 Label each lite to show manufacturer's name and trade mark, thickness, and space between sheets in sealed units.

.11 Remove protective coatings and clean contact surfaces with solvent and wipe dry.

.12 Apply primer-sealer to contact surfaces.

.13 Place setting blocks as per manufacturer's instructions.

.14 Install glass, centre and support on setting blocks at quarter points, ensure full contact and adhesion at perimeter.

.15 Install removable stops, without displacing tape or sealant.

.16 Provide edge clearance of 3 mm minimum if area of unit less than 1 sq m; 5 mm minimum if area of unit 1 sq m to 2 sq m, 6 mm minimum otherwise.

.17 Insert spacer shims to centre glass in space. Place shims at 600 mm oc and keep 6 mm below sight line.

.18 Apply sealant to uniform and level line, flush with sight line and tooled or wiped with solvent to smooth appearance.

.19 Do not cut or abrade tempered, heat treated, or coated glass.

.20 Install clear tempered float glass to all metal frames.

.21 Install 13 mm thick laminated glass to lobby counter and elsewhere as indicated.

.22 Install speaker port into glazing to prisoner/visitor counter/divider and at lobby counter, as indicated and in strict accordance with manufacturer’s recommendations.

3.4 EXTERIOR GLAZING

.1 Lock strip gasket method: (to exterior aluminum curtain wall and windows and exterior aluminum doors)

- .1 Unpack and lay out gaskets on flat warm area to permit recovery of shape.
- .2 Install gaskets under compression from corners inward. Seal corner junctions between gaskets with a black type 1 sealant specified in Section 07 92 00.
- .3 Drain infiltrated moisture to exterior through drain holes in sill.
- .4 Install locking strip and gasket assembly to manufacturer's instructions.

3.5 INTERIOR GLAZING

.1 Dry method - tape/tape: (to interior metal frames)
- .1 Cut glazing tape to length and install against permanent stop, project 1.6 mm above sight line. Install horizontal strips first, extend over entire width of opening before applying vertical strips. Weld corners together by butting tape and dabbing with sealant.
- .2 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .3 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
- .4 Place glazing tape on free perimeter of glazing in same manner described in 3.5.1.
- .5 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .6 Knife trim protruding tape.

.2 Gasket method: (to interior aluminum doors and frames)
- .1 Install gasket to permanent stop and install glass.
- .2 Apply removable stops. Install gaskets in frame channels.

3.6 INSTALLATION OF SEALED GLASS UNITS

.1 Where not otherwise covered in this Section, install sealed glass units in accordance with the specifications of the Insulated Glass Manufacturer's Alliance (IGMA).

3.7 INSTALLATION: MIRRORS

.1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

.2 Set mirrors with clips. Anchor rigidly to wall construction.

.3 Set in frame.

.4 Place plumb and level.

3.8 FRAMELESS BUTT JOINT GLAZING

.1 To locations where frameless vertical butt joint glazing occurs, install glazing in perimeter frames as specified herein, with silicone sealed frameless vertical butt joints between glass panels as indicated.

.2 Ensure joints between the glass panes are plumb, square, true to line, and of uniform thickness 6 mm.

.3 Wire tie wood blocks to align glass at spaced butt joints and apply silicone sealant to completely fill voids between pieces of glass.

.4 When silicone is cured, remove wood blocking and ties and infill with silicone.

.5 Upon curing of silicone, remove excess sealant from glass be razor blade or other approved method.

3.9 INSTALLATION OF POLYCARBONATE SHEET

.1 Unmask sheets immediately prior to installation.

.2 Install items in accordance with details and manufacturer's recommendations. Position items accurately, secure and rigid.

.3 Allow for expansion and contraction where through-bolted.

.4 Design and select fasteners to suite size and nature of components being joined.

.5 Install polycarbonate sheet to locations indicated, using compatible sealing compound and stainless steel screws through the polycarbonate into the window frame as recommended by the polycarbonate sheet manufacturer.

.6 Apply clear silicone sealant as detailed. Ensure compatibility of sealant and sheet product.

.7 Replace damaged items.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.11 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 80 50 - Glazing

.2 Section 08 87 53 - Security Films

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM D882-12: Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- .2 ASTM D1004-13: Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- .3 ASTM D1044-13: Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
- .4 ASTM D2582-09: Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
- .5 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 International Window Film Association (IWFA)
- .1 IWFA Visual Quality Standard for Applied Window Film, current edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: manufacturer’s standard product data, indicating performance, materials, thicknesses, installation requirements.

.3 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Indicating joints, patterns and installation methods.

.4 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit four (4) 500 x 500 x sample of film installed on 6 mm thick clear float glass.

.5 Submit test reports in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.

.6 Submit Closeout Submittals in accordance with Section 01 78 00 - Closeout Submittals.
- .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Follow manufacturers written instructions for care and maintenance of security and safety film.

.3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.

.4 Remove from storage, in quantities required for same day use.

.5 Store materials in accordance with manufacturers written instructions.

1.6 WARRANTY

.1 Work of this Section 08 87 00 - Glazing Surface 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 5 years.

.2 Ensure warranty includes items as follows:
- .1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.
- .2 Maintaining appearance without discolouration.
- .3 Removing, replace and reapply defective materials.
- .4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Departmental Representative.

1.7 MAINTENANCE DATA

.1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

2 Products

2.1 MATERIALS

.1 Glazing Surface Film: cast vinyl, matte finish, 0.05 mm thickness, dusted etched, translucent film, solvent acrylic, pressure sensitive adhesive, manufacturer and type as indicated in the Drawings.

3 Execution

3.1 INSTALLERS

.1 Use only manufacturer authorized applicators for Work of this Section.

3.2 PREPARATION

.1 Clean glass before beginning installation using neutral cleaning solution.

.2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.3 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.4 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems. Report findings to Departmental Representative.

.5 Proceed with Work only after receipt of written approval from Departmental Representative.

.6 Before beginning Work, place absorbent material on window sill to absorb moisture accumulation generated by film application.

3.3 INSTALLATION

.1 Cut film edges straight and square. Where applicable, laser cut film to patterns as indicated.

.2 Ensure film is installed behind window stops.

.3 Apply and attach film to glass in accordance with manufacturer's written instructions.

.4 Splicing:
- .1 Splice film only when glass is greater in width than film.
- .2 Splice film only after receipt of written approval from Departmental Representative.
- .3 Use butt factory edges only.
- .4 Ensure patterns are aligned and that joints are rendered undetectable.

.5 Use clean, clear water to remove protective water soluble coating on adhesive side of film.

.6 Use only water and film slip solution on glass to facilitate positioning of film.

.7 Ensure removal of excess water from between film and glass.

.8 Remove left over material form work area and return work area to original condition.

3.4 INSPECTION

.1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Return to work place after 30 days but no longer than 40 days for final cleaning and inspection of installed film.

.3 Ensure finished surface of film is vision free of blisters, bubbles, tears, scratches, edge defects, delaminating or vision distortion when viewed under natural daylight from 2.0 m minimum.

.4 Remove and replace without glass replacement, film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.

3.5 FINAL CLEANING

.1 Wash interior and exterior of each glass panel and film using cleaning solution recommended by film manufacturer.

3.6 MAINTENANCE

.1 Follow manufacturers written instructions for care and maintenance of tape on film.

.2 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of tape on film.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:
.1 Security and safety film placed on glass surfaces for increased security protection and to improve resistance to glass breakage.

1.2 RELATED REQUIREMENTS

.1 Section 08 80 50 - Glazing

1.3 REFERENCES

.1 American National Standards Institute (ANSI)
.1 ANSI Z97.1-2009; Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

.2 American Society for Testing and Materials (ASTM)
.1 ASTM D882-12: Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
.2 ASTM D1004-13: Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
.3 ASTM D1044-13: Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
.4 ASTM D2582-09: Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
.5 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.
.6 ASTM F1642-12: Standard Test Method for Glazing and Glazing Systems Subject to Air Blast Loadings.

.3 International Window Film Association (IWFA)
.1 IWFA Visual Quality Standard for Applied Window Film 1999.

.4 General Services Administration (GSA)
.1 GSA-TS01-2003: Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

.5 Consumer Product Safety Commission Publications (CPSC):
.1 CPSC, 16 CFR, for Category 1 and 2 used in buildings.

.6 Government of Canada:
.1 Canada Labour Code, WHMIS data sheets.

.7 Underwriters laboratories of Canada (ULC):
.1 ULC-S332-93: Standard for Burglary Resisting Material.

.8 Underwriters laboratories (UL):

.1 UL-972-06: Burglary Resistant Glazing Materials.

1.4 DEFINITIONS

.1 Safety: reduction of risk of injury, loss or death of persons due to accidental, natural or unintentional causes.

.2 Security: reduction of risk of injury, loss or death of persons due to intentional actions of others.

.3 Security and Safety Film Types:
.1 Type 3 Security / Blast: areas of concern related to bomb blasts.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

.3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit four (4) 500 x 500 mm sample of film installed on 6 mm thick clear float glass.

.4 Submit test reports in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.

.5 Submit Closeout Submittals in accordance with Section 01 78 00 - Closeout Submittals.
.1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
.2 Follow manufacturers written instructions for care and maintenance of security and safety film.
.3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

1.6 QUALITY ASSURANCE

.1 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
.2 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.

.4 Remove from storage, in quantities required for same day use.

.5 Store materials in accordance with manufacturers written instructions.

1.8 WARRANTY

.1 Work of this Section 08 87 53 - Security Films 12 months warranty period is extended to 120 months.

.2 Ensure warranty includes items as follows:
- .1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.
- .2 Maintaining appearance without discolouration.
- .3 Removing, replace and reapply defective materials.
- .4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Departmental Representative.

1.9 MAINTENANCE DATA

.1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

2 Products

2.1 MATERIALS

.1 Security Film - General: optically clear polyester film , abrasion resistant coating and release liner. Thickness to be 14 mil minimum. Testing in accordance with GSA-TS01, ANSI Z97.1, and CPSC 16 CFR 1201 CAT II. Manufacturer and type as indicated on the Drawings.

2.2 FABRICATION

.1 Shop installation of security film to glass panels:
- .1 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
- .2 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.
- .3 View glass from 2.0 m minimum. Report findings to Departmental Representative.
- .4 Proceed with Work only after receipt of written approval from Departmental Representative.
  - .1 Install security film to glass panels ensuring no blisters, bubbles, scratches, edge defects or distortions.
  - .2 Cut film edges straight and square to within 3 mm of edge of panel.

3 Execution

3.1 PREPARATION

.1 Clean glass before beginning installation using neutral cleaning solution.

.2 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

.3 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.4 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems. Report findings to Departmental Representative.

.5 Proceed with Work only after receipt of written approval from Departmental Representative.

.6 Before beginning Work, place absorbent material on window sill to absorb moisture accumulation generated by film application.

3.2 INSTALLATION

.1 Field Installation of Security Film to Glass Windows:
- .1 Install film in the same manner as tested.
- .2 Remove any window stops and window sealing device.
- .3 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.
- .4 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
- .5 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems. Report findings to Departmental Representative before starting Work.
- .6 Proceed with Work only after receipt of written approval from Departmental Representative.
- .7 Install security film to glass windows ensuring no blisters, bubbles, scratches or distortions.

.2 Cut film edges straight and square.

.3 Ensure film is installed behind window stops.

.4 Cut edges in accordance with manufacturers written instructions.

.5 Apply and attach film to glass in accordance with manufacturer's written instructions.

.6 Splicing:
- .1 Splice film only when glass is greater in width than film.

.2 Splice film only after receipt of written approval from Departmental Representative.
.3 Use butt factory edges only.
.4 Ensure maximum overlap of 3 mm.

.7 Use only water and film slip solution on glass to facilitate positioning of film.

.8 Ensure removal of excess water from between film and glass.

.9 Remove left over material form work area and return work area to original condition.

3.3 INSTALLER'S INSPECTION

.1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Remove and replace window unit that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.

.3 Remove and replace without glass replacement, film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.

3.4 FINAL CLEANING

.1 Wash interior and exterior of each glass panel and film using cleaning solution recommended by film manufacturer.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 05 41 00 - Cold Formed Structural Steel Framing Systems

.3 Section 07 27 00.01 - Air/Vapour Barrier

.4 Section 07 84 00 - Fire Stopping

.5 Section 07 92 00 - Joint Sealing

.6 Section 09 30 13 - Ceramic, Glass and Porcelain Tiling

.7 Section 09 91 23 - Interior Painting

.8 Section 09 96 59 - Special Wall Coatings

1.2 REFERENCES

.1 ASTM International

.1 ASTM A653/A653M-15: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A1008/ A1008M-15: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.3 ASTM C473-15: Standard Test Methods for Physical Testing of Gypsum Panel Products.

.4 ASTM C474-15: Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction.

.5 ASTM C475/C475M-15: Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.6 ASTM C645-13: Standard Specification for Nonstructural Steel Framing Members.

.7 ASTM C754-15: Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.

.8 ASTM C840-13: Standard Specification for Application and Finishing of Gypsum Board.

.9 ASTM C919-12: Standard Practice for Use of Sealants in Acoustical Applications.

.10 ASTM C954-15: Standard Specification for Steel Drill Screws for Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.33 in (0.84 mm) to 0.112 in (2.84 mm) in Thickness.

.11 ASTM C1002-14: Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.12 ASTM C1047-14a: Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.13 ASTM C1177/1177M-13: Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
.14 ASTM C1178/1178M-11: Standard Specification for Glass Mat Water Resistant Gypsum Backing Panel.
.15 ASTM C1278/C1278M-07a(2011): Standard Specification for Fiber-Reinforced Gypsum Panel.
.16 ASTM C1280-13a: Standard Specification for Application of Gypsum Sheathing Board.
.17 ASTM C1325-14: Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
.18 ASTM C1396/C1396M-14a: Standard Specification for Gypsum Board.
.19 ASTM C1629/C1629M-15: Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
.20 ASTM C1658/C1658M-13: Standard Specification for Glass Mat Gypsum Panels.

.2 AWCC: Association of Wall and Ceiling Contractors/Wall & Ceiling Institute, Specification Standards Manual, 2012 (5th Edition).

.3 Association of the Wall and Ceilings Industries International (AWCI)
.1 AWCI Levels of Gypsum Board Finish.

.4 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-10: Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store gypsum board assemblies materials level off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
.3 Protect from weather, elements and damage from construction operations.
.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
.6 Replace defective or damaged materials with new.
.7 Do not load any area of the building beyond the design limits.

1.5 EXAMINATION

.1 Examine drawings, details and schedules. Determine the intent, extent, materials, location, conditions of interfacing with other work. Be aware of requirements set out therein.

.2 Inspect surfaces on which the work of this Section is dependent, for unevenness, moisture and other irregularities detrimental to the application and performance of the work. Confirm that conditions are satisfactory before proceeding.

.3 Examine and co-ordinate work with other trades and ensure that anchors, blocking, grounds, electrical conduit, wiring and mechanical work, which is to be installed in or behind work of this Section, has been installed, tested and accepted.

.4 Inspect existing conditions which will affect the Work of this Section. Report any unacceptable conditions to the Departmental Representative. Do not proceed with Work of this Section until unacceptable conditions have been rectified. Starting Work implies acceptance of existing conditions.

1.6 PROTECTION

.1 Protect the work against damage by others, from weather or other causes. Protect other work against damage. Make good any damage caused.

.2 Protect other surfaces from accidental application of taping compound, take particular care with finished surfaces and glass. Restore damaged work to its original condition.

1.7 AMBIENT CONDITIONS

.1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimumafter completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.8 FIRE RATED CONSTRUCTION

.1 Erect materials and components to partitions, ceilings, enclosures, beams, columns, and the like, which are required to have a fire resistance rating, to meet the Authority Having Jurisdiction listed requirements for the required rating.

.2 Where a ULC (or other testing laboratory) listing is quoted, ensure that all work and materials comply with the listed requirements, or are approved by the Authority Having Jurisdiction.

.3 Erect fire rated partitions to provide the fire separations required. Confirm fire rated enclosures with mechanical & electrical drawings.

1.9 ACOUSTIC ASSEMBLIES

.1 Maintain continuity of acoustic rated assemblies, including at junction with dissimilar adjacent materials and components such as beams, slabs, columns above ceilings and the like.

2 Products

2.1 METAL STUDS, FURRING, AND SUSPENSION MATERIALS

.1 Metal studs: fabricated from hot dipped or wiped coat galvanized sheet steel conforming to ASTM C645 and CAN/CGSB-7.1-98. Flanges not less than 32 mm wide, edges bent back 90° and doubled over to form a 5 mm return. Faces knurled. Knock-out service holes at 600 mm centres. Widths as noted on the drawings. Use minimum 0.762 mm core thickness studs at all door jambs, behind glass mat faced gypsum board to interior locations and to all walls with impact resistant gypsum board. Elsewhere use minimum 0.457 mm base metal thickness steel studs, except as noted herein. Base metal thickness to be as determined by ASTM C754 to suit heights of walls. All stud walls for this project are to be designed for a maximum deflection of L/360. Note: that 0.457 mm base metal thickness studs may not be sufficient for every wall type and every application.

.2 Floor and overhead tracks: hot dipped galvanized sheet steel. Width to suit studs. Flanges for floor tracks not less than 32 mm high. Flanges for top track 50 mm. Use 1.372 mm base metal thickness top and bottom track to all short walls 150 mm or less in length before change of direction. Elsewhere, floor and overhead track base metal thickness is to match stud thickness as noted above.

.3 Channel retainer for double track at head of partitions: hot dipped galvanized sheet metal channel; fabricated just wide enough to accept top track; in as long lengths as practical. Channel retainer base metal thickness is to match stud thickness as noted above. Flanges to be minimum 50 mm wide.

.4 Drywall furring channels: hat-shaped, from 0.457 mm core thickness hot-dipped galvanized sheet steel 22 mm deep x 32 mm wide face. Face knurled. Use 0.762 mm core thickness furring channels behind all glass mat faced gypsum board and impact resistant gypsum board.

.5 Metal Channel Stiffeners: 38 mm x 12.7 mm size, 1.372 mm base metal thickness cold rolled steel, coated with rust inhibitive coating.

.6 Bracing and carrying channels: except as noted otherwise 38 mm x 12.7 mm x 1.372 mm base metal thickness, with protective paint coating. Where appropriate, light gauge metal framing members may be used in lieu of channels.

.7 Tiewire: galvanized soft annealed 1.6 mm diameter.

.8 Hangers: galvanized mild steel, 6 mm diameter.

.9 Anchors for suspended ceilings hung from concrete elements: drilled type with eye bolt, with safe working load not exceeding 25% of manufacturer's stated average test loads.

.10 Other fasteners, clips, splices and the like: suitable for intended application.

2.2 GYPSUM BOARD

.1 Regular Gypsum Board: to ASTM C1396/C1396M, plain, 15.9 mm thick or as indicated, x 1200 mm wide x maximum permissible length, ends square cut, edges tapered, paper/paper faced. For gypsum board in acoustically rated partitions, use type X gypsum board conforming to ASTM C1396/1396M, whether drawings indicate Type X gypsum board or not.

.2 Gypsum board for ceilings (where 12.7 mm thick gypsum board is indicated): to ASTM C1396/C1396M, non-sag type plain gypsum board, 12.7 mm thick or as indicated, x 1200 mm wide x maximum permissible length, ends square cut, edges tapered, paper/paper faced.

.3 For use in fire rated construction (including fire rated ceilings): to ASTM C1396/C1396M, Type 'X' special ULC approved fire retardant type, 15.9 mm thickness unless noted otherwise, 1200 mm wide x maximum permissible length, ends square cut, edges tapered, paper/paper faced. Where required to meet ULC or Intertek Testing Services (Warnock Hersey) designs, use “C” formulation fire rated gypsum board, to the satisfaction of the Authority Having Jurisdiction.

.4 Abuse Resistant Gypsum Board: conforming to ASTM C1629/C1629M and ASTM C1396/C1396M, thickness as indicated, type X where required, abuse resistant gypsum board consisting of fire resistant, dimensionally stable gypsum core formed between a face layer of heavy, smooth, abuse resistant paper, and a back layer of heavy liner paper.

.5 Exterior gypsum Sheathing: silicone treated gypsum core conforming to ASTM C1177, fibreglass mat faces both sides, alkali resistant, 12.7 mm thickness, 1220 mm wide by lengths to suit; Fire rated type where required and to meet tested fire rating requirements.

.6 Gypsum Tile Backer Board: surface coated, fibreglass faced gypsum board conforming to ASTM C1178, with silicone treated gypsum core, 15.9 mm thick, Type "X" where required, 1220 mm wide x maximum permissible length, square edges.

.7 Glass Mat faced Gypsum board (moisture resistant gypsum board): conforming to ASTM C1177, GreenGuard Certified for low VOC content, moisture and mould resistant, non combustible gypsum board embedded with coated glass mat faces (without embedded glass coats to locations where epoxy coating is applied as the finish), exposed face to be smooth and ready for finishing like regular gypsum board, and to resist growth of mould and mildew as per ASTM D3273; 1220 mm wide x maximum permissible length, tapered edges, 15.9 mm thickness, type X to fire rated assemblies.

.8 Shaftwall system: providing required fire rating to approval of Authority Having Jurisdiction and as noted on the drawings. One of the following:
- .1 CertainTeed Shaftwall.
- .2 Georgia-Pacific Shaft Enclosure System.
- .3 CGC Shaft Wall Systems.
- .4 Other preapproved product.

2.3 MISCELLANEOUS MATERIALS

.1 Tape: to ASTM C475, 50 mm wide spark perforated tape; as recommended by the gypsum board manufacturer. To fibre glass faced smooth gypsum board use 50 mm wide fibreglass tape as recommended by the manufacturer.

.2 Jointing compound: to ASTM C475, slow setting, vinyl bedding and finishing compound, as recommended by gypsum board manufacturer. To locations where epoxy coatings are installed on walls, use drywall mud/taping as recommended by the epoxy coating manufacturer.

.3 Setting Compound: to fibreglass faced gypsum board, use setting compound for fibreglass tape in lieu of regular jointing compound for bedding of fibreglass tape (first coat). Use regular jointing compound for all other coats to joints. Type as recommended by the fibreglass faced gypsum board manufacturer.

.4 Screws: to ASTM C1002, type W for application of gypsum board to wood, Type S for application of gypsum board to metal framing and type G for application of gypsum board to gypsum board; Power drilling self-applying type, case hardened, socketed countersunk head, galvanized, of type and sizes recommended by gypsum board manufacturer and as required for fire rated partitions. Use flat headed screws to fasten sheet metal blocking to steel studs, and studs to lower top track of double top track installation to allow for unrestricted vertical movement to accommodate structural deflection from above.

.5 Fasteners for silicone treated core fibre glass faced gypsum sheathing:
- .1 For metal framing: wafer headed, rust resistant, type S-12 drill or Hi-Lo, minimum 25 mm length for steel studs and steel framing.

.6 Trim: conforming to ASTM C1047; minimum 0.5 mm thickness commercial grade sheet steel with wiped coat zinc finish to ASTM A924/A924M, type specially design for use in gypsum board applications, flanges designed to be concealed with taping compound and as follows:
- .1 Casing beads and trim: metal or metal and paper combination "J" type, beaded angle, with one side perforated for joint filling, to suit gypsum board thickness.
- .2 Corner beads: square, metal or metal and paper combination, beaded angle, flanges 28.6 mm or 32 mm.
- .3 Expansion joints: preformed metal, beaded, with one side perforated for joint filling.
- .4 Control Joints: to ASTM C1047, pre-formed galvanized metal or plastic "V" type, perforated flanges.

.7 Acoustical sealant: To ASTM C919 as specified in Section 07 92 00.

.8 Acoustical batt insulation: conforming to ASTM C665; thickness as indicated.

.9 Fasteners: manufacturer's standard suitable for intended application.

.10 Wood and Plywood blocking and backing: as specified in Section 06 10 00 - Rough Carpentry.

.11 Metal strip 'blocking': 1.092 mm (18 ga.) base metal thickness steel sheet, 150 mm wide and of sufficient length to attach to minimum of 2 steel studs or as otherwise indicated on the drawings. To locations where gypsum board partitions extend to underside of structure, use 1.092 mm (18 ga.), base metal thickness sheet steel of sufficient width to span across three bottom flutes of underside of metal deck and continuous length of partition.

.12 Fire safing filler: rock wool or mineral fibre, conforming to ASTM C612.

.13 Foam strip: continuous, closed cell, self adhering foam tape, 6 mm x 25 mm and 10 mm x 25 mm.

.14 Polyethylene Gaskets: 6 mm thick x 89 mm wide, polyethylene foam.

.15 Security mesh: To EMMA 557-99. Style ¾-9F: nominal strand thickness of 0.120” (0.108” to 0.132”). Diamond opening of 0.563” x 1.688”.

.16 Mesh Rivets: 3/16" steel pop rivets, Speaneur part #301-440.
.1 Washers: 1 ½" OD, 3/16 ID, “fender” washers, Fastenal part #1133204.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Do not commence work of this Section until all framing is acceptable to receive gypsum board.

.2 Do not fasten gypsum board or metal framing directly to aluminum curtain wall and window frames.

3.3 ERECTION/METAL STUDS

.1 Install metal studs and framing in accordance with AWCC Specification Standards Manual, Section 9.2.

.2 Execute work neatly and accurately, plumb and true, co-ordinated with work of other trades. Do not place studs extending to the underside of structural elements such as roof slabs or roof decks until all dead loading (ie. roofing materials, mechanical units and the like) has been placed on structure above.

.3 Align walls correctly on accepted lay-out.

.4 Install continuous polyethylene gasket to underside of track to all partitions containing acoustic batt insulation. Also, install polyethylene gasket where studs abutting existing and dissimilar construction. Install studs tight against gasket to form a complete acoustic seal. At corners, intersections and end joints, overlap gasket minimum 75 mm.

.5 Floor and overhead tracks (where underside of structure/wall junction is concealed by suspended ceilings):

.1 To partitions extending to the underside of bulkheads and gypsum board ceilings, secure overhead track to framing above at each framing member spanning perpendicular to the partition using accepted fasteners.

.2 For partitions extending to underside of structure and running parallel to flutes in metal deck, anchor 1.21 mm thick sheet metal blocking to underside of structure at 600 mm oc to each bottom flute; stagger fasteners minimum 300 mm and attach at 50 mm maximum from ends.

.3 For partitions extending to underside of structure, anchor the galvanized sheet metal channel retaining the top track (for deflection control) to sheet metal blocking or underside of structure using bolts at maximum 600 mm o.c. to metal deck or steel structure. Form the upper track 1.6 mm wider to nest with the lower. Screw studs to the lower track, near the bottom edge of the flange. Do not screw studs or top channel through to retaining channel.

.4 Where top track is exposed to permit structural deflection, completely fill void between double track with 'Fire Safing Insulation'.

.5 Secure floor track in place to concrete slab, at 600 mm o.c. using drilled screw on fasteners or other accepted fasteners. At exterior walls secure floor track in place to concrete slab, at 600 mm o.c. using drilled screw in anchors.

.6 Secure floor and ceiling track to short walls, 150 mm in length or less before change in direction, using minimum 3 drilled anchors, to securely fasten in place.

.6 Position studs vertically in the tracks, spaced not more than 400 mm o.c., unless indicated otherwise and not more than 50 mm from abutting walls, and at each side of openings and corners. Crimp lock studs to tracks except where screw fixing is specified or required, such as to top track where double top track is indicated. At door frames and other frames, double up jamb studs.

.7 Construct corners using minimum three studs.

.8 Provide one continuous row of horizontal bracing in all partitions up to 2.7 m in height, two rows equally spaced in partitions 2.7 m to 3.6 m in height. Over 3.6 m in height provide one addition row of bracing for every additional 1.2 m of wall height.

.9 For partitions type with 92 mm wide studs or smaller, with ceiling on one side or no ceiling on either side of partition, provide diagonal bracing where required. Install so that underside of bracing is approximately 600 mm above underside of adjacent ceilings. To all other locations, install horizontal carrying channel brace at 1200 mm maximum o.c. to interior walls more than 2.4 m high, unless indicated otherwise.

.10 Erect metal studding to tolerance of 1:1000.

.11 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned. Install gaskets for all plumbing supports in steel stud walls.

.12 Jog framing around mechanical ducts or joists as required to maintain fire ratings.

.13 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.14 Set door and similar frames into position, align and brace securely until properly anchored. Anchor bottom of door frames to floors with drilled inserts. Install temporary horizontal spreader at door mid-height to ensure maintenance of frame width until adjacent work is completed. After removing bottom (steel) spreader, grind frame smooth.

.15 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.16 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.17 Install header framing suspended from structure using screws only.

.18 Extend all metal stud partitions to underside of structure except where indicated otherwise.

.19 Allow for 25 mm live load deflection on all stud walls which terminate at underside of structure.

.20 At openings, install cut-to-length sections of track with web flanges bent at each end and securely attached to jamb studs. Install infill studs above or below opening as applicable. Where directed, place end infill studs so that it is possible to have a control joint in line with a door jamb. Frame for all openings larger than 150 mm diameter or side.

.21 In addition to sheet metal blocking as specified below, provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and the like, attached to steel stud partitions.

.22 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.23 Form control joints in long runs of wall. Place double studs so that control joints will be no more than 9 m apart. Wherever possible locate control joints at door or window jambs or as otherwise indicated on the drawings.

.24 Make allowance for packings to furring and the like, as required to provide vertical and true plane surfaces when furring to and around concrete work.

.25 Install all bracing as noted on the drawings, and as otherwise may be required to secure partitions and bulkheads in place.

.26 Where foam tape or polyethylene gasket is used, ensure that it is compressed for its entire length, to provide acoustic seal.

3.4 SECURE WALL FRAMING

.1 In addition to the requirements specified in item 3.3 of this Section, comply with the following requirements for secure walls at locations indicated on the drawings:
- .1 Extend wall partition framing slab to slab.
  - .1 Top and Bottom Tracks:
    - .1 SSMA standard: 2” x 6”, 18ga (600T200-43) as indicated on the drawings.
    - .2 Secure top and bottom steel stud track to both slabs using mechanical fasteners at 300mm oc. Fasteners must be suitable for concrete and installed per manufacturer’s recommendations.
  - .2 Studs:
    - .1 SSMA standard: 2” x 6”, 18ga (600S200-43: 33ksi)
    - .2 Space studs at 300 mm oc and secure to the top and bottom tracks with welds or rivets (not screws).
- .2 Install double (jamb) studs at the door frame opening. Install the door frame as per HMMA 840-07, part 3 A, B, C, D and E (except that screws shall be replaced with steel rivets).
- .3 Install anti-spread bracing approximately 48” from the bottom of the wall between the door frame double stud and the adjacent stud on both sides of the frame.
- .4 Construct wall corners with double studs.
- .5 Note:
  - .1 Leaving a small gap and using drywall sheets to brace frame sections during wall erections is permitted provided steel sheets on the attack side are continuous over all gaps.
  - .2 Where double studs occur connect and orient doubled studs as per standard industry practice.

3.5 BLOCKING

.1 Install metal strip blocking for fixing of wall mounted items. Confirm blocking requirements before applying gypsum board. If this is not done, and blocking is required, remove and replace board at own expense. Screw to face of studs using self-tapping flat

headed screws at 150 mm oc maximum along each stud, with a minimum of 2 screws per stud.

.2 Where required by shop drawings, or where otherwise indicated, provide additional blocking or wood blocking, to support items mounted on gypsum board assemblies.

.3 Coordinate installation of plywood and wood blocking in steel stud walls with Section 06 10 00. Install wood blocking to all heavy wall mounted items such as upper cabinets and the like.

.4 Install metal blocking or 89 mm stud install on flat and horizontally between vertical studs, behind all wall mounted door stops. Screw fasten blocking or stud to adjacent studs.

.5 Install sheet metal blocking for all items In Contract and for Not in Contract items and for Departmental Representative supplied items indicated.

3.6 METAL FURRING

.1 Install metal furring according to details on drawings, at 400 mm o.c. unless indicated otherwise. Fur to form bulkheads, pipe and duct spaces, around columns, on concrete and block walls, and the like. Form rigid, plumb, and square.

.2 Locate furrings not more than 50 mm away from all openings, interior corners, intersections, frames, jambs, control joints and the like.

.3 At windows, doors or similar openings having returns, and around corners, install lengths of mitred and bent pieces of furring horizontally spaced approximately 400 mm o.c. Form mitres by cutting the flanges and bending the web. Do not cut web to form corners.

3.7 SUSPENSION SYSTEM FOR GYPSUM BOARD CEILINGS AND BULKHEADS

.1 Install ceiling suspension systems in accordance with AWCC Specification Standards Manual, Section 9.2 and ASTM C840.

.2 Install suspension system where required for gypsum board ceilings, at height(s) indicated on drawings. Erect after above-ceiling work is complete. Co-ordinate the location of hangers with other work.

.3 Install suspension system independent of walls, columns and above ceiling work. Securely anchor hangers to structural members. Anchor hangers into angled side of metal deck flutes.

.4 Space hangers in accordance with AWCC Specification Standards Manual, Section 9.2 and ASTM C840.

.5 Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.

.6 Install hangers plumb and true to line and vertical. Hangers installed at an angle to the ceiling will not be accepted. Where hangers are visible, evenly and neatly space hangers.

.7 Install suspension system in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 3 mm in 3 m.

.8 Fur down to form gypsum board bulkheads at difference in ceiling levels as required.

.9 Ensure layout of hangers and carrying channels are located to accommodate fittings and equipment to be placed after installation of ceilings. Install main carrying channels at 1200 mm o.c. from hangers at 1200 mm o.c. along each carrying channel. Locate runners at interruptions and changes in directions.

.10 Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels to span the required distance.

.11 Install hangers plumb and not pressed against ducts, pipes or conduits. Splayed hangers are not acceptable. Arrange hangers to cause as little interference as possible to ducts and piping.

.12 Form hangers tightly and sharply around main runner channels to prevent movement or rotation of the channel within the loop. Securely saddle tie channel to hanger and return loop leg of hanger to the hanger with two strands of tie wire.

.13 Do not make kinks or bends in hangers as a means of levelling main runner channels.

.14 Install furring channels perpendicular to carrying channels at 400 mm on centre, and not more than 50 mm from perimeter walls. Rigidly secure to carrying channels. Lap splices 200 mm and secure together 25 mm from each end of splice.

.15 Ensure furring member ends and sides are not in contact with walls. Provide additional furring members where required. Provide double (side by side) furring to enable control joints to be no more than 9 m apart, each way.

.16 Support light fixtures larger than 1200 x 1200 mm by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.17 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.

.18 Laterally brace entire suspension system.

.19 Install metal access panels where indicated on drawings. Rigidly secure in place. Coordinate with mechanical and electrical.

.20 To ceilings which span 2 metres or less, frame ceilings with 0.762 mm base metal thickness steel studs and 50 mm deep tracks. Install tracks fastened to walls, at each location where

they cross steel wall studs or at 400 mm o.c maximum. Install studs at 400 mm o.c. Install steel stud framed ceilings level and true to line, at same tolerances as specified for suspended ceilings. Install ceilings to withstand all superimposed loading.

3.8 SECURITY MESH

3.9 SECURITY MESH

.1 Install security mesh to face of studs to all locations indicated, prior to installation of gypsum board.

.2 Mount on the outside (attack side) of the room. Support all edges by anti-spread bracing, studs or corners. Align the sheet edges at every vertical and horizontal seam on the centre line of the steel stud or anti-spread bracing and secure all sheets with welds or rivets.

.3 Note: Screws (including “security screws”) are NOT acceptable for permanently attaching the protection material (steel or steel mesh) to steel studs. Screws may be used to “tack’ the sheets in place pending riveting. Temporary screws do not need to be removed.

.4 Rivet mesh to studs as detailed on the drawings.

3.10 SHAFT WALL INSTALLATION

.1 Install shaftwall system to locations indicated, to manufacturer's directions to obtain the fire resistance rating indicated, to approval of the Authority Having Jurisdiction and to AWCC Specification Standards Manual, Section 9.6.

3.11 ACOUSTIC INSULATION

.1 Install acoustic insulation in corridor partitions and to all demising partitions and elsewhere as indicated on the drawings.

.2 Fill behind electrical outlets boxes and other openings with at least 150 mm lap around perimeter of opening, packed tight in layers (to approximately 50% of nominal thickness).

.3 Co-operate with General Contractor, electrical and mechanical Subcontractors to ensure that no back-to-back openings are formed, whether or not so indicated on the drawings. Openings must be offset at least one stud space.

.4 Thickness of sound insulation batts is to be the full stud depth unless specifically noted otherwise, with material placed after one wall face has been installed, using adhesive to hold the material in place. Use multiple layers of insulation as required to achieve stud depth. Stagger joints between layers minimum 300 mm.

.5 Comply with manufacturer's directions.

3.12 APPLICATION /GYPSUM BOARD

.1 Generally, apply gypsum board to the requirements of the ASTM C840 and to the AWCC Specification Standards Manual, Section 9.5 and other referenced standards.

.2 Ensure that blocking, electrical and mechanical work required in or behind gypsum board has been installed and accepted.

.3 Install gypsum board with face side out.

.4 Apply gypsum board to framing with self-drilling screws of suitable length driven with power screw driver and set with countersunk head slightly below gypsum board surface. Screw spacing to ASTM C840 and ASTM C1280 and as noted below. Do not secure gypsum board to top track where deflection is to be accommodated.

.5 Install screws at a maximum of 200 mm o.c. at periphery of board and at 300 mm o.c. in field, along each framing member for both single and double application. For fire rated assemblies, install screws at 175 mm o.c. for partition and 150 mm o.c. for ceilings. Behind ceramic tile, fasten gypsum board at 150 mm oc on edges and in field along each framing member.

- .1 Single-Layer Application:
  - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .2 Double-Layer Application:
  - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
  - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
  - .3 Apply base layers at right angles to supports unless otherwise indicated.
  - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.6 For double layer application, use fire rated gypsum board for first layer; screw apply the second layer of fire rated gypsum board in accordance with fire rating test requirements. Stagger joints of second layer over underlay.

.7 Apply gypsum tile backer to metal framing using screws at 150 mm oc along each framing member.

.8 Install gypsum board to the face of stud and track webs around openings where there is no other finish. Use gypsum board to satisfy all Alberta Building Code 2014 and National Building Code of Canada 2010 requirements. Install gypsum board to stud and track webs around openings at fire damper locations, to match adjacent gypsum board on walls and to maintain the required fire ratings and to meet all Alberta Building Code 2014 and National Building Code of Canada 2010 requirements.

.9 Fit gypsum board openings snugly to electrical outlets, plumbing piping, and the like, and make small enough to be covered by plates and escutcheons. Cut both face and back paper for all cut-outs not made by saw. Seal around all openings using accepted sealant. In fire rated partitions, ensure that sealant proposed is acceptable to the Authority Having

Jurisdiction. Ensure cut-outs for electrical installations are neatly done using a saw or knife. Back-cut for clearance to plaster ring. Do not punch holes.

.10 Install control joints in walls and ceilings using back-to-back filled metal beads with 200 mm strip of poly sheet backing, or manufactured control joint with recess for caulking. Install each member or side of control joint on a separate framing member. Install at 9 m o.c., at locations acceptable to the Departmental Representative.

.11 Install gypsum board vertically with joints occurring on studs.

.12 Install gypsum board with a minimum 6 mm and maximum 12 mm space between floor and bottom of gypsum board.

.13 In fire-rated partitions and assemblies, maintain the fire-rating maintained behind receptacles, switches, panel boxes, and any other penetration of the wall, as required by the Authority having Jurisdiction and the NBCC and ABC.

.14 Verify that all gypsum board is tight to framing prior to application of tape and joint compound and trim.

.15 Provide continuous moisture-resistant insulating material at edges of gypsum board in contact with exterior materials such as window frames, to provide thermal break. Seal edges of gypsum board at exterior walls between gypsum board and floors, ceilings or underside of structure, adjacent walls or columns, around exterior doors, windows and all other protrusions through the gypsum board.

.16 Use exterior gypsum sheathing board to exterior side of all exterior gypsum board assemblies, behind all exterior cladding, including, but not limited to brick, concrete masonry veneer, solid phenolic panels, cementitious composite panels and the like.

.17 Install smooth fibre glass faced and backed gypsum board to all kitchen, shower and washroom area surfaces receiving gypsum board, except where tile is applied to gypsum board. Use gypsum tile backer behind all wall tile finishes, except where tile is applied to inside face of exterior walls, use gypsum sheathing behind tile.

.18 Install abuse resistant gypsum board to walls and partitions where indicated.

3.13 INSTALLATION/GYPSUM SHEATHING

.1 Apply gypsum board sheathing in accordance with ASTM C1280 and AWCC Specification Standards Manual, Section 9.5.

.2 Leave minimum 3 mm to maximum 6 mm space between sheets and sides and ends.

.3 Install silicone treated core fibreglass faced gypsum sheathing using corrosion resistant wafer headed screws in strict accordance with manufacturer’s recommendations. Space fasteners at maximum 200 mm o.c. around perimeter of sheets and 200 mm along each framing member in the field. Locate fasteners minimum 10 mm from edges and ends of sheathing panels.

.4 Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink.

.5 Apply with long dimension perpendicular to supports. Stagger end joints ½ sheet.

3.14 ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at the proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secure. Mitre and fit corners accurately, free from rough edges. Completely adhere in place in a bed of jointing compound wherever possible, elsewhere, secure at 800 mm o.c.

.2 Place casing and corner beads straight and rigid. Secure in place in a continuous bed of jointing compound. For metal corner and casing bead, secure in place at maximum 225 mm o.c. Use longest practical lengths. Place corner beads at all external corners. Place fill type casing beads where gypsum board abuts a dissimilar material.

.3 Install fill type casing beads where gypsum butts against surfaces having no trim concealing the junction. Secure beads as for corner beads.

.4 At junctions of partitions and suspended acoustic ceilings, use corner bead in lieu of casing bead and use dust strips of polyethylene film. Install to achieve a true, even and level top edge to the gypsum board.

.5 At junctions between gypsum board ceilings and concrete block walls, install fill type casing bead tight to walls around edge of ceiling, and fill joint between ceiling and wall with latex caulking prior to painting.

.6 In non-fire rated partitions and ceiling form control joints using one piece control joint or back-to-back casing beads with polyethylene dust protector behind joint.

.7 In fire rated partitions and ceilings, install 2 studs at either side of the control joints. Install 2 layers of 15.9 mm thick fire rated gypsum board to the full length and width of the stud web at the control joint. Install second stud with 15.9 mm joint between stud face and face of gypsum board applied to the other stud web as indicated in current edition Gypsum Association Fire Resistance Design manual. Ensure that control joints are centred on the edge of the 2 layers of gypsum board applied to the stud web. Fasten backing and facing panels on one side of joint only. Install one piece control joint at face of gypsum board, as specified for non-fire rated gypsum board control joints.

.8 Control joints to be at 9 metres o.c. maximum for ceilings and partitions.

.9 At locations where deflection tracks occurs, and the gypsum sheathing or gypsum board extends up above the deflection tracks, provide a 25 mm wide horizontal control joint in the gypsum board occurring at the deflection track location, to allow for the deflection in the studs and gypsum board or gypsum sheathing.

3.15 ACCESS PANELS

.1 Install access panels provided by the mechanical and electrical trades, in positions as directed by them. Erect plumb and square. Leave clean and operable.

3.16 FINISHING

.1 Mix joint compound in accordance with manufacturer's specifications. Finish joints in accordance with AWCC Specifications Standards Manual to produce smooth surfaces ready to receive finishes.

.2 Fill gaps and screw depressions with two coats of joint compound. Allow preceding coat to set before applying second coat.

.3 On corners apply joint compound to one side of corner and allow to set before applying compound to the other side of corner.

.4 Apply a thin coat of joint compound over the board on each side of joint and embed the reinforcing tape and roll firmly in place. Cover edges of tape with a thin coat of joint compound. Neatly crease tape at internal corners.

.5 To fibreglass faced gypsum board, where fibreglass tape is used, install fibreglass tape into bedding compound as recommended by the manufacturer.

.6 Apply joint compound over the flanges of corner and casing beads flush with nose of the bead and extending at least 75 mm onto the surface of the board.

.7 After bedding coat has set, apply a second coat of joint compound feathered at least 150 mm on each side of butt joint and 100 mm past the flanges of beads.

.8 After the second coat has set apply a third coat of joint compound and feather to 200 mm on each side of butt joints and 125 mm past the flanges of beads.

.9 Feather coats of joint compound onto adjoining surfaces so that joints, tape holes and flanges of beads are invisible and so that the camber is 1.6 mm maximum.

.10 After complete treatment has thoroughly set and after at least twenty-four (24) hours, sand the surface lightly with fine grit sandpaper to leave it smooth and ready for decoration.

.11 Ensure that finish work is seamless, plumb, true, flush and with square, plumb and neat corners. Sand lightly to remove burred edges and other imperfections. When sanding, avoid sanding adjacent surface of board and raising nap of paper face.

.12 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.13 Tape gypsum board in areas not exposed to view but need not be finished.

.14 Retouch all defects in taping and filling and all other depressions or imperfections in gypsum board applications after the first prime application under illumination of not less than 540 lumens/m^2.

.15 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI and AWCC Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable. Use level 1 finish to Where gypsum board is unexposed, such as above ceilings.

.2 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable. Use Level 2 finish to gypsum tile backer.

.3 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges. Where gypsum board surfaces are to receive special wall coating, finish to a level 3 finish, if recommended by the special wall coating manufacturer; otherwise finish to a Level 4 finish.

.4 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges. Use Level 4 where gypsum board surfaces are painted.

3.17 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.18 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 21 13 - Board Insulation

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM):
- .1 ASTM C144-11: Standard Specification for Aggregate for Masonry Mortar.
- .2 ASTM C847-14a: Standard Specification for Metal Lath.
- .3 ASTM C897-15: Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
- .4 ASTM C926-15a: Standard Specification for Application of Portland Cement-Based Plaster.
- .5 ASTM C932-06(2013): Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
- .6 ASTM C933-14: Standard Specification for Welded Wire Lath.
- .7 ASTM C1063-15: Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
- .8 ASTM C1116/C1116M-10a: Standard Specification for Fiber-Reinforced Concrete.

.2 Canadian Standards Association (CSA):
- .1 CSA-A3000-13: Cementitious Materials Compendium.
- .2 CSA A179-14: Mortar and Grout for Unit Masonry.

.3 AWCC: Association of Wall and Ceiling Contractors/Wall & Ceiling Institute, Specification Standards Manual, 2012 (5th Edition).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for parging materials and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address. Packages or materials showing evidence of water or other damage will be rejected.

.3 Storage and Handling Requirements:

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

.2 Deliver, store and handle all material so as to prevent the inclusion of foreign materials and the damage of materials by water or breakage.

.4 Deliver materials to the job in ample time to facilitate inspection and testing of the same.

1.5 EXAMINATION

.1 Examine all surfaces and work of other trades, which might affect the work of this Section, before proceeding with any work.

.2 Report any conditions which are unsatisfactory to the Departmental Representative in writing.

.3 Do not proceed until all unsatisfactory conditions have been corrected. Starting work implies acceptance of conditions.

1.6 PROTECTION

.1 Protect work of this Section against damage by other trades for at least forty-eight (48) hours after application.

.2 During parging installation, protect work of other trades against damage arising out of work of this trade; take special care to avoid splattering of finished surfaces adjacent to parging work.

.3 Make good and clean up all damage to finished metal, wood or other surfaces, at no additional expense to the Departmental Representative.

.4 Do not apply parging to surfaces containing frost. Surfaces and ambient temperatures are not to be less than 4°C. Avoid a range of temperature exceeding 10°C in a 24 hour period.

.5 In cold weather, apply temporary heating at least one week prior to parging. Maintain uniform temperature during parging application until they are dry. Use deflectors or protective screens to prevent concentrated or irregular heat on parging near the heat source. When discontinuing temporary heat, reduce heat gradually to prevent thermal stress on the parging.

1.7 ENVIRONMENTAL CONDITIONS

.1 Provide sufficient heat and ventilation to avoid freezing of parging and to permit proper curing. Take precautions required to prevent rapid and large changes in temperature for seven (7) days following application.

2 Products

2.1 CEMENTITIOUS MATERIALS

.1 Cement: Type GU Portland, conforming to CSA-A3000; colour to be grey, unless noted otherwise.

.2 Hydrated Lime: Normal finishing type hydrated lime.

.3 Base Coat Sand: To ASTM C144 or ASTM C897, natural or manufactured, clean, sharp, angular, washed and free of deleterious materials such as alkali, salt, silt, coal, or organic matter.

.4 Finish Coat Sand: To ASTM C897, Natural or manufactured, clean, sharp angular, freshwater washed and free of deleterious materials such as alkali, salt, silt, coal, or organic matter.

.5 Water: Clean potable fresh water, free from injurious amounts of oil, acid, alkali, organic matter and other deleterious substances.

.6 Fibres (to base coat mixes only - do not use in finish coats) : conforming to ASTM C 1116, 13 mm long.

.7 Bonding Agents: to conform to ASTM C932, non-oxidizing, non-crystallizing, non-re-emulsifiable.

.8 Texture of parging to be sand float texture. Colour to match concrete colour.

2.2 METAL ACCESSORIES

.1 Parging Trim and Accessories: Where parging terminates against other materials in the same plane; or at right angles to other materials; or at openings through parging surface, and the edge is exposed to view, use a square casing bead of not less than 0.478 mm thick galvanized steel. At external corners use 19 mm corner beads of not less than 0.478 mm thick galvanized steel. At expansion/control joints use a one piece, 0.396 mm thick galvanized steel section, complete with perforated wings.

.2 Metal Lath: fabricated from expanded sheet steel, galvanized, 9.5 mm diamond mesh metal lath. Weight of lath to be in accordance with ASTM C847 governed by support spacing, but in no case less than 1.6 kg. per square metre.

.3 Screwed fasteners: 6.4 mm diameter, drilled self tapping galvanized or stainless steel "tapcon" screw anchors complete with PVC or galvanized steel discs approximately 38 mm diameter. Screws to be long enough to penetrate through insulation and into concrete back-up minimum 32 mm.

.4 Anchorages: Nails, staples, or other approved metal supports of type and size to suit application and to rigidly secure metal accessories in place; galvanized.

2.3 PARGING MIXES

.1 Parging: 1 part cement/ to 1/4 to 1 part lime/ 3 1/4 to 4 parts aggregate. Use bonding agent in the mixing water for both coats of parging applied over stucco wire and perimeter insulation or concrete, in accordance with manufacturers recommendations.

3 Execution

3.1 GENERAL

.1 Conform to the Alberta Building Code 2014 and National Building Code of Canada 2010 with regard to covering polystyrene insulation.

3.2 SURFACE PREPARATION

.1 Ensure all surfaces are firm, and free from frost, loose particles, cracks, pits, rough projections, grease, oil and other foreign matter detrimental to adhesion and monolithic application of parging.

.2 Remove loose particles and foreign matter with scraper, wire brush or other effective means. Remove grease or oil with safety solvent, effective alkaline cleaner or detergent. If safety solvents are used, follow with an application of alkaline cleaner or detergent, then scrub surfaces clean with water.

.3 Ensure surfaces are free from dirt, laitenance and honeycomb. Clean and repair as required.

3.3 APPLICATION/PARGING

.1 Apply cement parging to all foundation walls from 150 mm below finish grade to top of wall or as otherwise detailed.

3.4 FURRING & LATHING

.1 Conform to AWCC Specification Standards Manual.

.2 Cover perimeter insulation exposed above grade with metal lath.

.3 Install metal lath over insulation using screw-on fasteners at 400 mm o.c. each way, and not less than 75 mm from all ends and edges. Do not over compress insulation.

.4 Space and secure grounds as required to produce a true finished surface. Install them to provide control joints at 5 metre maximum intervals.

.5 At corners where plaster is applied directly to board insulation, Install a 1.21 mm base metal thickness, Z275 galvanized, continuous sheet metal brake shape, bent 90° with 300 mm legs, and fastened through insulation and into concrete up, using galvanized or stainless steel screws at 400 mm oc on each side of corner, to provide a solid corner for fastening corner bead. Ensure corner is straight and true to line.

3.5 APPLICATION/PARGING

.1 Apply plaster over perimeter insulation in 3 coats, the first fully embedding the metal lath, and scored, the second coat scored. Apply 3rd coat to provide a sand float finish. Install a total minimum thickness of 19 mm.

.2 Apply the second coat while the first coat is still green.

.3 Apply both coats without joints except at grounds and control joints.

.4 Keep plaster continuously moist from the time of initial set until 72 hours after completion of the finish coat.

.5 Finish to a sand float texture and colour to match concrete.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .4 Clean all adjacent exposed surfaces which are splattered or marked with parging materials following manufacturer's recommendations to the satisfaction of the Departmental Representative.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 09 21 16 - Gypsum Board Assemblies

1.2 REFERENCES

.1 Do tile work in accordance with Specification Guide 09 30 00 Tile Installation Manual 2012 - 2014, produced by Terrazzo Tile and Marble Association of Canada (TTMAC).

.2 ANSI Standards:

.1 American National Standards Institute (ANSI) Specifications for the installation of Ceramic Tile.

.2 ANSI A108.01-2013: General Requirements, Subsurfaces and Preparation by Other Trades.

.3 ANSI A108.02-2013: General Requirements: Materials, Environment and Workmanship.

.4 ANSI A108.1-2013: Glazed Wall tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.

.5 ANSI A108.5-2013: Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

.6 ANSI A108.10-2013: Installation of Grout in Tile Work.

.7 ANSI A108.13-2013: Installation of Load Bearing, Bonded, Waterproof Membranes for Thin Set Ceramic Tile and Dimension Stone for the Waterproofing Membrane Installation Process.

.8 ANSI A118.4-2013: Specifications for Latex Portland Cement Mortar (included in ANSI A108.1-2013).

.9 ANSI A118.6-2013: Specifications for Ceramic Tile Grouts (included in ANSI A108.1-2013).

.10 ANSI A118.7-2013: Specifications for Polymer Modified Cement Grouts for Ceramic Tile Installation.

.11 ANSI A118.10-2013: Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations.

.12 ANSI A137.1-2012: American National Standard Specifications for Ceramic Tile.

.13 ANSI A137.2-2012: American National Standard Specifications for Glass Tile (version 1).

.14 ANSI A138.1-2011: American National Standard Specification for Sustainable Ceramic Tiles, Glass tiles and Tile Installation Materials.

.3 American Society for Testing and Materials (ASTM) Standards:

.1 ASTM C627-10: Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.

.2 ASTM C1028-07e1: Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

.3 ASTM F1869-11: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
.4 ASTM F2170-11: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.

.4 American Concrete Institute:
.1 ACI 302 – Guide for Concrete and Floor Slab Construction.

.5 CGSB Standards:
.1 CAN/CGSB-75.1-M88: Tile Ceramic.

.6 International Standards Organization (ISO):
.1 ISO 13007-1: 2010 Ceramic Tiles – Grouts and adhesives - Part 1: Terms, definitions and specifications for adhesives.
.2 ISO 13007-2: 2010 Ceramic Tiles – Part 2: Grouts and adhesives; test method for adhesives.
.3 ISO 13007-3: 2010 Ceramic Tiles – Grouts and adhesives - Part 3: Terms, definitions and specifications for grout.
.4 ISO 13007-4: 2013 Ceramic Tiles – Grouts and Adhesives - Part 4: Test methods for grout.

.7 International Concrete Repair Institute (ICRI):
.1 Concrete Surface Profile (CSP).

.8 Tile Council of North America (TCNA) Handbook for Ceramic, Glass and Stone Tile Installation, 2015 edition.
.1 Floor rating installation guide performance requirements outlined in the Tile Council of North America Handbook (ASTM C627 test cycles 1 thorough 14).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
.1 Include manufacturer's information on:
.1 Ceramic tile, marked to show each type, size, and shape required.
.2 Mortar and grout.
.3 Divider strip.
.4 Elastomeric membrane and bond coat.
.5 Levelling compound.
.6 Latex cement mortar and grout.
.7 Slip resistant tile.

.3 Provide shop drawings indicating locations of each type of tile and tile patterns.
.1 Indicate widths, details and locations of expansion, contraction, control and isolation joints in tile substrates and finished tile surfaces.
.2 Indicate tile patterns, tile and joint layouts, colour arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details, with full layout of all tile surfaces.
.3 Indicate locations of access doors and fixtures.

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Base tile: submit four (4), 600 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
- .2 Floor tile: submit four (4), 600 x 600 mm sample panels of each colour, texture, size, and pattern of tile.
- .3 Four (4) 300 mm long samples of each type of edge angle.
- .4 Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

1.4 QUALIFICATIONS

.1 The tile Subcontractor for the work of this Section must be a member of the Terrazzo, Tile and Marble Association of Canada, or be able to provide references for three (3) installations of similar scope and size, with a minimum of five (5) years documented successful experience using skilled workers thoroughly trained and experienced in tile work. If requested by Departmental Representative, submit a listing of at least three previously completed projects of similar size and scope.

.2 Install all tile using a complete system, from one manufacturer, meeting the TCNA performance rating required.

.3 Use tile manufacturers who specialize in manufacturing the types of tiles specified in this Section, with a minimum of five (5) years documented experience, and have the facilities capable of meeting all requirements of the Contract Documents as a single-source responsibility and warranty.

1.5 QUALITY ASSURANCE

.1 Quality Assurance Submittals:
- .1 Manufacturer's Instructions: manufacturer's installation instructions.
- .2 Manufacturer's Field Reports: manufacturer's field reports specified.

.2 Perform and coordinate work in such a way so as that cut tiles are kept to an absolute minimum.

.3 Obtain each type of tile specified from one source or producer. Note: different types of tiles may be obtained from different sources, however, use only one supplier or manufacturer for each individual tile.
- .1 Obtain each tile type from the same product run and of consistent quality in appearance and physical properties for each contiguous area.

.4 Obtain setting and grout materials and ingredients of a uniform quality for each mortar, adhesive and grout component from a single manufacturer and each aggregate from one source or producer.

.5 Obtain other products, such as anti-fracture membrane from a single source.

.6 The entire setting system, including all anti-fracture membrane, medium mortar beds, uncoupling underlayment, thin set bond coat, tile, grout and accessories, are to be installed by the tiling Subcontractor. If any portion of the tiling system is done by the Contractor or other Subcontractor, it is to be removed and replaced with installation by the tiling Subcontractor.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver packaged materials in original unopened containers, sealed with grade seals bearing printed name or manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used.

.3 Ensure each type of tile is supplied of the same caliber for the entire project.

.4 Keep delivered material dry and free from stains. Store cementitious material off damp surfaces.

.5 Commence work only after other work, which affects this work, is completed.

.6 Protect tile from traffic and abuse for a minimum of 48 hours after laying. Make good all damage to work of this Section at no additional expense to the Departmental Representative.

1.7 SCHEDULING

.1 Arrange for production and shipment of tile and installation materials in sufficient time to avoid delays. Substitutions will not be considered due to last minute unavailability of the tile and installation materials. All extra costs incurred to insure delivery of the tile and installation of materials will be at the Contractor's Expense.

1.8 ENVIRONMENTAL CONDITIONS

.1 Maintain ambient temperature of substrate and ambient air of +12°C minimum to +35°C maximum.

.2 Do not install tiles at temperatures less than 12°C or above 35°C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15°C or above 25°C.

.4 Alkali: negative alkalinity of substrate required before application of flooring. Test surface with litmus paper.

.5 Provide additional ventilation as required. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

.6 Prohibit smoking or open flame near inflammable adhesives and in areas where flammable materials are used.

.7 Protect installed tiles from exposure to sun, freezing, high temperatures, or other environmental conditions which may affect proper curing of setting or grouting materials.

1.9 MAINTENANCE

.1 Extra Materials:
- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.
- .3 Maintenance material same production run as installed material.

.2 Furnish copies of manufacturer's instructions for use of mortars, additives and grouts to be used.

.3 Submit four (4) copies of TTMAC Specification Guide 09 30 00 Tile Installation Manual 2012-2014 for inclusion in the operations and maintenance manuals specified in Section 01 78 00. Give specific warning of any maintenance practice or materials which may disfigure the finished work.

2 Products

2.1 FLOOR TILE

.1 Porcelain tile: to CAN/CGSB-75.1 and ANSI A137.1, manufacturers, sizes, colours, as indicated in the Finish Schedule. Provide slip resistant tiles with a static coefficient of friction of .60 or higher in accordance with ASTM C1028 and to meet all Alberta Building Code 2014 and National Building Code of Canada 2010 requirements.

2.2 WALL TILE

.1 Glass tile: to ANSI A137.2, , manufacturers, sizes, colours, as indicated in the Finish Schedule.

.2 Porcelain tile: to CAN/CGSB-75.1 and ANSI A137.1, manufacturers, sizes, colours, as indicated in the Finish Schedule.

2.3 BASE TILE

.1 Base: coved; type, size, colour and texture to match adjacent flooring material.

2.4 MORTAR AND ADHESIVE MATERIALS

.1 General Note: Use preblended powder for mortars and grouts as provided by the material manufacturer.

.2 Levelling coat for concrete block: Crete Filler Powder mixed with latex thin set mortar adhesive.

.3 Latex additive: formulated for use in cement mortar and thin set bond coat.

.4 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

.5 Medium Bed Mortar: latex modified portland cement mortar conforming to ANSI A118.4-2013.

.6 Bond Coat (Thinset) Mortar: to meet ANSI A118.4-2013 latex/portland cement mortar; low VOC content; where glass tile is used, provide white thinset mortar.

2.5 GROUT

.1 Colouring Pigments:
- .1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
- .2 Colouring pigments to be added to grout by manufacturer.
- .3 Job coloured grout are not acceptable.
- .4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout.

.2 Latex Cement Grout: to ANSI A108.1, fast curing, high early strength, polymer-modified, stain resistant, sanded mix for floors, unsanded mix for walls and floors with polished tiles commercial tile grout.

2.6 ACCESSORIES

.1 Transition Strips: purpose made metal extrusion; stainless steel type.

.2 Reducer Strips: purpose made metal extrusion; stainless steel type; maximum slope of 1:2.

.3 Crack Isolation membrane (to large format tile wall installations): conforming to ANSI A118.10-2013; complete with reinforcing fabric.

.4 Uncoupling underlayment (to large format tile floor installations): 3 mm thick, orange, high-density polyethylene membrane with a grid structure of 12 mm x 12 mm square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to its underside. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation and is listed by cUPC® to meet or exceed the requirements of the “American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.

.5 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

.6 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

2.7 MIXES

.1 Mix all premixed materials in accordance with manufacturer's directions. Use latex additive in thinset mortar and grout.

.2 Add materials, water, and additives in accurate proportions.

.3 Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

2.8 PATCHING AND LEVELLING COMPOUND

.1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:
- .1 Compressive strength - 25 MPa.
- .2 Tensile strength - 7 MPa.
- .3 Flexural strength - 7 MPa.
- .4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.9 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 SURFACE PREPARATION AND INSPECTION

.1 Have the setting system manufacturer's technical representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the Work is correctly installed. When requested, submit manufacturer's inspection reports and verification that the work of this Section is correctly installed.

.2 All surfaces to receive tile must be structurally sound, plumb, level and smooth and free from openings and projections not specified or indicated.

.3 Seal substrate cracks with filler.

.4 Before starting work, clean surfaces of any extraneous matter, dust, dirt, mortar, grease, form oil, sealants, soil, sealers, curing agents, paint, oil, waxy residue or efflorescence or any other material which may act as a bond barrier.

.5 Ensure all surfaces receiving tile are dry.

.6 Ensure that all concrete or cementitious surfaces are fully cured minimum 28 days prior to installation of tile. Wet down dry or dusty concrete or masonry surfaces and remove excess water just prior to the application of tile.

.7 Ensure concrete floors scheduled to receive tile applied over a bonded mortar bed have been screed finished. Verify substrate surface variation does not exceed 6 mm in 3000 mm.

.8 Tolerance for surface flatness of surfaces to receive tile set with thinset mortar are:
- .1 Wall flatness: within 3 mm in 1 m.
- .2 Maximum abrupt change of surface: 1 mm.

.9 Roughen concrete floor substrates. Shot blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

.10 Use saw cuts to isolate areas which are to be abraded, without damaging existing construction.

.11 Protect surrounding work from damage or disfiguration.

.12 Apply a latex cementitious levelling coat wherever a slight substrate irregularity exists. Limit levelling coat thickness to less than 8 mm where thin set tile methods are to be used.

.13 Ensure existing conditions are suitable for installation of new tile.

.14 Immediately notify the Departmental Representative of any substrate where conditions are not suitable to install work of this Section. Commencement of work implies acceptance of surfaces and working conditions.

.15 For tile exhibiting colour variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colours as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CONTROL JOINTS

.1 Provide floor control joints over structural control joints. Install control joints, expansion joints and movement joints to TTMAC details 301MJ-2012-2014, A, B, C1, C2, D, E, F, G, H & I as applicable.

.2 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on Site with the Departmental Representative.

.3 Provide floor control joints over structural control joints.

.4 Install joint widths to match grout joint widths, except where a minimum width is required by the joint sealant.

.5 Install control joints to TTMAC requirements, in the following typical locations:
- .1 Aligned over substrate control joints.
- .2 Aligned over changes in type of substrate.
- .3 At the restraining perimeters such as at perimeters of floors, walls and columns.
- .4 Where tile abuts other hard materials.
- .5 At vertical surfaces and at transitions, including changes in direction.
- .6 Interior areas not subject to sunlight: 6 mm minimum width, at 7320 mm o.c. maximum.
- .7 Interior areas subject to sunlight: 6 mm minimum width, at 3660 mm o.c. maximum.
- .8 As indicated on the Drawings.

3.4 INSTALLATION/CRACK ISOLATION MEMBRANE

.1 Install crack isolation membrane to all wall surfaces receiving large format tile finish.

.2 Prepare surface and install crack isolation membrane to manufacturer's directions, using first coating, embed reinforcing fabric membrane into first coat while still wet and overcoat with second coating. Install using trowel, brush or roller as recommended by the manufacturer.

.3 Reinforce all corners, in accordance with manufacturer's recommendations to form a continuous and crack isolation membrane.

3.5 SETTING SYSTEMS

.1 Apply tile to concrete block using slight levelling coat as required, and thin set method to TTMAC Detail 303W-2012-2014.

.2 Install tile to coated glass mat backer board using latex portland cement bond coat mortar in thin set method to TTMAC Detail. 305W-2012-2014 Detail B.

.3 Apply large format tiles to walls using a crack isolation membrane and medium mortar bed in accordance with TTMAC Detail No. 330LFTW - 2012-2014.

.4 Apply large format tiles to floors using uncoupling membrane and medium mortar bed to TTMAC Detail No. 329LFT - 2012 - 2014. Install uncoupling underlayment into a thin set bed of mortar to fully engage fleece into mortar to provide mechanical bond to substrate. Apply tile over uncoupling membrane over tile using a medium mortar bed so that mortar becomes mechanically anchored in the square cut back cavities of the underlayment.

3.6 INSTALLATION/TILE

.1 Prepare and prime all surfaces as recommended by the manufacturers of mortars, as required by job conditions to ensure good permanent bonds. Proceed with installation only when conditions are satisfactory.

.2 Install tile in accordance with the Specification Guide 09 30 00 Tile Installation Manual 2012-2014 prepared by the Terrazzo, Tile and Marble Association of Canada and the setting materials manufacturer's current recommended procedure.

.3 Install tile complete with all special units and accessories which are necessary and required to complete the installation.

.4 Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

.5 Apply tile or backing coats to non-frozen, frost free surfaces.

.6 Behind glass tile, trowel mortar smooth, prior to installation of tile, so as to ensure that wavy pattern of notched trowel is not visible through glass tile in the finished installation.

.7 Where possible, centre fields on wall and floor areas so that no cut tile occurs. Where cut tile cannot be avoided, ensure no cut tile less than half size occurs. Form joints vertical and horizontal.

.8 Wet joints prior to grouting.

.9 Trim tile work neatly around wall fittings, plumbing fixtures, and the like. Provide edge angles and trim to all exposed edges; install in strict accordance with manufacturer’s recommendations, in as long lengths as possible.

.10 Make joints between tiles uniform and of widths as recommended by the tile manufacturers; confirm joint widths with Departmental Representative prior to installing materials. Ensure joints are plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout is not visible after installation. Face mount all tile; do not use paper or mesh back mounted tile.

.11 Align tiles with joints running through in each direction, except where tile is installed in brick pattern.

.12 Form openings of correct sizes in tile work to receive fixtures, fittings, built-in work.

.13 Cut, drill, fit, as required to accommodate work of other trades.

.14 Cut and drill tile accurately and without damage. Smooth exposed cut edges with abrasive stone, where exposed. Cut edges resulting from splitting are not acceptable. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

.15 Accurately locate accessories before tile is installed.

.16 Where tile bases occur, install with factory edge at top of base (not cut edge).

.17 Form an open joint in wall tile at the following locations. Apply a one-component silicone rubber sealant containing an anti-mildew additive:

.1 Wherever a change in the backing wall material occurs.
.2 At all vertical interior corners.
.3 Where abutting other materials or fixtures.
.4 Around junction with plumbing fixtures.
.5 Around penetrating pipes and fixtures.

.18 Fit tile accurately at pipes, and the like, so that plates, collars, and the like, will overlap cuts.

.19 Prior to installation ensure that the back of each tile is free of contaminants.

.20 Lay tiles with minimum 95% coverage with setting materials. Ensure corner and edges are fully supported by setting material. Avoid lippage. Set tile in place while mortar is wet and tacky, prior to skinning over.

.21 Back butter porcelain tile just prior to setting, with raised or textured backs in notched straight lines. Lay tile on mortar, slide tile back and forth at 90 degree to the notches.

.22 Prevent rapid drying of mortar bed. Do not set tile on dry or partially dry mortar bed.

.23 Keep two-thirds of the depth of grout joints free of setting material.

.24 Clean and seal installed tile surfaces after mortar and grout has cured as recommended by TTMAC.

.25 Sound tiles after setting and replace hollow sounding units to obtain full bond.

.26 Supply and install edge angle to any exposed edges of tile to walls and floors, for example, at doorways and where tile abuts adjacent flooring. Install edge angle to all exposed tile edge to walls and the like. Install into mortar bed and ensure that mortar completely encases the perforated leg of the edge angle.

.27 Remove grout and adhesive from exposed surfaces of metal trim pieces immediately to prevent staining.

3.7 GROUTING

.1 Do not grout before mortar has fully set.

.2 Grout cushion edge tile to suit the contour of the tile. Fill joints completely, tool neatly. Make uniform in appearance and water tight, without voids or cracks.

.3 Adjust moisture content of tile before grouting so that it is not too dry nor excessively wet.

.4 Force grout into joints, avoid air traps or voids. Use sufficient grout to completely fill joints without air pockets or voids. Strike or tool joints of cushioned edge tile to depth of cushion. Hold joints flush with square edge tile. Remove excess grout and mortar from face of tile. Leave joints to be caulked free of grout.

3.8 COMPLETION

.1 Protect the work of this Section, make good damage, remove all debris and rubbish and leave the works in a clean and tidy condition.

.2 Clean and seal all tile surfaces as recommended by TTMAC.

.3 Power-scrub tile with neutral detergent. Do not apply any protectors to slip resistant floor tile.

3.1 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.2 CLEANING

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

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:
.1 Materials and application of acoustical units for application and installation within a suspended ceiling.

1.2 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum Board Assemblies

1.3 REFERENCES

.1 ASTM International:
.1 ASTM A641/A641M-09: Specification for Steel Sheet, Zinc-Coated (galvanized) Carbon Steel Wire.
.2 ASTM C423-09a: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.3 ASTM C635/C635M-13a: Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
.4 ASTM C636/C636M-13: Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
.5 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.
.6 ASTM E119-12a: Standard Test Methods for Fire Test of Building Construction and Materials.
.7 ASTM E580/E580M-14: Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.
.8 ASTM E795-05(2012): Standard Practice for Mounting Test Specimens During Sound Absorption Tests.
.9 ASTM E1111-07: Standard Test Method for Measuring Interzone Attenuation of Ceiling Systems.
.10 ASTM E1264-14: Standard Classification for Acoustical Ceiling Products.
.11 ASTM E1414/E1414M-11a: Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
.12 ASTM E1477-98a(2013): Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 CGSB Standards:
.1 CAN/CGSB-92.1-M89: Sound Absorptive Prefabricated Acoustical Units.

.3 CISCA (AC) - Acoustical Ceilings: Use and Practice; Ceilings & Interior Systems Construction Association; Current Edition.

.4 International Organization for Standardization (ISO):
.1 ISO 4611-2008: Plastic - Determination of the Effects of Exposure to Damp, Heat, Water Spray and Salt Mist.
.2 ISO 11654-2002: Sound Absorbers for Use in Buildings - Rating of Sound Absorption.
.3 ISO 14644-1: Classification of Air Cleanliness.

.5 Underwriters' Laboratories of Canada (ULC):
.1 CAN/ULC-S102-10: Surface Burning Characteristics of Building Materials and Assemblies.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data, shop drawings and samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data: submit manufacturer’s standard product data for all acoustic ceiling tiles and suspension systems.

.3 Shop Drawings:
.1 Clearly indicate all system components, types of grid and grid layout, suspension methods, requirements, and location of mechanical and electrical services and fixtures, details of components, finish, texture, and all related trim.
.2 Submit proposed methods for attaching hangers to soffits.
.3 Submit duplicate full size samples of each type acoustical units.

1.5 DESIGN

.1 Design acoustical suspension systems for deflection not exceeding 1/360 of span, considering that lighting fixtures in ceiling area are directly or indirectly supported by the suspension systems.

.2 Conform to the requirements of ASTM E580.

1.6 QUALITY ASSURANCE

.1 Perform Work of this Section using a well established acoustical ceiling Subcontractor, employing skilled mechanics. Ensure installer has minimum of five years experience in performance of product application.

.2 Use a manufacturer specializing in manufacturing of the type of acoustic ceilings specified in this Section, with a minimum of five (5) years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty.

.3 Submit manufacturer's certification that materials meet or exceed specified requirements.

.4 Obtain each type of acoustic ceiling tile and T bar grid through one source from a single manufacturer and from the same production run.

.5 Provide acoustic ceilings that comply with the following requirements:

.1 Surface-Burning Characteristics: provide acoustic panels with surface burning characteristics complying with CAN/ULC-S102, for class “A” materials as determined by testing identical products as per CAN/ULC-S102.

.6 Health and Safety:

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

1.7 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Store extra materials required for maintenance, where directed by Departmental Representative.

.3 Deliver material to the job site, store and handle in original packages, in an undamaged condition, with the manufacturer's seals and labels intact.

.4 Do not pile acoustical materials more than 6 cartons high.

.5 Store materials to prevent damage caused by water or breakage, until ready to use.

.6 Damaged materials will be rejected.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install and until mechanical, electrical and all other systems installed above the ceiling are inspected, tested and accepted.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.9 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project, from the same production run as the installed tiles.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Departmental Representative, upon completion of the work of this section.

2 Products

2.1 ACOUSTIC TILE

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1 and ASTM E1264; sizes, patterns and types as indicated in the Finish Schedule.
- .1 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
- .2 Class A fire rating in accordance with CAN/ULC-S102.
- .3 Noise Reduction Coefficient (NRC) designation of 0.55.
- .4 Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM E1264
- .5 Light Reflectance (LR) range of 0.82 to ASTM E1477.
- .6 Edge type: square.
- .7 Colour: white.
- .8 Size 610 mm x 1220 mm x 16 mm thick.
- .9 Shape flat.

2.2 SUSPENSION SYSTEMS

.1 Suspension System: non fire rated standard profile exposed tee bar grid conforming to ASTM C635, as follows:
- .1 Commercial quality cold rolled steel zinc coated, shop painted flat, white. Die cut interlocking components. Main and cross tee of double web with rectangular bulb, depth governed by span. Include wall moulding. All components 23.8 mm exposed face.

2.3 ACCESSORIES

.1 Hangers: pre-stretched galvanized annealed steel wire of adequate gauge for the specified design conditions.

.2 Fasteners to underside of structure: to concrete structure, use expansion anchor to suit installation. To wood structure, screw connections with eyebolts.

.3 Splices, stabilizer bars: as required to complete and complement the suspended ceiling grid system.

.4 Edge Trim: 0.556 mm thick zinc coated cold rolled steel with flat white baked enamel matte finish, 23.8 mm wide on exposed face, regressed edge profile.

.5 Hold down clips: purpose made clips to secure tile to suspension system, approved for use in fire-rated systems.

3 Execution

3.1 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.

3.2 INSTALLATION

.1 Perform Work in strict accordance with material manufacturer's directions to produce an installation in accordance with the workmanship and performance clauses of the Code of Practice of 'The National Acoustical Contractors Association' and ASTM C636.

.2 Install ceiling suspension systems to lay-out and heights indicated on reflected ceiling plans.

.3 Install suspension system level within a tolerance of 1:1000. Finished ceiling system to be square with adjoining walls.

.4 Install runners supporting ceiling fixtures to remain horizontal across their width within 2 degrees after the fixture loads are imposed.

.5 Attach hangers to underside of the structure using appropriate fasteners to suit existing conditions and to withstand all superimposed loading. Obtain Departmental Representative's acceptance of hanger fastenings.

.6 Install hangers at 1.2 m maximum oc and within 150 mm from ends of main tees; securely attach to the overhead structure. Install additional hangers at each corner of light fixtures and diffusers. Ensure hangers are well hooked and twisted to prevent loosening under load. Position wire ends so lifting out does not cause damage to ceiling board.

.7 Install hangers perpendicular to the ceiling both ways. Hangers installed at an angle to the ceiling will not be accepted.

.8 Co-ordinate the location of hangers with other work. Ensure layout of hangers and carrying channels are located to accommodate fitting and equipment to be placed after installation of ceilings.

.9 Hang independently of walls, columns, ducts, pipes and conduit.

.10 Install the main tees and cross tees at correct centre to receive the acoustic tile. Install all acoustic tiles, cut tiles as required.

.11 Install systems in each room or area symmetrical with all other panels of equal dimension, or as otherwise noted in the reflected ceiling plan.

.12 Install fixtures so that main runners and cross runners are not eccentrically loaded. Where fixture installation would produce rotation of runner, provide stabilizer bars.

.13 Install regressed edge mouldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Mitre all corners. Provide edge mouldings at junction with other ceiling finishes.

.14 Under no circumstances suspend the ceiling grid system from any mechanical and electrical work.

.15 Under no circumstances support or suspend any mechanical work from the ceiling suspension system. DO NOT FASTEN THROUGH PLYWOOD DECKING ABOVE.

ENSURE THAT FASTENERS DO NOT PIERCE ROOFING AIR/VAPOUR BARRIER MEMBRANE OR ROOFING.

.16 Immediately reject acoustic board panels which are damaged in any way.

.17 Ensure exposed grids, tiles, and accessories, are free from waves, smears, sags, soiling, dents, and all other defects.

.18 Do not use "tees" which are chipped, cut, bent out of alignment or damaged in any way and reject immediately.

.19 Where perimeter supply air diffusers are located, install double tees to accommodate diffusers.

.20 Install tiles, cut tiles as required. Do not mix lots in the same ceiling area.

.21 Fit acoustic board in place, free from damaged edges or other defects detrimental to appearance and function.

.22 Install hold-down clips on all lay in tiles to hold such tiles tight to grid system within 3 m of exterior doors.

.23 Co-operate with the respective trades regarding the installation of ceiling mounted objects. Cut holes for diffusers, light fixtures, grilles, speakers, smoke detectors, sprinklers, alarms and the like which are to be installed in the ceiling board. Cut and neatly form and fit openings in ceilings.

.24 Provide all T bar as required to accommodate mechanical and electrical items such as light fixtures, diffusers and the like.

3.3 CLEANING

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

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

.3 Following installation, clean soiled or discoloured surfaces of suspension system and of acoustical board.

3.4 ADJUSTMENTS

.1 At completion, replace any uneven or defective work, eliminate any waves and sags, and remedy any damage to exposed surfaces.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 35 00 - Concrete Finishing

1.2 REFERENCES

.1 ASTM International
- .1 ASTM F1859-14: Standard Specification for Rubber Sheet Floor Covering Without Backing.
- .2 ASTM F1861-08(2012)e1: Standard Specification for Resilient Wall Base.
- .3 ASTM F1869-11: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .4 ASTM F2034-08(2013): Standard Specification for Sheet Linoleum Floor Covering.
- .5 ASTM F2169-15: Standard Specification for Resilient Stair Treads.
- .6 ASTM F3041-14: Bonded Rubber Crumb Floor Coverings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for resilient sheet flooring and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit four (4), 300 x 300 mm sample pieces of sheet material, 300 mm long treads, base, edge strips, nosing.

.4 Submit seaming plan for review.

.5 Maintenance Data: Submit maintenance instructions for insertion in operations and maintenance manuals include recommended methods and frequency of maintenance for maintaining optimum condition of work under anticipated usage and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance. Include product data for maintenance products recommended by installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALIFICATIONS

.1 Installers Qualifications: Trained and approved by the manufacturer and having a minimum five (5) years experience in the installation of the work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type with a record of successful in-service performance. If requested, provide letter of certification from manufacturer stating that installer is certified applicator of its products, and is familiar with proper procedures and installation requirements required by the manufacturer.

.1 Qualifications include having the necessary experience, staff, and training to install manufacturer's products. Manufacturer's willingness to sell its products to installers does not in itself confer qualification on installer.

.2 Mechanics installing resilient flooring to have a minimum of five (5) years experience in heat welding installation of linoleum flooring in institutional or related facilities.

.3 Installers of linoleum to be trained and approved by the linoleum manufacturer and must be a manufacturer’s master Installer.

.2 Source Limitations: Obtain each type of product from a single manufacturer.

.3 Products: Provide like Products from same production run. Install Products in sequence from sequentially numbered dye lots.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide 2% extra of each colour, pattern and type flooring material in full roll widths, required for project for maintenance use.

.3 Extra materials one piece and from same production run as installed materials.

.4 Identify each roll of sheet flooring and each container of adhesive.

.5 Deliver to Departmental Representative, upon completion of the work of this section.

.6 Store where directed by Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect specified materials from damage.

.3 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Store flooring materials in area of application and allow three days for material to reach the area air temperature.

.2 Maintain temperatures within range recommended by the manufacturer, but not less than 20°C or more than 29°C at flooring installation area for three (3) days prior to, during and for two (2) days after installation. Arrange for controlled ventilation during this period to avoid high humidity and cold drafts.

.3 After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 13°C or more than 35°C.

.4 Install floor coverings after other finishing operations, including painting, have been completed.

.5 Perform moisture tests on all slabs receiving floor finishes, using the Calcium Chloride Test procedure in accordance with ASTM F1869. Conduct one test for every 93 m^2 of flooring with test results not exceeding 1.36 kg per 93 m^2. If moisture content exceeds 1.36 kg per 93 m^2 or as otherwise recommended by the flooring manufacturers at time of installation of flooring, then apply moisture reduction barrier over slabs prior to installation of flooring.

.6 Store all linoleum products in the building to acclimatize linoleum as recommended by the manufacturer prior to installation, under proper and protected ventilation. Ensure that the building is weather tight and dry with all exterior doors and windows in place.

1.8 PROTECTION

.1 Lay protective covering in traffic areas. Maintain floors in good condition until completion.

.2 Apply the specified floor finishing as soon as possible after flooring application to protect the surface.

.3 Prohibit traffic from floor finish for two days after installation.

.4 Protect the walls and work of other Sections before and during the execution of the work of this Section.

1.9 SITE MEETING

.1 Before commencement of work on site, arrange a site meeting to be attended by the General Contractor's superintendent, the Subcontractor's representative, the Subcontractor's foreman for this project, the flooring manufacturer's representative, and the Departmental Representative.

.2 Specifications and details will be reviewed, including the following:
.1 Scheduling for manufacturer's supervision.

.2 Confirmation of all colours, patterns, samples and miscellaneous materials.
.3 Condition of surfaces.
.4 State of completion of areas.
.5 Protection of finished floor surfaces.
.6 Temperature conditions.
.7 Rolling requirements.
.8 Floor dressing requirements.

1.10 MANUFACTURER SUPERVISION

.1 Make necessary arrangements for initial installation of floor covering materials, to be supervised by the material manufacturer's representatives.

.2 Obtain Material manufacturer's representative written assurance that installation is carried out in accordance with manufacturer's specification. Should such specifications conflict with these specifications, inform the Departmental Representative.

.3 Ensure that the manufacturer's representative makes the inspections together with the Departmental Representative's Site Representative.

2 Products

2.1 MATERIALS

.1 Linoleum sheet flooring (RES-1): to ASTM F2034, composed of natural ingredients which are mixed and calendered onto a jute backing:
.1 Type: 1, linoleum sheet with backing.
.2 Backing: jute.
.3 Width: 2 metres.
.4 Pattern: marbleized.
.5 Thickness: 2.5 mm.
.6 Manufacturer, Colour and Type: as indicated in the Finish Schedule.

.2 Rubber sheet flooring (RRF-1): post consumer recycled vulcanized rubber, and coloured rubber EPDM chips, bonded rubber crumb floor covering conforming to ASTM F3041, Type 1 & 2, Class A, B, C & D.
.1 Width: 1220 mm.
.2 Length: 15.09 m
.3 Thickness: 9.52 mm (3/8")
.4 Manufacturer, Colour and Type: as indicated in the Finish Schedule.

.3 Resilient base (RCB-1): continuous, top set, complete with premoulded end stops and external corners:
.1 Type: rubber.
.2 Style: cove.
.3 Thickness: 3.17 mm.
.4 Height: 101.6 mm.
.5 Lengths: cut lengths minimum 2400 mm.
.6 Manufacturer, Colour and Type: as indicated in the Finish Schedule.

.4 Resilient stair nosing: square nose, 5 mm thick, 30 mm vertical face, 40 mm horizontal face, raised circular design. Manufacturer, colour and type to match resilient stair treads.

.5 Resilient stair tread (RST-1): rubber, 30 mm vertical face, square nose, full tread deep, 5 mm thick, raised circular design surface, complete with integral risers; manufacturer, colour and type as indicated in the Finish Schedule.

.

i) Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.6 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.

.7 Welding Rod: designed to weld seams of sheet flooring, as recommended by flooring manufacturer, colour to match flooring material.

.8 Metal edge strips:

.1 Aluminum extruded, smooth, polished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.9 Edging to floor penetrations: aluminum, type recommended by flooring manufacturer.

.10 Moisture Reduction Barrier: two component, solvent free, fluid applied breathable epoxy coating, specially formulated to treat high moisture vapour transmitting concrete surfaces as determined by a Calcium Chloride Test as per ASTM F1869. Moisture reduction barrier must be compatible with all flooring adhesives, self levelling compounds and components applied over it.

.11 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

.2 Examine surfaces in advance of application. Ensure that floors are protected from moisture entry.

.3 Check floor surfaces for evidence of carbonation, dusting and excessive moisture. Ensure Concrete is at least 28 days old, straight, level and firm, free from grease, oil or other matter detrimental to bond. Do not apply resilient floor to any surface with moisture content in excess that which is recommended by the flooring manufacturer.

.4 Ensure new floor surfaces are smooth and flat to plus or minus 3 mm over 3 metres.

.5 Do not apply the work of this Section until work which is to receive it and site conditions are satisfactory.

.6 Notify the Departmental Repsentative in writing of any defects in such surfaces. Commencement of work implies acceptance of surfaces and conditions.

.7 When subfloors are ready for installation, request an inspection of the subflooring by the Departmental Representative and Flooring Manufacturer. Do not proceed with installation of resilient flooring until sub floors are acceptable to the Departmental Representative and flooring manufacturer.

3.2 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 PREPARATION

.1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.3 Prime sub-floor to resilient flooring manufacturer's printed instructions.

.4 Before applying flooring adhesive or primer, sweep, clean and vacuum the area involved thoroughly with industrial vacuum cleaner. Remove all substances deleterious to adhesive bond.

.5 Feather floors as required using substrate filler, to bring floor covering flush with adjacent floor surfaces such as porcelain tile, carpet and the like. Ensure that the area feathered is large enough so that no noticeable slopes or irregularities are created. Extend feathering out minimum 900 mm, and ramp slope maximum 1 in 30.

3.4 INSTALLATION/MOISTURE REDUCTION BARRIER

.1 If the moisture content of slabs to receive flooring finishes including sports floorings, is greater than 1.36 kg per 93 m^2 at time of flooring installation or less as may be required by the flooring manufacturers, then apply moisture reduction barrier membrane over all slabs to receive flooring.

.2 Ensure moisture reduction barrier is compatible with floor finishes and adhesives.

.3 Apply moisture reduction barrier in strict accordance with manufacturer's recommendations. Prepare concrete surfaces in strict accordance with manufacturer's recommendations.

.4 Apply moisture reduction barrier at rates as recommended by the manufacturer, to suit existing conditions.

.5 Allow membrane to cure as recommended by the manufacturer, prior to application of self levelling compounds and finish flooring.

.6 Ensure that the moisture reduction barrier installation is accepted by the Departmental Representative and the moisture reduction barrier manufacturer's representative prior to application of flooring.

3.5 APPLICATION GENERALLY

.1 Install materials according to manufacturer's recommendations using mechanics skilled in the trade.

.2 Consult other trades in advance and build in or make provisions for installation of their work to avoid cutting and patching.

.3 Take necessary precautions to minimize noise, odors, dust and inconvenience during installation.

.4 Spread adhesives, and primers where recommended, evenly over the entire surface according to manufacturer's directions, using correct type and notching of trowel as recommended by the flooring and adhesive manufacturer. Do not spread more adhesive than can be covered before the adhesive hardens. Install materials within time limit recommended by manufacturer. Remove any overdried adhesive and apply new adhesive.

.5 Cut and fit neatly to frames, breaks, openings, fixtures and around all projections through flooring. Carry into all closets, toe spaces, recesses, and the like, and under all movable fitments.

.6 Securely bond entire undersurface of flooring in place. Install flooring continuous through doorways for similar patterns. Roll flooring with 45.45 kg roller to ensure full bonding to floor.

.7 Fit corners neatly and accurately scribe around door frames, fitments and such obstructions.

.8 Distribute variation in shade or pattern of production run to obtain a uniform effect. Abrupt variations will not be allowed.

.9 Install edge strips to unprotected or exposed edges where floor terminates. Cement edging strips with contact cement.

.10 Install reducer strips to unprotected or exposed edges where floor terminates against concrete floor, using one length pieces per locations wherever possible. If joints are required, use as few joints as possible. Cement reducer strips with contact cement.

.11 Install adapter strips between resilient flooring and carpeting, using one length pieces per locations wherever possible. If joints are required, use as few joints as possible. Cement adapter strips with contact cement.

.12 Install adapter strips at doorways with bottom weatherstripping or seals, so that the weatherstripping or seal does not occur directly over or interfere with adapter strip.

.13 Install reducer strips, adapter strips and edge strips in bed full adhesive, at interface of dissimilar floorings, where flooring terminates at floors, at flooring exposed edges and where indicated. Set mouldings with top flush with adjacent floorings. Locate mouldings below centre of door when door is in closed position, where doors occur.

.14 Where resilient flooring terminates against porcelain tile use edge angle as specified in Section 09 30 00.

3.6 APPLICATION: FLOORING

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least 1 month following building occupation.

.2 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines as indicated on the reviewed seaming plan, to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.4 Run sheets in direction of traffic.

.5 Heat weld seams of linoleum sheet flooring in accordance with manufacturer's printed instructions. Use fully filled welded seams to produce square, straight, flat joints. Install using the 'double pass' procedure. Install the abutting edges of the covering welded to form a homogeneous unit, under the action of hot air using a round welding bead.

.6 Install sheet rubber flooring in strict accordance with manufacturer’s recommendations.

.7 Install continuously through doorways for similar patterns. Butt joints under doors if colours or patterns are dissimilar.

.8 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.9 Cut flooring around fixed objects.

.10 Continue flooring over areas which will be under built-in furniture.

.11 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

3.7 APPLICATION: STAIRS

.1 Install all stair treads and nosings in strict accordance with manufacturers' specifications and recommendations, with a heavy bead of adhesive at the outside edge of the stair, prior to installation of stair treads and nosings.

.2 Install rubber treads with intergral risers to full width of each stair/riser.

.3 Install rubber nosings to full width of edge of landings. Install resilient flooring to the remainder of the tread and up risers.

.4 Adhere over entire surface and fit accurately.

3.8 APPLICATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

3.9 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

3.10 PROTECTION

.1 Protect new floors from time of final set of adhesive until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Use only water-based coating for linoleum.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 35 00 - Concrete Finishing

1.2 REFERENCES

.1 ASTM Standards:

.1 ASTM C413-01(2012): Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes.

.2 ASTM C531-00(2012): Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.3 ASTM C579-01(2012): Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes.

.4 ASTM D523-14: Standard Test Method for Specular Gloss.

.5 ASTM D580/D580M-10: Standard Specification for Greige Woven Glass Tapes and Webbings.

.6 ASTM D635-10: Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

.7 ASTM D638-10: Standard Test Method for Tensile Properties of Plastics.

.8 ASTM D695-10: Standard Test Method for Compressive Properties of Rigid Plastics.

.9 ASTM D790-10: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.10 ASTM D1864/D1864M-89(2009)e1: Standard Test Method for Moisture in Mineral Aggregate Used on Built-Up Roofs.

.11 ASTM D2047-11: Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

.12 ASTM D2240-05(2010): Standard Test Method for Rubber Property - Durometer Hardness.

.13 ASTM D4060-10: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

.14 ASTM D4226-11: Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products.

.15 ASTM D4258-05(2012): Standard Practice for Surface Cleaning Concrete for Coating.

.16 ASTM D4259-88(2012): Standard Practice for Abrading Concrete.

.17 ASTM D4260-05(2012): Standard Practice for Acid Etching Concrete.

.18 ASTM D4262-05(2012): Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.

.19 ASTM D4263-83(2012): Standard Test Method for Indicating Moisture in Concrete by Plastic Sheet.

.20 ASTM D4541-09e1: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

.21 ASTM E84-15a: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for epoxy flooring and include product characteristics, performance criteria, thickness, finish and limitations.

.3 Samples:

.1 Submit four (4), 300 x 300 mm sample of each type of epoxy flooring applied to Concrete. Submit additional samples until Departmental Representative's acceptance is obtained. Make changes in aggregate mix as required to secure correct colour and texture. Label sample(s) with Project name and number, applicator, names of material and manufacturer, colour, gloss, texture and aggregate mix proportion.

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

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 JOB MOCKUP

.1 Construct mockup of each type of epoxy flooring to one complete cell, in a location as directed by the Departmental Representative. Do not proceed until the mockup has been accepted by the Departmental Representative.

.2 If accepted, the mockup may be incorporated into the work.

.3 If it is not accepted, remove and re-install another mockup and do not proceed until mockup has been accepted by the Departmental Representative.

a) CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide specific instructions for maintenance, preservation and cleaning. Provide adequate warning of maintenance materials or practices which may be detrimental to flooring.

1.5 QUALITY ASSURANCE

.1 Installer Qualifications: Trained and approved by the manufacturer and having a minimum five years experience in the installation of the work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type with a record of successful in-service performance. If requested, provide letter of certification from manufacturer stating that installer is certified applicator of its products, and is familiar with proper procedures and installation requirements required by the manufacturer.

- .1 Qualifications include having the necessary experience, staff, and training to install manufacturer's products. Manufacturer's willingness to sell its products to installers does not in itself confer qualification on installer.

.2 Maintenance Seminars: Engage a factory authorized service representative to train Owner's maintenance personnel on proper maintenance procedures.

.3 Pre-Installation Meeting: Prior to commencing work of this Section, arrange for manufacturer's technical representative to visit the site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the work of this Section. Advise the Departmental Representative of the date and time of the meeting.

.4 Manufacturer's Site Inspection: Have the manufacturer's technical representative inspect the Work at suitable intervals during application and at conclusion of the work of this Section, to ensure the Work is correctly installed. When requested, submit manufacturer's inspection reports and verification that the work of this Section is correctly installed.

.5 Testing of Concrete Floors: Test floors that have been cured for minimum 28 days, and after preparation for Product installation is complete and patching or levelling compound is fully cured. Conduct testing simultaneously on floors free of sealer, curing compounds, oil, grease and other agents detrimental to the test and Product performance. Locate test sites to cover representative installation areas. Do not proceed with work when the test results do not conform to the specified allowable.

- .1 Cohesive Strength: Minimum 1.45 MPa by tensile load as tested to CSA A23.2-6B. Do one test for every 9 sq.m. or fraction thereof.
- .2 Moisture Vapour Transmission: ASTM D4263 plastic sheet method, no visible condensation or vapour allowed. Do one test for every 4.5 sq.m. or fraction thereof.
- .3 Surface Moisture Content: Maximum 4%, tested by moisture meter. Do one test for every 4.5 sq.m. or fraction thereof.
- .4 Surface Temperature: Minimum 3 degree C above the measured dew point.

.6 Apply epoxy flooring in accordance with the most recent installation instructions of the manufacturer.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Maximum moisture content of substrate: 4%.

.2 Temperature: maintain minimum temperature of substrate 12°C for a minimum of 48 hours before, during and after installation or until cured unless otherwise required by the flooring manufacturer. Minimum temperature of air during and for 48 hours after coating is applied 16°C.
.1 Alkali: Ensure negative alkalinity of substrate before application of coating.

.3 Alkali: Ensure negative alkalinity of substrate before application of coating.

.4 Ventilation: provide continuous ventilation during and after coating application to control dangerous vapour build-up, odours and fumes.

.5 Maintain well lit work area.

.6 Post and enforce "No smoking or open flame" signs until flooring has cured. Eliminate all spark producing devices (furnaces, all pilot lights, spark-producing switches and the like) in or near the work area.

.7 Provide uniform and sufficient lighting in areas of installation.

.8 Do not begin flooring installation until all other work which would cause damage, dirt dust or interruption of normal installation pace has been completed.

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect epoxy flooring materials from damage.
.3 Protect prefinished surfaces with wrapping.
.4 Replace defective or damaged materials with new.

.4 Designate a room for storage of flooring materials and equipment. Keep room neat and clean at all times, under lock and key, and surrounding surfaces protected from damage. Keep material temperatures at 16°C minimum.

.5 Store flammable materials in safe, approved containers to eliminate fire hazards and remove from Site at end of each work shift.

.6 Do not use materials that has been stored for period of time exceeding maximum recommended shelf life of materials

1.8 PROTECTION

.1 Protect adjacent surfaces from damage resulting from work of this Section. If necessary, cover or mask adjacent surfaces to those receiving flooring including fixtures and equipment. Make good any damage so caused, to the satisfaction of the Departmental Representative.

.2 Replace materials soiled during application, and from which soil cannot be completely removed, at no extra cost.

.3 Ensure that spark-proof electrical equipment is used in areas where inflammable materials are being applied. Prevent use of open flames or equipment that may cause sparks.

.4 Keep all traffic out of all areas receiving flooring until it has been completed and cured.

.5 Apply temporary protection until floor is fully cured.

2 Products

2.1 MATERIALS

.1 Epoxy Floor Coating (to flooring SFC-1 and SFC-3): Low VOC, low odour, 100% solids; coating and sealer; slip-resistant finish; manufacturer, colour and type as indicated in the Finish Schedule.

.2 Epoxy Flooring System (SFC-2): nominal 3 mm thick; Flooring system to consist of the following:
- .1 Penetrating two component, moisture tolerant, epoxy primer.
- .2 Three component self levelling formulation consisting of epoxy resin, curing agent and filler.
- .3 Coloured quartz silica aggregate broadcast.
- .4 Two component clear epoxy sealer.
- .5 Manufacturer, colour and type as indicated in the Finish Schedule.

.3 Primer: As recommended by manufacturer supplying flooring material for types of surface to be primed.

.4 Subfloor Filler: Compatible to floor coating and as recommended by coating manufacturer.

.5 Joint and crack sealant: manufacturer's standard.

.6 Surface conditioner: to manufacturer's standard.

.7 Aggregate: manufacturer's standard as required to achieve a slip resistant finish.

3 Execution

3.1 INSPECTION

.1 Ensure concrete floors conform to manufacturer's requirements.

.2 Ensure that items penetrating coating are placed before application of coating.

.3 Ensure that all surfaces are clean and dry.

.4 Ensure slabs are properly sloped to drain and that a heavy polyethylene vapour retarder is installed under the slab.

3.2 PREPARATION OF SURFACES

.1 Protect adjacent surfaces and equipment from damage by overspray, fall-out and dusting.

.2 Ensure surfaces are clean, sound and dry; in all cases requiring some form of preparation. Prepare substrates in accordance with manufacturer's printed instructions.

.3 Effectively remove concrete laitance by steel shot blasting, grit blasting or method approved by manufacturer.

.4 Prefill and repair surface irregularities, holes, cracks and other defects in accordance with manufacturer's recommendations. Level subfloor with filler.

.5 Clean subfloor free of laitance, oil, grease, curing and sealing compounds, hardeners, chemical additives and other foreign matter detrimental to flooring application.

.6 Prepare concrete floors with shot blasting or other method recommended by manufacturer. Remove weak concrete, uneven joints, rough areas, foreign and projection off surfaces. Surface to be hard, and sound. Equip dry blasting machine with vacuum to minimize dust.

.7 Blow clean control joints, sawcuts and cracks with compressed air and grout with material compatible with floor coating materials.

.8 Ensure that gysum board backing surfaces for cove bases are free of voids and irregularities.

.9 Before commencement of application of flooring, ensure that concrete floors are acceptable in accordance with manufacturer's recommendations.

.10 Commencement of work implies acceptance of surfaces and working conditions.

3.3 APPLICATION/EPOXY FLOORING

.1 Ensure that floors have been prepared in accordance with manufacturer's instructions prior to application of epoxy flooring.

.2 Install cove and base including top cap in accordance with manufacturer's instructions. Ensure top of base is level, and true to line.

.3 Mix and apply work in strict accordance manufacturer's printed directions in specified thickness, with integral cove bases, uninterrupted except at sawn joints or other types of joints required, free of laps, pin holes, voids, crawls, skips or other marks or irregularities are visible, and to provide uniform appearance.

.4 Work coating into corners and other restricted areas, up and over bases, and into recesses in floors to ensure full coverage.

.5 Make clean true junctions with no visible overlap between adjoining applications of coatings.

.6 Primer: Apply primer over prepared substrate, at manufacturer's recommended spreading rate with timing of application co-ordinated with subsequent application of topping mix to ensure optimum adhesion between flooring materials and substrate. Prime entire surface with recommended primer.

.7 Apply flooring in accordance with manufacturer's instructions to the proper thickness.

.8 Apply grout coats and top coats at recommended coverage, to provide a uniform, dense surface.

.9 Finish flooring uniformly, free from surface imperfections, and to match the accepted sample in the Departmental Representative's office.

.10 Allow proper cure time for each installation procedure.

.11 Apply flooring up adjoining walls 150 mm to form base to flooring. Top of base to be level, true, and even.

.12 Flash pipes, conduits and other penetrations to manufacturer's standards.

.13 Coat house keeping pads prior to installation of equipment.

.14 Incorporate aggregate into topping at rate recommended by the manufacturer to achieve a slip resistant surface.

.15 Apply sealers over epoxy flooring in strict accordance with manufacturer’s recommendations.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion of work of this Section clean area up of debris, remove flooring material from adjacent surfaces where splattered and leave area in clean, tidy condition acceptable to the Departmental Representative.

.3 Touch up and refinish minor defects in work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

.4 Remove promptly as work progresses spilled or splattered coating materials from adjacent surfaces. Clean floors on completion of Work. Do not mar surfaces while removing splatters.

.5 Protect completed work from traffic for at least one week to allow proper curing of floor finish. Protect work from any trades using area after completion of installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 35 00 - Concrete Finishing

.2 Section 09 30 13 - Glass & Porcelain Tiling

.3 Section 09 65 16 - Resilient Sheet Flooring

.4 Section 09 67 10 - Epoxy Flooring

1.2 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC):
- .1 AATCC Test Method 16-2004: Colorfastness to Light.
- .2 AATCC Test Method 23-2005: Colorfastness to Burn Gas Fumes.
- .3 AATCC Test Method 129-2005: Colourfastness to Ozone in the Atmosphere Under High Humidities.
- .4 AATCC Test Method 134-2006: Electrostatic Propensity of Carpets.
- .5 AATCC Test Method 171-2005: Carpets: Cleaning of; Hot Water Extraction Method.
- .6 AATCC Test Method 175-2008: Stain Resistance: Pile Floor Coverings.
- .7 AATCC Test Method 189-2007: Fluorine Content of Carpet Fibers.

.2 ASTM International:
- .1 ASTM D297-15: Standard Test Methods for Rubber Products-Chemical Analysis.
- .2 ASTM D1335-12: Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
- .3 ASTM D2661-14: Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
- .4 ASTM D1667-05(2011): Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
- .5 ASTM D3574-11: Standard Test Methods for Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams.
- .6 ASTM D3936-12: Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No. 22-2004 (R2013): Textile Test Methods - Colourfastness to Rubbing (Crocking).
- .2 CAN/CGSB-4.2 No.27.6M-M91(R2013): Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
- .3 CAN/CGSB-4.2 No. 76-94/ISO 2551: 1981, IDT (R2013): Textile Test Methods - Machine-Made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions.
- .4 CAN/CGSB-4.2 No.77.1-94/ISO 4919:1978 (R2012): Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
- .5 CAN/CGSB-4.129-93(R1997): Carpet for Commercial Use.

.6 CAN/CGSB-4.155-M88 (R2013): Flammability of Soft Floor Coverings - Sampling Plans.
.7 CAN/CGSB 4-GP-156: Direct Glue-Down Carpet, Guide to Selection and Installation.
.8 CAN/CGSB-4.161-M87: Carpets for Residential Use.
.9 CGSB 20-GP-23M: Cushion, Carpet, Flexible Polymeric Material.

.4 Carpet and Rug Institute (CRI):
.1 CRI 104/105 Carpet Installation Standard 2015.
.2 CRI Green Label Indoor Air Quality Testing Program.
.3 CRI Green Label Plus Indoor Air Quality Testing Program.

.5 Environmental Choice Program (ECP):
.1 CCD-152: Flooring Products, Commercial Non-modular Textile Flooring.

.6 Health Canada:
.1 C.R.C., c.923-10: Hazardous Products Act - Carpet Regulations, Part II of Schedule 1.

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

.8 National Floor Covering Association (NFCA):
.1 National Floor Covering Reference Manual 2015.

.9 ULC Standards:
.1 CAN/ULC-S102-10: Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC-S102.2-10: Surface Burning Characteristics for Flooring, Floor Covering, and Miscellaneous Materials.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other construction subtrades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Sequencing: sequence with other work in accordance with Section 01 11 00. Comply with manufacturer's written recommendations for sequencing construction operations.

.3 Scheduling: schedule with other work in accordance with Section 01 32 16.06.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile, adhesive, carpet protection, subfloor patching compound and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Shop Drawings:
- .1 Information on shop drawings to indicate:
  - .1 Nap: direction, open edges, special patterns.
  - .2 Cutouts: show locations where cutouts are required.
  - .3 Edgings: show location of edge moldings and edge bindings.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit four (4) samples of each type of carpet tile specified and duplicate tiles for each colour selected, edge strips and transition strips.

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

.6 Test and Evaluation Reports:
- .1 Certified test reports showing compliance with specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation instructions.

.8 Manufacturers Reports:
- .1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance with specifications.

.9 Maintenance Data: Include the following:
- .1 Methods for maintaining work, including cleaning and stain removal products and procedures and manufacturer's recommended maintenance schedule.
- .2 Precautions for cleaning materials and methods that could be detrimental to work.

.10 Qualification Statements:
- .1 Compliance: to CAN/ULC-S102 and/or CAN/ULC-S102.2.
- .2 Testing: passes testing requirements of:
  - .1 Green Label Plus Indoor Air Quality Testing Program.
- .3 Tuft bind: meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.
- .4 Dust control measures.
- .5 Carpet schedule.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra stock materials in accordance with Section 01 78 00: deliver to Departmental Representative extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.

.1 Quantity: provide minimum 2% (to the nearest full carton) of:
.1 Carpet tile.
.2 Adhesives.

.2 Delivery, storage and protection : comply with Owner's requirements for delivery and storage of extra materials. Protect in strict accordance with manufacturer’s recommendations.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Prequalification: compliance with Health Canada regulations under "Hazardous Products Act", Part II of Schedule 1, and to CAN/CGSB-4.2 No. 27.6.

.2 Qualifications:
.1 Manufacturer: capable of providing field service representation during construction and approving application method.
.2 Supplier.
.3 Flooring Installer:
.1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
.2 Certified by carpet manufacturer prior to bid submission.
.3 Must not sub-contract labour without written approval of Departmental Representative.
.4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

.3 Source Limitations: Obtain each type of product from a single manufacturer.

.4 Products: Provide like Products from same production run. Install Products in sequence from sequentially numbered dye lots.

.5 Testing of Concrete Floors: Test floors that have been cured for minimum 28 days, and after preparation for Product installation is complete. Conduct testing simultaneously on floors free of sealer, curing compounds, oil, grease and other agents detrimental to the test and the Product performance, and in strict conformance with test kit manufacturer's written

instructions. Locate test sites to cover representative installation areas. Do not proceed with work when the test results do not conform to the specified allowable.

.1 Alkalinity: Acceptable range of 5 to 9 on the pH scale. Test floors using distilled water and pH paper. Provide 6 test sites for floor area up to 93 sq.m, add 2 test site for each additional 93 sq.m. or fraction thereof.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.3 Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.

.4 Store and protect carpet tile and accessories in location as directed by Departmental Representative.

.5 Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.

.6 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.7 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.8 Replace defective or damaged materials with new.

1.9 SITE CONDITIONS

.1 Ambient Conditions:

.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer. Prepare moisture testing and provide report to Departmental Representative.

.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.

.4 Ventilation:

.1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.2 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.

.5 Install carpet after space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

.2 Ensure concrete pH does not exceed 10.0. Acid etch if greater than 10.0.

1.10 WARRANTY

.1 Manufacturer's warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents.

.2 Warranty period: 5 years, commencing on date of substantial performance of work.
.1 Warranty covers labour, repair or replacement of defective components for 5 year after date of substantial performance.

2 Products

2.1 MATERIALS

.1 Manufacturers:
.1 Ensure manufacturer has minimum 5 years experience in manufacturing components similar to or exceeding requirements of project.

2.2 PERFORMANCE

.1 Flammability: certified for flammability to Health Canada regulations under "Hazardous Products - Carpet Regulations", Part II of Schedule 1.

.2 Flame Spread: maximum flame spread rating 300, maximum smoke developed classification 500, when tested to CAN/ULC-S102.2.

.3 Smoke Development: 450 or less per ASTM E662.

.4 Dry Breaking Strength: to ASTM D2661, minimum acceptable tear strength in both length and width:
.1 11.3 kg for carpets installed by glue down installation.

.5 Wear: maximum 10% of pile face fiber by weight for 10 years.

.6 Edge Ravel: none for 10 years.

.7 Static Resistance: permanent static control to AATCC 134, 3000 V maximum at 20% RH and 22 degrees C.

.8 Static Generation: less than 3.0 kV per AATCC 134 for 10 years.

.9 Tuft Bind: Tuft Lock: to ASTM D1335 and CAN/CGSB-4.129, minimum acceptable 1.6 kilograms for cut pile product and 3.6 for loop pile product.

.10 De-lamination of Secondary Backing: Lamination Strength of Secondary Backing: to ASTM D3936, minimum acceptable peel strength of 1.6 kg/25 mm.

.11 Stain resistance: to AATCC 175, 8.

.12 Soil Resistance: Fluorine Durability Level to AATCC 189 and CRI TM-102, 500 ppm fluorine minimum.

.13 Colourfastness to light: to AATCC 16E, > 4 after 60 hours.

.14 Colourfastness to atmosphere: to AATCC 129 and/or AATCC 23.

.15 Colourfastness to crocking: to CAN/CGSB-4.2 No. 22.

.16 Indoor Air Quality Certification: certified to CRI Green Label Plus IAQ requirements.

2.3 FABRICATION

.1 Carpet Tile: manufacturer, colour, pattern as indicated in the Finish Schedule.
.2 Type: large scale pattern, 457 mm x 914 mm size.

.3 Face construction:
.1 patterned loop.

.4 Pile Surface Appearance:
.1 Level loop: non-textured.

.5 Pile fibre: to CAN/CGSB-4.129.

.1 Nylon: Dynex SD Nylon.

.6 Dyeing Method: 100% solution dyed.

.7 Tufted Carpet Backing: to CAN/CGSB-4.129.
.1 Primary backing:
.1 Non woven synthetic fibre.

.8 Stitches per inch: 39.4/10 cm.

.9 Gauge: 50.4 rows/10 cm.

.10 Face Pile Weight: 711.9 g/m^2.

.11 Finished Pile Height: minimum 4.7 mm average.

.12 Tile backing: ER3 modular backing.

2.4 ACCESSORIES

.1 Edge Strips:

.1 Metal:
.1 Hammered surface aluminum, Designed for carpet being installed.
.2 Floor flange minimum 38 mm wide, face minimum 16 mm wide.
.3 Finish: clear anodic coating.

.2 Adhesive:
.1 Multi-purpose Adhesive Type: recommended by carpet tile manufacturer for direct glue down installation.

.3 Transition Mouldings: to other floorings: as specified in Sections 09 30 13 and 09 65 16.

.4 Carpet protection: non-staining heavy duty kraft paper.

.5 Subfloor patching compound: Portland cement base filler, mix with latex and water to form cementitious paste.

3 Execution

3.1 INSTALLERS

.1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section, co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

.3 Examine surfaces in advance of application. Ensure that floors are protected from moisture entry.

.4 Check floor surfaces for evidence of carbonation, dusting or excessive moisture.

3.3 PREPARATION

.1 Subfloor Preparation:
.1 Inspect concrete and determine special care required to make it a suitable for carpet.
.2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible latex patching compound.

.3 Comply with manufacturer's written recommendations for maximum patch thickness.
.4 Prime large patch areas with compatible primer.
.5 Ensure concrete substrates are cured, clean and dry.
.6 Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
.7 Where powdery or porous concrete surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation.

.2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
.1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.

.3 Tile Carpeting Preparation:
.1 Pre-condition carpeting: following manufacturer's written instructions.

3.4 INSTALLATION

.1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard and co-ordinate with Section 01 73 00 - Execution.

.2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.

.3 Install carpet tile after finishing work is completed but before telephone and electrical pedestal outlets are installed.

.4 Install carpet tile in vertical ashlar pattern as per manufacturer's recommendation.

.5 Snugly join carpet tiles in completed installation.
.1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer specifications.
.2 Do not trap yarn between carpet tiles.

.6 Apply thin film of pressure-sensitive adhesive according to manufacturer's recommendations.

.7 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.

.8 Use material from same dye lot.
.1 Ensure colour, pattern and texture match within visual areas.
.2 Maintain constant pile direction.

.9 Fit around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.10 Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.11 Install carpet tiles smooth and free from bubbles, puckers, and other defects.

.12 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

3.5 SITE QUALITY CONTROL

.1 Site Tests and Inspections:
  .1 Co-ordinate site test with Section 01 45 00 - Quality Control.

.2 Manufacturer's Field Services:
  .1 Co-ordinate manufacturer's services with Section 01 45 00 - Quality Control. Have manufacturer review work involved in handling, installation / application, protection and cleaning of its products, and submit written reports, in acceptable format, to verify compliance of work with Contract.
  .2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
  .3 Schedule site visits:
    .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
    .2 Twice during progress of Work at 25% and 60% complete.
    .3 Upon completion of Work, after cleaning is carried out.
  .4 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.
  .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
    .1 Vacuum carpets clean immediately after completion of installation.

3.7 PROTECTION

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

.2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.

.3 Install carpet protection to satisfaction of Departmental Representative.

.4 Repair damage to adjacent materials caused by tile carpeting installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 09 21 16 - Gypsum Board Assemblies

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:
.1 Submit shop drawings indicating panel layout, and interfaces with adjacent materials, edge strips, welded seams, sealing to adjacent materials and the like.

.3 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for resilient wall protection and include product characteristics, performance criteria, physical size, finish and limitations.
.2 To wall protection WP-2, indicate all joint trims, edge trims and accessories.

.4 Samples:
.1 Provide four (4), 300 mm x 300 mm samples of each type of wall protection, showing exact quality, colours, texture and weight.

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

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for each type of wall protection for incorporation into manual.

.3 Provide to the Departmental Representative, for future maintenance use, four (4) sheets (1220 x 2440 mm) of each colour and type of resilient wall protection used in this project, in accordance with Section 01 78 00. Deliver to site where directed. Ensure that material is from same production run as installed material. Mark rolls to indicate contents and quantity.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect wall protection materials from damage.
- .3 Protect prefinished surfaces with wrapping.
- .4 Replace defective or damaged materials with new.
- .5 Keep delivered materials warm, dry and free from stains.
- .6 Protect edges from damage. Replace damaged materials at no cost to the Departmental Representative.

1.5 TEMPERATURE CONDITIONS

.1 Store materials in area of application and allow three days for material to reach the area air temperature.

.2 Maintain minimum 20°C air temperature at flooring installation area for three (3) days prior to, during and for two (2) days after installation. Arrange for controlled ventilation during this period to avoid high humidity and cold drafts.

.3 Take precautions to avoid adversely affecting other building elements. Be responsible for any damage caused by lack of control of heating operation.

1.6 PROTECTION

.1 Protect finish surfaces and work of other sections before and during the execution of the work of this section. Protect finished installation of work of this Section until date of Substantial Performance of the Work.

1.7 SITE MEETING

.1 Before commencement of work on site, arrange a site meeting to be attended by the Contractor’s superintendent, the Subcontractor's representative, the Subcontractor's foreman for this project, the resilient wall manufacturer's representative, and the Departmental Representative.

.2 Specifications and details will be reviewed, including the following:
- .1 Scheduling for manufacturer's supervision.
- .2 Confirmation of all colours, samples and miscellaneous materials.
- .3 Condition of surfaces.
- .4 State of completion of areas.
- .5 Protection of finished surfaces.
- .6 Temperature conditions.
- .7 Rolling requirements.
- .8 Coordination of installation of corner guards and crash rails on walls receiving resilient wall covering.
- .9 Confirmation of use of conventional and industry approved tools for PVC application (for heat welded seams).

1.8 MANUFACTURER SUPERVISION

.1 Make necessary arrangements for initial installation of resilient wall covering materials, to be supervised by the material manufacturer's representatives.

.2 Obtain Material manufacturer's representative written assurance that installation is carried out in accordance with manufacturer's technical specification. Should such specifications conflict with these specifications, inform Departmental Representative.

.3 Ensure that the manufacturer's representative makes the inspections together with the Departmental Representative.

.4 Confirm that sufficient lighting is provided.

2 Products

2.1 WALL PROTECTION TYPE WP-1 MATERIALS

.1 Wall protection: 1.5 mm thick rigid high impact sheet, 1220 mm x 2440 mm sized sheets or larger as required to suit installation, with a flame spread rating of 25 or less and smoke developed of 450 or less, and meeting Class A fire rating, pebble texture; colour as indicated in the Finish Schedule.

.2 Trim: Provide manufacturer’s standard cap trim in colour to match wall protection.

.3 Adhesive: as recommended by the manufacturer to suit installation, with total VOC concentration less than 50 g/L.

2.2 WALL PROTECTION TYPE WP-2 MATERIALS

.1 Resilient wall covering: Semi-rigid PVCu wall covering, 2.5 mm thickness, white colour, matte finish; heat welded seamless wall system; type as indicated in the Finish Schedule.

.2 Adhesive: as recommended by the manufacturer, solvent free, waterproof type only, as recommended by resilient wall covering manufacturer. Adhesive to have acceptable low level emissions as follows:
- .1 Total VOC concentration less than 50 g/L.
- .2 Formaldehyde: must be less than 1 part per billion (1 PPB).
- .3 4 Phenycyclohexane (4-PCH): must be less than 1 part per billion (1-PPB).
- .4 Submit evidence of adhesives meeting the above requirements.

.3 Welding rod material: same chemical composition as resilient wall covering, colour to match wall covering.

.4 Cove cap: type to match resilient wall protection and as recommended by the manufacturer.

.5 Sealant: one component polyurethane to CAN/CGSB-19.13-M87, MCG-2-25-B-N and Federal Specification TTS-S-00230C, Type II, Class A and ASTM C-920, Type S, Grade NS, Class 25.

3 Execution

3.1 PREPARATION

.1 Prepare surfaces in accordance with the manufacturer's directions.

.2 Before applying adhesive or primer, vacuum the walls involved thoroughly with industrial vacuum cleaner. Remove all substances deleterious to adhesive bond.

.3 Ensure adequate lighting is provided.

.4 Ensure concrete block has flush joints, and is skim coated to provide a smooth uniform surface to tolerances as required by the resilient wall protection manufacturers.

.5 Consult other trades in advance and built-in or make provisions for installation of their work to avoid cutting and patching. Co-ordinate the installation of work of this Section with work of other trades.

3.2 INSTALLATION/WALL PROTECTION TYPE WP-1

.1 Install materials according to manufacturer's recommendations using mechanics skilled in the trade.

.2 Spread adhesives, and primers where recommended, evenly over the entire surface according to manufacturer's directions, using correct type and notching of trowel. Do not spread more adhesive than can be covered before the adhesive hardens. Install materials within time limit recommended by manufacturer. Remove any overdried adhesive and apply new adhesive.

.3 Cut and fit resilient wall covering neatly to frames, breaks, openings, fixtures and around all projections. Apply resilient wall covering to all walls and to heights as noted on the drawings.

.4 Use routed and filled welded joints. Finish joints smooth and flush. Use a two-pass finishing procedure using the manufacturer's colour-match welding rod melted into the groove, with sufficient material to result in a continuous "ridge" or "head" above wall or ceiling surface. When cool, make the first finishing pass with trimming tool with trim plate attachment. Use only the trimming tool for the second pass. Re-trim as required to provide a homogeneous weld surface smooth and flush with wall panels and coves. Seal resilient wall covering around metal door frames at corners and junctions as recommended by the manufacturer.

.5 Allow minimum 24 hours after wall and ceiling panel installation before welding seams.

.6 Maintain minimum 1.6 mm gap between sheets and to any other obstruction.

.7 Roll each sheet with laminated roller from centre of material to outer edges.

.8 For inside and outside corners, material must be thermo-moulded using the appropriate heat bending tool or other method as recommended by the manufacturer; heat welded corners will not be acceptable.

.9 Install "cove cap" to top of wall covering and to all exposed edges.

.10 Seal between resilient wall covering and adjacent surfaces with sealant, to provide a water tight seal.

3.3 INSTALLATION/WALL PROTECTION TYPE WP-2

.1 Install wall protection in strict accordance with manufacturer's directions. Install in as large pieces as possible, with as few joints as possible.

.2 Ensure walls are dry and free from dirt, grease, loose paint, scales and the like. Prepare wall surfaces in strict accordance with manufacturer's recommendations.

.3 Outline the area to be covered with a chalk line or with masking tape to insure a neat, level installation. Make sure the sight line at the top edge is level.

.4 Wipe the back side of the wall protection with a damp cloth to remove any dust. Apply adhesive to totally cover back side of sheet. Provide slip sheets to ensure that contact surfaces do not come in contact prematurely.

.5 Alight the top of edge of the wall protection sheets with chalk line or masking tape. Carefully remove slip sheet without moving the wall protection.

.6 Remove slip sheet and bond to substrate and ensure that wall protection is completely bonded to substrate. Roll entire surface with heavy duty roller to ensure complete bonding. Pay particular attention to edges.

.7 Install with as few joints as possible. Where joints occur, tightly butt joints to produce hairline joints in accordance with manufacturer's recommendations.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications

.2 Section 08 11 00 - Metal Doors and Frames

.3 Section 09 91 23 - Interior Painting

.4 Section 09 96 59 - Special Wall Coatings

1.2 REFERENCES

.1 Environmental Protection Agency (EPA)
  .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

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

.3 The Master Painters Institute (MPI)
  .1 Architectural Painting Specification Manual - current edition.
  .2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.

.4 National Fire Code of Canada.

.5 Society for Protective Coatings (SSPC)
  .1 Systems and Specifications, SSPC Painting Manual 2005.

1.3 QUALITY ASSURANCE

.1 Qualifications:
  .1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
  .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
  .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
  .4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
  .5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
  .6 paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
  .7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.8 Standard of Acceptance:
.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
.2 Soffits: No defects visible from ground at 45 degrees to surface when viewed using final lighting source.
.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:
.1 Provide paint products meeting MPI "Environmentally Friendly" E1 or E2 ratings based on VOC (EPA Method 24) content levels.
.2 Green Performance in accordance with MPI Standard GPS-1.

1.5 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representative for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about building.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Submit four (4), 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
.1 3 mm plate steel for finishes over metal surfaces.
.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
.3 Submit full range of available colours where colour availability is restricted.

1.7 MAINTENANCE

.1 Extra Materials:
  .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit one, four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:.
  .1 Deliver and store materials in original containers, sealed, with labels intact.
  .2 Labels: to indicate:
    .1 Manufacturer's name and address.
    .2 Type of paint or coating.
    .3 Compliance with applicable standard.
    .4 Colour number in accordance with established colour schedule.
  .3 Remove damaged, opened and rejected materials from site.
  .4 Provide and maintain dry, temperature controlled, secure storage.
  .5 Observe manufacturer's recommendations for storage and handling.
  .6 Store materials and supplies away from heat generating devices.
  .7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
  .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
  .9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.
  .10 Remove paint materials from storage only in quantities required for same day use.
  .11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
  .12 Fire Safety Requirements:
    .1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.
    .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
    .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 AMBIENT CONDITIONS

.1 Heating, Ventilation and Lighting:
  .1 Ventilate enclosed spaces in accordance with Section 01 51 00.
  .2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate

temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.3 Where required, provide continuous ventilation for seven days after completion of application of paint.

.4 Co-ordinate use of existing ventilation system with General Contractor and Departmental Representative and ensure its operation during and after application of paint as required.

.5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.6 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85% or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds:

.1 12% for concrete and masonry (clay and concrete brick/block).

.2 15% for wood.

.3 12% for plaster and gypsum board.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 Products

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Only qualified products with E1 or E2 "Environmentally Friendly" ratings are acceptable for use on this project.

.4 Use only MPI listed L rated materials.

.5 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.6 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.7 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61.0 degrees C or greater.

.8 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:

.1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.9 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

2.2 COLOURS

.1 Colours: as indicated in the Finish Schedule or as otherwise selected by the Departmental Representative.

.2 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	85	

.2 Gloss level ratings of painted surfaces as specified.

2.5 EXTERIOR PAINTING SYSTEMS

.1 All painting is to be MPI premium grade.

.2 Asphalt Surfaces: as specified in Section 32 17 23 - Pavement Markings.

.3 Structural Steel and Metal Fabrications:
.1 EXT 5.1H - Pigmented polyurethane finish (over epoxy); G5 gloss level.

.4 Galvanized Metal: not chromate passivated
.1 EXT 5.3L - Alaphatic Urethane (over epoxy primer); G5 gloss level.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Exterior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.

.2 Exterior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

3.3 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
.1 Remove dust, dirt, and surface debris by wiping with dry, clean cloths or compressed air.
.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
.5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
.6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.4 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.5 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.6 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush or roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.4 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

.4 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.8 FIELD QUALITY CONTROL

.1 Inspection:

.1 Field inspection of exterior painting operations to be carried out be independent inspection firm as designated by Departmental Representative.

.2 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Co-operate with inspection firm and provide access to areas of work.

.2 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9 CLEANING

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

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.10 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:
.1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.

1.2 RELATED REQUIREMENTS

.1 Section 04 22 00 - Unit Masonry

.2 Section 05 50 00 - Metal Fabrications

.3 Section 06 20 00 - Finish Carpentry

.4 Section 08 11 00 - Metal Doors and Frames

.5 Section 08 14 16 - Wood Doors

.6 Section 08 31 00.10 - Access Doors

.7 Section 09 21 16 - Gypsum Board

.8 Section 09 91 13 - Exterior Painting

.9 Section 09 96 59 - Special Wall Coatings

1.3 REFERENCES

.1 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)
.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

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

.4 Master Painters Institute (MPI)
.1 MPI Architectural Painting Specifications Manual, current edition.

.5 National Fire Code of Canada

.6 Society for Protective Coatings (SSPC)
.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

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

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
.2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
.3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

.2 Pre-Installation Meeting:
.1 Convene pre-installation meeting one week prior to beginning work of this Section in accordance with Section 01 31 19 - Project Meetings.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Coordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.3 Health and Safety:

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

1.5 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.

.3 Samples:
- .1 Submit full range colour sample chips to indicate where colour availability is restricted.
- .2 Submit four (4) 200 x 300 mm sample panels of each paint and with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
  - .1 3 mm for finishes over metal surfaces.
  - .2 13 mm birch plywood for finishes over wood surfaces.
  - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
  - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
  - .5 10 mm hardboard for finishes over wood surfaces.
- .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .1 Lead, cadmium and chromium: presence of and amounts.
  - .2 Mercury: presence of and amounts.
  - .3 Organochlorines and PCBs: presence of and amounts.
- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions:
  - .1 Submit manufacturer's application instructions.
- .7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
  - .1 Product name, type and use.
  - .2 Manufacturer's product number.
  - .3 Colour numbers.
  - .4 MPI Environmentally Friendly classification system rating.

1.7 MAINTENANCE

.1 Extra Materials:
- .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
- .2 Quantity: provide one - four litre can of each type and colour of finish coating and stain. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
- .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:
- .1 Identify products and materials with labels indicating:
  - .1 Manufacturer's name and address.
  - .2 Type of paint or coating.
  - .3 Compliance with applicable standard.
  - .4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:
- .1 Provide and maintain dry, temperature controlled, secure storage.
- .2 Store materials and supplies away from heat generating devices.
- .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:
- .1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.9 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00.
- .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
- .3 Provide continuous ventilation for seven days after completion of application of paint.
- .4 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
- .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by Paint Inspection Agency Authority and product manufacturer, perform no painting when:
  .1 Ambient air and substrate temperatures are below 10 degrees C.
  .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
  .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
  .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
  .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:
  .1 Allow new concrete and masonry to cure minimum of 28 days.
  .2 15% for wood.
  .3 12% for plaster and gypsum board.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:
  .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
  .3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:
  .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

  .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.7 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

.8 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.

.9 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.10 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.11 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:

.1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.

.2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.12 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

2.2 COLOURS

.1 Colours to be as indicated in the Finish Schedule or as otherwise selected by the Departmental Representative.

.2 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes inaccordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 All painting to be to MPI premium grade.

.2 Concrete masonry units: smooth block:
.1 INT 4.2K - Waterborne light industrial, G3 Gloss level coating.

.3 Structural steel and metal fabrications: columns, beams, joists:
.1 INT 5.1TT - Alkyd G5 gloss level finish (over rust inhibitive primer).

.4 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
.1 INT 5.3N - Institutional low odour/low VOC G5 gloss finish.

.5 Dressed lumber: including doors:
.1 INT 6.3P - Waterborne light industrial G5 gloss level coating.

.6 Dressed lumber: including interior benches:

.1 INT 6.3E - Polyurethane Varnish over semi-transparent stain, G3 gloss level

.7 Electrical Backboards: INT 6.4Q and 6.4QQ - Clear.

.8 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
.1 INT 9.2L - Waterborne light industrial G3 gloss level coating.

.9 Canvas and cotton coverings.
.1 INT 10.1D - Institutional low odour/low VOC G3 gloss level finish.

2.6 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
- .1 Stucco, plaster and gypsum board: 12%.
- .2 Concrete Block: 12%.
- .3 Wood: 15%.

3.4 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect building occupants in and about the building.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
.2 Apply wood filler to nail holes and cracks.
.3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush, roller or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
.1 Apply paint in uniform layer using brush and/or roller type suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
.4 Brush out immediately all runs and sags.
.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

.11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD QUALITY CONTROL

.1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Departmental Representative and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.

.4 Standard of Acceptance: meeting tolerances specified in item 3.7 of this Section.

.5 Field inspection of painting operations to be carried out be independent inspection firm as designated by Departmental Representative.

.6 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.7 Cooperate with inspection firm and provide access to areas of work.

.8 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 05 50 00 - Metal Fabrications

.3 Section 08 34 63 - Detention Doors and Frames

.4 Section 09 21 16 - Gypsum Board Assemblies

.5 Section 09 67 10 - Epoxy Flooring

.6 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 ASTM Standards:
- .1 ASTM D522/D522M-13: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
- .2 ASTM D523-14: Standard Test Method for Specular Gloss.
- .3 ASTM D570-98(2010)e1: Standard Test Method for Water Absorption of Plastics.
- .4 ASTM D638-10: Standard Test Method for Tensile Properties of Plastics.
- .5 ASTM D1308-02(2013): Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- .6 ASTM D1360-98(2011): Standard Test Method for Fire Retardancy of Paints (Cabinet Method).
- .7 ASTM D2486-06(2012)e1: Standard Test Methods for Scrub Resistance of Wall Paints.
- .8 ASTM D3029-95: Test Methods for Impact Resistance of Flat Rigid Plastic Specimens by Means of a Tup (Falling Weight) (Withdrawn 1995).
- .9 ASTM D4060-10: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- .10 ASTM D4541-09e1: Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- .11 ASTM E96/E96M-13: Standard Test Methods for Water Vapor Transmission of Materials.
- .12 ASTM E188-70: Recommended Practice for Operating Enclosed Carbon-Arc Type Apparatus for Light Exposure of Nonmetallic Materials (Withdrawn 1971).

.2 ULC Standards:
- .1 ULC: List of Equipment and Materials (current edition).
- .2 CAN/ULC-S102-10: Surface Burning Characteristics of Building Materials and Assemblies.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, cleaning procedures.

.3 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Provide copies of the material literature, clearly indicating conditions of acceptance for surfaces and methods of application on site before, and during, period of application of the work of this Section.

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit four (4) 400 x 200 mm samples of each colour and finish, coating applied to gypsum wallboard.

.5 Closeout Submittals:
- .1 Provide maintenance data for coatings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

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

.2 Apply coating of to one complete cell.

.3 Allow 72 hours for inspection of mock-up by Departmental Representative before proceeding with coating work.

.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .1 Deliver and store materials in manner to prevent damage.
- .2 Ensure materials remain in original wrapping and containers until used.
- .3 Deliver materials undamaged, in original containers, with manufacturer's labels and seals intact.
- .4 Store materials in protected conditions with a minimum temperature of 12°C.

1.6 SITE CONDITIONS

.1 Safety:
- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.
- .2 Ensure no open flame heating devices are used.

.3 Discourage occupancy of treated space until volatile materials are no longer being emitted and there is no odour.
.4 Provide adequate respiratory protection to exposed individuals.

.2 Ventilation:
.1 Provide ventilation continuously during and after coating application. Run system 24 hours per day during application; provide continuous ventilation for 7 days after completion of application.
.2 Ventilate enclosed spaces in accordance with Section 01 51 00.

.3 Temperature:
.1 Do not apply emulsion systems unless uniform minimum 10 degrees C air temperature at installation area for 24 hours prior to and after application.
.2 Maintain minimum temperature 10 degrees C within area of installation until final acceptance of building.

1.7 PROTECTION

.1 Protect adjacent surfaces from damage and over spray resulting from work of this Section. Mask or cover adjacent surfaces. Make good any damage at own expense, to the Departmental Representative's satisfaction.

.2 Post "Wet Coatings" and "No Smoking" signs while work is in progress and curing.

2 Products

2.1 MATERIALS

.1 Specialty Wall Coating (SWC-1): multi-layer, impact resistant, light stable flexible urethane wall coating comprising of the following:
.1 Base coat: a two component urethane membrane.
.2 First Topcoat: 2 component waterborne, aliphatic, polyurethane coating.
.3 Second Topcoat: 2 component waterborne, aliphatic polyurethane coating.
.4 Provide antimicrobial organic thione compound.
.5 Acceptable manufacturer and type and colour: as indicated in the Finish Schedule.

.2 Primer: as recommended by the manufacturer.

2.2 MIXES

.1 Mix coatings according to manufacturer's instructions.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Examine all surface conditions to which the work of this Section is to be applied. Report any deficient surfaces to the Departmental Representative.

3.3 PREPARATION

.1 Prepare surfaces in accordance with coating material manufacturer's instructions.

.2 Mask surrounding surfaces to provide neat, clean juncture lines, sound, clean and dry.

.3 Protect adjacent surfaces and equipment from damage by overspray.

.4 Prepare surfaces and apply in accordance with manufacturer's instruction. Remove sand, dust, dirt, oil, grease, wax, silicone, glue and other contaminates that may affect the bond of the application of the specialty wall coating and primer.

.5 Ensure surfaces are properly prepared, primed sealed and filled using specified primer.

.6 Concrete Block Surfaces:
- .1 Ensure that mortar joints have set for a minimum of 28 days prior to application of primer/block filler.
- .2 Remove all traces of efflorescence, loose mortar, mortar splatters, residues, oxidation powder and other foreign matter, by scrapping and wire brushing.
- .3 Fill all bug holes, cracks and irregularities and level with mortars as recommended by the coating manufacturer as appropriate for the existing conditions and as recommended by the manufacturer.

.7 Gypsum Board including ceilings:
- .1 Finish to a level 3 finish as specified in Section 09 21 16.

3.4 MIXING

.1 Thoroughly pre-stir each component separately to ensure that all solids are distributed throughout and components are consistent within themselves.

.2 Mix components in strict accordance with manufacturer’s recommendations, just prior to use and apply immediately.

3.5 APPLICATION

.1 Apply specialty coating over primed and prepared surfaces, in strict accordance with manufacturer’s recommendations. Apply primer to walls, ceilings, cell bench, detention door and frame and other surfaces in strict accordance with manufacturer’s recommendations.

.2 Cover and mask adjacent surfaces such as glass or other such surfaces to protect against contact with the material. Maintain on hand, suitable cleaning rags and cleaning solvent to remove accidental splashes.

.3 Cover and mask adjacent surfaces such as glass or other such surfaces to protect against contact with the material. Maintain on hand, suitable cleaning rags and cleaning solvent to remove accidental splashes.

.4 Apply specialty wall coating immediately after mixing the two components. The Basecoat may be applied using a 10 mm to 13 mm nap roller. Dip and roll the basecoat onto the wall surface at a thickness of 250 to 300 microns (wft). Immediately after rolling the coating on the wall, use a saturated nap roller to remove roller lines and drips. Finish roll on one direction only, picking the roller up between passes.

.5 Apply two layers of topcoat to ensure proper coverage and hiding of the Basecoat. Apply topcoat immediately after mixing the two components using a 6 mm to 10 mm nap roller. Dip and roll the topcoat onto the wall surface at a thickness of 101 to 152 microns (wft). Immediately after rolling the coating on the wall, use a saturated nap roller to remove roller lines and drips. Finish roll on one direction only, picking the roller up between passes.

.6 Application of the second coat of topcoat can begin once the first layer is cured.

.7 After application and prior to drying, remove masking tape in between each coat to avoid ‘ripping’ in the finished coating and let surfaces dry completely.

.8 Ensure that the finished surfaces match accepted samples, and maintain uniform thickness, sheen, colour, texture and free from defects detrimental to appearance or performance.

.9 Apply special wall coating to all surfaces as indicated, including, but not limited to walls, ceilings, benches, detention doors and frames and the like.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.7 CLEANING

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

.1 Clean surfaces to coating manufacturer's printed instructions.

.2 Promptly, as the work proceeds and upon completion, clean up excess materials and rubbish.

.3 Collect and contain spills with absorbent product. Discard in accordance with applicable regulations. Once hardened, remove products using mechanical methods only.

.4 Clean tools and brushes with manufacturer’s recommended cleaning solvent.

.5 Wash soiled hands and skin thoroughly in hot soapy water or use manufacturer’s recommended hand cleaner towels.

END OF SECTION

FIN_SCH-01 FINISH SCHEDULE

LEGEND	DESCRIPTION	MANUFACTURER	STYLE	COLOUR	COMMENTS
ACT-1	ACOUSTIC CEILING TILE - 610 x 1220mm, 15/16" SQUARE LAY-IN MEDIUM TEXTURE TILE C/W SUSPENSION SYSTEM	ARMSTRONG OR EQUIVALENT	CORTEGA	WHITE	
CG-1	CORNER GUARD - 304 STAINLESS STEEL, 89mm X 89mm	C/S GROUP OR EQUIVALENT	CO-8	STAINLESS STEEL	
CPT-1	CARPET TILE (FIELD), 24X24, SOLUTION DYED, RECYCLED VINYL MODULAR BACKING SYSTEM	TANDUS OR EQUIVALENT	NANO - 04539, ER3 DRY BACK	RAW MINERAL - 48203	INSTALL METHOD - UNDIRECTIONAL
DP-1	DECORATIVE PANEL - 8mm HIGH PRESSURE COMPACT LAMINATE PANEL C/W WALL MOUNTING SYSTEM (NO VISIBLE FASTENERS)	TRESPA / GECKO WALL SYSTEM (ATS) OR EQUIVALENT	METEON - EXTERIOR - SATIN FINISH	ITALIAN WALNUT NW08/MT	
GT-1	GROUT WALL	MAPEI	-	01 ALABASTER	PWT-1 & GWT-2
GT-2	GROUT FLOOR/WALL	MAPEI	-	02 PEWTER	PFT-1 & GWT-1
GWT-1	GLASS WALL TILE, 2X12	INTERSTYLE (TIERRA SOL) OR EQUIVALENT	GLASSHUES (GLOSSY)	LOW CLOUD	GT-2
GWT-2	GLASS WALL TILE, RANDOM INTERLOCKING MOSAIC TILE, 12X12 SHEET	DALTILE OR EQUIVALENT	COLOR WAVE CLASSIC BLENDS	EVENING MIXER CW28	GT-1
M-1	MELAMINE	-	-	WHITE	
PF-1	PRIVACY WINDOW FILM - 0.05mm THICK DUSTED ETCHED TRANSLUCENT, MATTE FILM W/PERMANENT ADHESIVE	3M OR EQUIVALENT	SCOTCHCAL ELECTROCUT GRAPHIC FILM	7225-314	REFER TO INTERIOR ELEVATIONS
PFT-1	PORCELAIN FLOOR TILE (FIELD), 6X24, 12X24 UNGLAZED RECTIFIED, MIN. DCOF RATING - 0.42	OLYMPIA TILE OR EQUIVALENT	ROCK SERIES	GRIGIO (GREY) (OL.RK.GRG.1224.N)	6X24 TILE IN VESTIBULE FOR BOARDER AROUND WM-1. GT-2
PL-1	PLAM HORIZONTAL	PIONITE	-	AV250 PASSIN THROUGH	
PL-2	PLAM VERTICAL	FORMICA	-	8849-58 NATURAL TEAK	
PL-3	PLAM HORIZONTAL BOH	NEVAMAR	-	GLACIER II GC7002T	BACK OF HOUSE
PL-4	PLAM VERTICAL BOH	WILSONART	-	7964K-12 SKYLINE WALNUT	BACK OF HOUSE

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project

GOVERNMENT OF CANADA

NEW BUILDING

Revision _____ YYYY.MM.DD _____

Title

FINISH SCHEDULE SECTION 09 99 99

Project No. 144202690

Reference Sheet

Figure No. FIN_SCH-01

FIN_SCH-02 FINISH SCHEDULE

LEGEND	DESCRIPTION	MANUFACTURER	STYLE	COLOUR	COMMENTS
PL-5	PLAM HORIZONTAL	PIONITE	-	GRAVEYARD OF THE ATLANTIC AG611	WASHROOM VANITIES
PT-1	PAINT (FIELD) - WALL	SCUFFMASTER	SCRUBTOUGH (EGGSHELL)	TO MATCH 29-31 FULL MOON (PRATT & LAMBERT)	
PT-2	PAINT DOORS/FRAMES	SHERWIN WILLIAMS	SEMI-GLOSS	SW 7051 ANALYTICAL GRAY	
PT-3	PAINT CEILINGS/BULKHEADS	GENERAL PAINT	EGGSHELL	CLW 1042W MISTAYA	
PT-4	PAINT CEILING/BULKHEADS	GENERAL PAINT	SEMI-GLOSS	CLW 1042W MISTAYA	
PT-5	PAINT ACCENT	SCUFFMASTER OR EQUIVALENT	SCRUBTOUGH (EGGSHELL)	TO MATCH SW 6235 FOGGY DAY	
PT-6	PAINT (ACCENT) - WALL	SCUFFMASTER OR EQUIVALENT	SCRUBTOUGH (EGGSHELL)	TO MATCH SW 7011 CREWEL TAN	
PT-7	PAINT - CELL BLOCK DOORS/FRAMES	-	ELECTROSTATIC	TO MATCH SHERWIN WILLIAMS SW 6236 GRAYS HARBOR	
PT-8	PAINT - EXTERIOR DOORS/FRAMES	SHERWIN WILLIAMS	SEMI-GLOSS	SW 7019 GAUNTLET GRAY	
PWT-1	GLAZED PORCELAIN WALL TILE, 12X24, POLISHED, RECTIFIED	OLYMPIA TILE OR EQUIVALENT	NIAGARA FALLS	WHITE (QT.NF.WHT.1224)	GT-1
RCB-1	RUBBER COVE BASE, 4"h	ROPPE OR EQUIVALENT	PINNACLE - TYPE TS 1/8"	P114 LUNAR DUST	
RES-1	RESILIENT FLOORING	FORBO OR EQUIVALENT	MARMOLEUM, VIVACE	3420 SURPRISING STORM	
RRF-1	RECYCLED RUBBER FLOOR - SHEET, 3/8" THICK, 10% COLOR	ROPPE OR EQUIVALENT	RECOIL	131 BISQUE	

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision

YYYY.MM.DD

Title
FINISH SCHEDULE SECTION 09 99 99

Project No.
144202690

Reference Sheet

Figure No.
FIN_SCH-02

FIN_SCH-03 FINISH SCHEDULE

LEGEND	DESCRIPTION	MANUFACTURER	STYLE	COLOUR	COMMENTS
SC-1	SEALED CONCRETE FLOOR	REFER TO SPECIFICATIONS	-	CLEAR COAT	
SFC-1	SPECIALTY FLOOR COATING, INCLUDES 6" COVE UP WALL	STONHARD OR EQUIVALENT	STONKOTE GS4	SILVER GRAY	
SFC-2	SPECIALTY FLOOR COATING, INCLUDES 6" COVE UP WALL. CELLS C/W SMOOTH COVE BASE FOR THE FRONT/SIDE FACE OF CONCRETE BUNK, INCLUDING 6" COVE WHEREVER THE TOP OF THE BUNK MEETS THE WALL	STONHARD OR EQUIVALENT	STONSHIELD SLT (MEDIUM TEXTURE)	FLAGSTONE	COLOR TBC WITH PRODUCT SAMPLES
SFC-3	SPECIALTY FLOOR COATING, INCLUDES 6" COVE UP WALL	STONHARD OR EQUIVALENT	STONKOTE GS4 (W/BROADCAST AGGREGATE)	SILVER GRAY	
SHC-1	SHOWER CURTAIN - ANTIMICROBIAL VINYL	AMERICAN SPECIALITIES OR EQUIVALENT	-	WHITE	
SHR-1	SHOWER ROD - BREAK AWAY	AMERICAN SPECIALITIES OR EQUIVALENT	-	STAINLESS STEEL	
STS-1	STAINLESS STEEL - 16 GAUGE, TYPE 304	ASM INDUSTRIES OR EQUIVALENT	-	STAINLESS STEEL	
SWC-1	SPECIALTY WALL COATING, HIGH PERFORMANCE, HIGH GLOSS PIGMENTED WALL SYSTEM C/W AN ACRYLIC BLOCK FILLER & EPOXY BASED PRIMER SYSTEM FOR CEILING APPLICATION	STONHARD OR EQUIVALENT	STONGLAZE VSR	ASH GRAY	COLOR TBC WITH PRODUCT SAMPLES
SWC-2	SPECIALTY WALL COATING, GENERAL SERVICE COATING	STONHARD OR EQUIVALENT	STONKOTE GS4	CHARCOAL	USE WITH STENCIL FOR CELL ROOM NUMBERS
TP-1	TOLIET PARTITION/VISION SCREEN - POWDER COAT STEEL, FLOOR BRACED	SHANAHAN OR EQUIVALENT	-	415 NORTHERN STAR	

Stantec
325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision

YYYY.MM.DD

Title
FINISH SCHEDULE SECTION 09 99 99

Project No.
144202690

Reference Sheet

Figure No.
FIN_SCH-03

FIN_SCH-04 FINISH SCHEDULE

LEGEND	DESCRIPTION	MANUFACTURER	STYLE	COLOUR	COMMENTS
WM-1	WALK OFF MAT - 7/16"d ROLL BACK MAT W/NO FRAME C/W HEAVY DUTY CARPET INSERT & SQUARE VINYL END TRIMS	C/S PEDISYSTEMS OR EQUIVALENT	PEDIMAT (M1) C/W MONOTUFT HD INSERT	WROUGHT IRON 7325	
WP-1	WALL PROTECTION - RIGID HIGH-IMPACT SHEET, 1.5mm (0.60") C/W MATCHING ACCESSORY MOLDINGS (INSIDE/OUTSIDE CORNERS, TOP CAPS, DIVISION STRIPS)	KOROSEAL OR EQUIVALENT	KOROGARD ETS	MIST	
WP-2	WALL PROTECTION - SEMI-RIGID PVCu SHEET, 2.5mm (0.10") C/W MATCHING ACCESSORIES (VINYL WELDING ROD, JOINT & TRANSIITION STRIPS AND TRIM)	ALTRO OR EQUIVALENT	WHITEROCK (MATTE)	STANDARD WHITE W103/00	

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision YYYY.MM.DD

Title
FINISH SCHEDULE SECTION 09 99 99

Project No. 144202690
Reference Sheet
Figure No. FIN_SCH-04

RM_SCH-01 ROOM FINISH SCHEDULE

ROOM No.	CEILING	FLOOR	BASE	WALL				COMMENTS
				NORTH	EAST	SOUTH	WEST	
T/O SLAB (MAIN)								
101	PT-3	PFT-1/WM-1	PFT-1	-	-	DP-1	-	
102A	PT-3	PFT-1	PFT-1	PT-1	PT-1	PT-1	PT-1	
103	PT-4	PFT-1	PFT-1	PT-1	PWT-1/GWT-2	PWT-1/GWT-2	PT-1	REFER TO WASHROOM TILE ELEVATION FOR DETAILS
104	ACT-1	CPT-1	RCB-1	PT-6	PT-6	PT-6	PT-6	
105	ACT-1	CPT-1	RCB-1	PT-1	PT-1	PT-1	PT-6	
106	ACT-1	CPT-1	RCB-1	PT-1	PT-1	PT-1	PT-6	
107	ACT-1	RES-1	RCB-1	PT-1	-	-	PT-1	
107A	ACT-1	RES-1	RCB-1	PT-1	PT-1/WP-1	-	-	
108	ACT-1	RES-1	RCB-1	PT-1/WP-1	PT-1/WP-1	PT-1/WP-1	PT-1/WP-1	WP-1 - 1200 AFF
109	ACT-1/PT-3	RES-1	RCB-1	PT-1	PT-1	PT-1/GWT-1	PT-1	REFER TO MILLWORK ELEVATION FOR DETAILS
110	ACT-1	CPT-1	RCB-1	PT-1	PT-1	PT-5	PT-1	
111	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-5	PT-1	
112	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
113	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-5	PT-1	
114	ACT-1	SC-1	RCB-1	PT-1	PT-1	PT-1	PT-1	PROVIDE INTUMESCENT PAINT AS REQUIRED FOR ELEC PANELS
115A	SWC-1	SC-1	RCB-1	SWC-1	SWC-1	SWC-1	SWC-1	
115B	SWC-1	SC-1	RCB-1	SWC-1	SWC-1	SWC-1	SWC-1	
116A	SWC-1	SFC-3	SFC-3	-	SWC-1	SWC-1	SWC-1	
116B	EXP	SFC-3	SFC-3	SWC-1	-	-	-	
116C	EXP	SFC-3	SFC-3	SWC-1	-	-	SWC-1	
116D	EXP	SFC-3	SFC-3	SWC-1	SWC-1	SWC-1	-	
116E	EXP	SFC-3	SFC-3	SWC-1	SWC-1	SWC-1	SWC-1	
117	ACT-1	RES-1	RCB-1	-	-	PT-1/WP-1	PT-1/WP-1	WP-1 - 1200 AFF
118	PT-3	PFT-1/WM-1	PFT-1	PT-1/WP-1	PT-1/WP-1	PT-1/WP-1	PT-1	WP-1 - 1200 AFF
119	ACT-1	RES-1	RCB-1	-	PT-1/WP-1	PT-1/WP-1	-	
120	PT-3	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
121	EXP	SC-1	RCB-1	PT-1	PT-1	PT-1	PT-1	PROVIDE INTUMESCENT PAINT AS REQUIRED FOR ELEC PANELS
122	EXP	SC-1	RCB-1	PT-1	PT-1	PT-1	PT-1	

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision

YYYY.MM.DD

Title
ROOM FINISH SCHEDULE SECTION 09 99 99.10

Project No.
144202690

Reference Sheet

Figure No.
RM_SCH-01

RM_SCH-02 ROOM FINISH SCHEDULE

ROOM No.	CEILING	FLOOR	BASE	WALL				COMMENTS
				NORTH	EAST	SOUTH	WEST	
T/O SLAB (MAIN)								
123	PT-4	SFC-2	SFC-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/GWT-2	PT-1 BEHIND LOCKERS, WP-2 IN SHOWER/CHG ENCLOSURE. REFER TO WASHROOM TILE ELEVATION FOR DETAILS.
123A	PT-4	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
124	ACT-1	RRF-1	RCB-1	PT-6	PT-1	PT-1	PT-1	
125	PT-4	SFC-2	SFC-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/ GWT-2	PT-1/PWT-1/GWT-2	PT-1 BEHIND LOCKERS, WP-2 IN SHOWER/CHG ENCLOSURE. REFER TO WASHROOM TILE ELEVATION FOR DETAILS.
125A	PT-4	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
126	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
127	ACT-1	CPT-1	RCB-1	PT-1	PT-1	PT-1	PT-6	
130	ACT-1	RES-1	RCB-1	-	PT-1/WP-1	PT-1/WP-1	PT-1/WP-1	WP-1 - 1200 AFF
131	ACT-1	SFC-1	SFC-1	PT-1	PT-1/WP-1	PT-1/WP-1	PT-1	WP-1 - 1200 AFF
132	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
133	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
134	ACT-1	RES-1	RCB-1	PT-1	PT-1	PT-1	PT-1	
136	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
140	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
141	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
142	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
144	SWC-1	SFC-3	SFC-3	SWC-1	SWC-1	SWC-1	SWC-1	
146	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
147	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
148	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
149	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
150	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
151	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
152	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
153	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	
154	SWC-1	SFC-2	SFC-2	SWC-1	SWC-1	SWC-1	SWC-1	

Stantec

325 - 25 ST SE /
CALGARY, AB T2A 7H8

Client/Project
GOVERNMENT OF CANADA

NEW BUILDING

Revision

YYYY.MM.DD

Title
ROOM FINISH SCHEDULE SECTION 09 99 99.10

Project No.
144202690

Reference Sheet

Figure No.
RM_SCH-02

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Unit Masonry

.2 Section 04 22 00 - Concrete Unit Masonry

1.2 REFERENCES

.1 Aluminum Association (AA)
  .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 CSA Group
  .1 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
  .2 CSA W59.2-M1991(R2013), Welded Aluminum Construction.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for signage and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
  .1 Submit catalogue sheets full size templates.
  .2 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods, schedule of signs.
  .3 Submit drawn-to-scale details for individually fabricated signage indicating word and letter spacing, fonts, sizes, colours, logos.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for signs for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Welding Certification in accordance with CSA W47.2.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Sheet aluminum: 3 mm thick aluminum sheet, utility quality.

2.2 SIGN GRAPHICS

.1 Sign graphics: well defined, arranged for balanced appearance, and properly word and letter spaced as indicated on the drawings and reviewed shop drawings.

.2 Self-stick vinyl film: individual letters and numerals and logos die cut from 0.1 mm thick integral colour, matte finish, exterior grade PVC film, with self-stick adhesive backing; colours and types as indicated on the drawings.

.3 Decals: silk screened or printed images on minimum 0.051 mm, matte finish, mylar or PVC film, with self-stick adhesive backing; logos as indicated on the drawings and reviewed shop drawings.
- .1 Protect image with laminated film overlay of same material as decal base.

2.3 FABRICATION

.1 Fabricate signs in accordance with details, specifications and shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 Exposed fasteners of same finish and colour as base material as indicated on the drawings.

.6 Apply bituminous paint to aluminum in contact with dissimilar metals, concrete or masonry.

.7 Manufacturer's nameplates on sign surface permitted in non visible locations in completed work.

3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Manufacturer's Instructions: compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
.2 Erect and secure signs plumb and level at elevations indicated and as directed by Departmental Representative.

.3 Comply with sign manufacturer's installation instructions and approved shop drawings.

.4 Mechanical attachment:
.1 To concrete or solid masonry: use lag screws and expansion bolts or screws and fibre plugs, as appropriate for stresses involved.
.2 To hollow masonry: use toggle bolts or equivalent.
.3 Secure into framing members behind stud walls or above ceilings.
.4 Mechanical fasteners on exterior: non-staining, non-ferrous type.
.5 Fabricate special fasteners as required for installation conditions.
.6 Mechanical fasteners and methods of attachment subject to Departmental Representative's approval.

3.3 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Leave signs clean.
.2 Touch up damaged finishes.

END OF SECTION

1 General

1.1 REFERENCES

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

.2 ASTM International
.1 ASTM A123/A123M-13: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A276/A276M-15: Standard Specification for Stainless Steel Bars and Shapes.
.3 ASTM A385/A385M-11e1: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
.4 ASTM B209-14: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
.5 ASTM B209M-14: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].
.6 ASTM B210-12: Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
.7 ASTM B210M-12: Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes [Metric].

.3 CSA International
.1 CAN/CSA-G40.20-13: General Requirements for Rolled or Welded Structural Quality Steel.
.2 CAN/CSA-G40.21-13: Structural Quality Steels.
.3 CSA W47.1-09(R2014): Certification of Companies for Fusion Welding of Steel.
.4 CSA W47.2-11: Certification of Companies for Fusion Welding of Aluminum.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.3 Shop Drawings:
.1 Indicate following items:
.1 Each type of sign, including dimensions, shapes, colours, lettering, logos, finishes.
.2 Posts and anchorage.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

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

2 Products

2.1 DESIGN CRITERIA

.1 Sign supports to be capable of withstanding the combination of following loads:
- .1 Wind loads in any direction on signboards and on sign supports, as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010 for the Elk Point area.
- .2 Dead load of signboards and sign supports.
- .3 Ice load on face of signboards and around surface of structural members.

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

2.2 MATERIALS

.1 Sign supports:
- .1 Steel posts: to CSA G40.21, 4 m long, flanged "U" shaped in cross section, measuring 65 mm wide x 30 mm deep. Metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M, minimum zinc coating 600 g/m^2.
- .2 Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for overhead sign installations: fabricate from 304 stainless steel as specified in ASTM A276.
- .3 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.

.2 Signboards:
- .1 Aluminum sheet: to ASTM B209M, precut to required dimensions.
  - .1 Thickness for signboards up to 750 mm wide: 1.6 mm minimum.
  - .2 Thickness for signboards 750-1200 mm wide: 2.1 mm minimum.
- .2 Aluminum extrusions: to ASTM B211M, 150 mm or 300 mm panels suitable for bolting together.
- .3 T-shape stiffeners for signboards: to ASTM B210M.
- .4 Connecting straps and brackets: to ASTM B209M.
- .5 Aluminum materials: to ASTM B209M.
- .6 Silk screen ink:
  - .1 Transparent or opaque colours: selected by Departmental Representative, or as indicated.

.7 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.

.8 Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.

2.3 FABRICATION

.1 Supports:

.1 Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted.

.2 Welds to be of same strength as adjacent member or casting.

.3 Reinforce in area of electrical hand holes to equal strength of full section member.

.4 Remove sharp edges and burrs.

.2 Signboards:

.1 Aluminum blanks:

.1 Degrease, etch and bonderize with chemical conversion coating.

.2 Clean surfaces with xylene thinner. Dry.

.3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.

.4 For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with MPI-EXT 5.4A.

.2 Reflective background sheeting and lettering:

.1 Cut and apply in accordance with manufacturer's instructions.

.2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.

.3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.

.4 Reflective signboard faces may be prepared using silk screen transparent ink.

.3 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint or silk screen transparent ink.

.4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.

.3 Sign identification:

.1 Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

.4 Signage Read-Out: as indicated on the drawings or as otherwise directed by the Departmental Representative.

3 Execution

3.1 INSTALLATION

.1 Sign support:
  .1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
  .2 Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.
  .3 Erect posts plumb and square to details as indicated.
  .4 Single channel steel posts:
    .1 Drive to required depth without damage to posts.
    .2 If rock or concrete is encountered, drill hole to required depth and set post in sand.
    .3 In finished concrete surfaces, backfill with concrete or grout. Protect from adverse conditions until cured.

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

3.2 CORRECTING DEFECTS

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

3.3 CLEANING

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

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

3.4 PROTECTION

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

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

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 10 28 10 - Toilet and Bath Accessories

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A240/A240M-15a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM A480/A480M-14b, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip.
- .3 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 CSA International
- .1 CSA B651-12, Accessible Design for the Built Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for metal toilet compartments and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Installation Drawings:
- .1 Indicate fabrication details, plans, elevations, hardware, and installation details.

1.4 QUALITY ASSURANCE

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

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect metal toilet compartments from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Metal toilet partitions and urinal screens.
- .1 Sheet steel: commercial quality to ASTM A653/A653M with ZF001 designation zinc coating.
- .2 Minimum base steel thickness:
  - .1 Panels and doors: 0.8 mm.
  - .2 Pilasters: 1.0 mm.
  - .3 Reinforcement: 3.0 mm.
- .3 Headrails: 25 mm x 50 mm, clear anodized, extruded aluminum, anti grip design with internal steel reinforcement, preformed socket brackets.
- .4 Pilaster shoe: chrome plated non-ferrous, 0.8 mm stainless steel, 75 mm high.
- .5 Attachment: stainless steel tamperproof type screws and bolts.

2.2 COMPONENTS

.1 Hinges:
- .1 Heavy duty, nylon bushings non-lubricating.
- .2 Material/finish: chrome plated non-ferrous casting.
- .3 Swing: as indicated on the drawings.
- .4 Return movement: gravity, non-rising.
- .5 Adjustable to hold door open at any angle up to 90 degrees.
- .6 Emergency access feature.

.2 Latch set: built-in, combination latch, combination door-stop, keeper and bumper, chrome plated non-ferrous, emergency access feature.

.3 Wall and connecting brackets: chrome plated non-ferrous extrusion or casting.

.4 Coat hook: combination hook and rubber door bumper, chrome plated non-ferrous.

.5 Door pull: barrier-free type suited for out swinging doors, chrome plated non-ferrous.

2.3 FABRICATION

.1 Doors, panels and screens: 25 mm thick, two steel sheets faces pressure bonded to honeycomb core, to sizes indicated.

.2 Pilasters: 32 mm thick, constructed same as door, to sizes indicated.

.3 Include formed and closed edges for doors, panels and pilasters.
.1 Miter and weld corners and grind smooth.

.4 Include internal reinforcement at areas of attached hardware and fittings.
.1 Temporarily mark location of reinforcement for tissue holders and grab bars.

.5 Include 0.8 mm thick type 316 stainless steel protective shields on urinal side of toilet partition panels next to urinals and on urinal screens.
.1 Make protective shields 1000 mm high with top of shield 1200 mm above finished floor.
.2 Make shields to full width of partition or screen panel.
.3 Fasten with stainless steel screws.

2.4 FINISHES

.1 Clean, degrease and neutralize steel components with phosphate or chromate treatment.

.2 Finish with a high performance powder coating, baked on to provide a uniform smooth protective finish.

.3 Finish: doors and pilaster/panels same colour as selected by the Departmental Representative from manufacturer's standard colours.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal toilet compartment installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 PREPARATION

.1 Ensure supplementary anchorage, if required, is in place.

3.4 ERECTION

.1 Do work in accordance with CSA B651.

.2 Partition erection.
- .1 Install partitions secure, plumb and square.
- .2 Leave 12 mm space between wall and panel or end pilaster.
- .3 Anchor mounting brackets to masonry/concrete surfaces using screws and shields: blocking/backing must be provided to hollow walls using bolts and toggle type anchors.
- .4 Attach panel and pilaster to brackets with self-drilling screws with through type sleeve bolt and nut.
- .5 Allow for adjustment of floor-braced pilasters variations with screw jack through steel saddles made integral with pilaster.
  - .1 Conceal floor fixings with stainless steel shoes.
- .6 Equip doors with hinges, latch set, and each stall with coat hook mounted on door.
  - .1 Adjust and align hardware for easy, proper function. Set door open position at 30 degrees to front.
  - .2 Install door bumper door mounting.
- .7 Equip outswinging doors with door pulls on outside of door in accordance with CSA B651.
- .8 Install hardware and grab bars.

.3 Floor supported and overhead braced partition erection.
- .1 Attach pilasters to floor with pilaster supports, adjust and level, plumb, and tighten installation with levelling device.
  - .1 Secure pilaster shoes in position.
  - .2 Secure headrail to pilaster face with not less than two fasteners per face.
  - .3 Set tops of doors parallel with overhead brace when doors are in closed position.
- .2 Screens erection:
  - .1 Include urinal stall screens consisting of panel specified for toilet compartments.
  - .2 Anchor wall-hung screen panels to walls with 3 panel brackets and wing brackets.

3.5 ADJUSTING

.1 Adjust doors and locks for optimum, smooth operating condition.

.2 Lubricate hardware and other moving parts.

3.6 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

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

3.7 CLEANING

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
  .1 Clean surfaces after installation using manufacturer's recommended cleaning procedures.
  .2 Clean aluminum with damp rag and approved non-abrasive cleaner.
  .3 Clean and polish hardware and stainless components.

3.8 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal toilet compartment installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 ASTM International:
  .1 ASTM A240/A240M-15a: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for wall and corner guards and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Installation Shop Drawings:
  .1 Indicate on shop drawings large scale details, materials, finishes, dimensions, anchorage and assembly.

1.4 QUALITY ASSURANCE

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

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

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
  .1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wall and corner guards from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Corner Guards: surface mounted; type 304 stainless steel with No. 4 finish, 90° square corner, sizes and configurations as indicated in the Finish Schedule, lengths to be minimum 1200 mm unless indicated otherwise, Adhesive applied.

.2 Adhesive: water resistant type as recommended by the corner guard manufacturer for the applicable substrate.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wall and corner guards installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION

.1 Install units on solid backing and erect with materials and components straight, tight and in alignment.

.2 Adhere corner guards to substrate at locations indicated.

3.4 CLEANING

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

.2 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Clean surfaces after installation using manufacturer's written recommended cleaning procedures.

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by wall and corner guards installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

.2 Section 06 10 00 - Rough Carpentry

.3 Section 09 11 16 - Gypsum Board Assemblies

.4 Section 10 21 13.13 - Metal Toilet Partitions

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A240/A240M-15a: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .2 ASTM B456-11e1, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A924/A924M-14, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 CSA International
- .1 CSA B651-12, Accessible Design for the Built Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:

.1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
.2 Deliver special tools to Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A240/A240M, Type 302 or 304, with No. 4 finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: double roll type, surface mounted, chrome plated steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.

.2 Combination towel dispenser/waste receptacle: recessed wall unit, approximately 280 mm wide, 1375 mm high, 195 mm deep. Interior of 0.8 mm galvanized steel, exterior of 0.8 mm stainless steel. Suitable for dispensing folded or roll paper towels. Removable galvanized steel waste receptacle, lockable access door with continuous full height stainless steel hinge.

.3 Soap dispenser: liquid push-in valve 152 mm spout, self contained 1.14 L tank, stainless steel piston and valve assembly, tamper proof filler lock, surface mounted and counter mounted where indicated, exposed metal components chrome plated.

.4 Feminine napkin/tampon dispenser: stainless steel surface, min capacity 15 napkins and 20 tampons, free operation, key locked, continuous hinge front panel.

.5 Feminine napkin disposal bin: stainless steel, surface unit, continuous hinged door, self closing, embossed with "napkin disposal" or universally accepted symbol, removable stainless steel receptacles fitted with spring clip for deodorizer block.

.6 Shower curtain: anti-bacterial fire resistive self extinguishing vinyl laminated fabric shower curtain. Provide curtain hold-back hook and chain at each curtain.

.7 Shower rods: stainless 38 mm diamater, 2 mm wall thickness steel tubing of required length with satin chrome finished flanges, 12 shower curtain hooks and curtain hold-back hook and chain. Shower rod material and anchorage to withstand downward pull of 0.9 kN.

.8 Shower seat: wall mounted folding hinged, moulded type with anti-microbial slats.

.9 Grab bars: 30/32 mm diameter, 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN. Lengths as indicated on the drawings.

.10 Soap holder: surface mounted, 5 mm thick stainless steel dished tray, self draining, flush screws.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to ASTM A924/A924M.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

.1 Chrome and nickel plating: to ASTM B456, satin finish.

.2 Manufacturer's or brand names on face of units not acceptable.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
- .1 Stud walls: install steel back-plate or 19 mm thick plywood to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
- .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
- .3 Toilet and shower compartments: use male to female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

.5 Install mirrors in accordance with Section 08 80 50 - Glazing.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.6 SCHEDULE

.1 Locate accessories where indicated. Exact locations determined by Departmental Representative.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-44.40-01, Steel Clothing Locker.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets for metal lockers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Indicate on drawings: type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, tops, hooks, shelves, bases, trim, numbering, filler panels, doors, handles, locking method, ventilation method and finishes.

.4 Samples:
.1 Submit four (4) 50 x 50 mm samples of colour and finish on actual base metal.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect metal lockers from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 CLOTHES LOCKERS

.1 Lockers: to CAN/CGSB-44.40, Type 1-Single full-height locker, Class 2 - A bank of two or more lockers, freestanding.
- .1 Size: 558 mm wide x 558 mm deep x 1829 mm high, steel thickness No. 16 MSG.
- .2 Assembly: welded construction.
- .3 Top: flat.
- .4 Doors: one-piece double-wall envelope construction, steel thickness No .20 MSG.
- .5 Door handle: recessed handle steel with bright chromium finish.
- .6 Accessories:
  - .1 Locking system: padlocks.
  - .2 Options: to CAN/CGSB-44.40, steel trim including corner angles, fillers to match locker finish , number plates, 3 chrome plated coat hooks per locker, one hat shelf per locker.
- .7 Finish:
  - .1 Clean, degrease and neutralize in an automatic wash process and iron phosphatized for positive paint adhesion, follow with minimum 1 mm thick powder coat finish in colour as selected by the Departmental Representative from the manufacturer’s standard colour selection.

2.2 GUN AND EVIDENCE LOCKERS

.1 Gun Lockers:
- .1 Wall mounted handgun lockers.
- .2 Surface mounted, 6 compartment.
- .3 648 mm wide x 368 mm high x 165 mm deep.
- .4 Locks keyed differently.
- .5 3 mm neoprene lining on shelves.
- .6 38 mm trim frame.
- .7 Textured powder coat finish; colour as selected by the Departmental Representative.
- .8 Acceptable Product: Model EDHGS06 as manufactured by Spacesaver Corporation or preapproved product.

.2 Evidence Lockers:
- .1 Room 146: Modules 610 mm deep, 915 mm wide x 2080 mm high.
- .2 Non-pass through.
- .3 Vented, rigid welded, 14 gauge top, bottom and sides, 16 gauge reinforced doors.
- .4 Lockable.
- .5 Standard colour range, minimum 5 colours will be selected.
- .6 Acceptable Product: Sentinel Evidence Lockers or preapproved product.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive metal lockers previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal locker installation.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions. Install metal lockers on wood bases; coordinate with Section 06 10 00.

.2 Securely fasten lockers to grounds and nailing strips.

.3 Install wall trim around recessed locker banks.

.4 Install filler panels (false fronts) where indicated and where obstructions occur.

.5 Install finished end panels to exposed ends of locker banks.

.6 Install locker numbers.

3.3 ADJUSTING

.1 Adjust metal lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

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

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

3.5 PROTECTION

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

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

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast In Place Concrete

1.2 REFERENCES

.1 The Aluminum Association (AA)
  .1 AA DAF-45-R2003, Designation System for Aluminum Finishes - 9th Edition.

.2 ASTM International
  .1 ASTM B241/B241M-12e1, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for flag poles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
  .2 Indicate dimensions, finishes, base jointing, anchoring and support systems, cleats, halyard boxes, trucks, finials and base collar for flagpoles.
  .3 Submit 4 copies of drawings of flagploes and bases, showing general layout, jointing and complete anchoring and supporting systems.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions for each type of flagpole.

1.4 QUALITY ASSURANCE

.1 Provide each flagpole as complete unit produced by single manufacturer, including fittings, accessories, bases and anchorage devices.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  .1 Spiral wrap each flagpole with heavy kraft paper, wood strip and steel band, or polyethylene wrap and pack in tubing for shipment.

.2 Ship flagpole to installation site in one piece. When more than one piece is required, provide precision joints with self aligning internal splicing sleeve arrangement.

.3 Storage and Handling Requirements:
- .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect flagpoles from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Aluminum:
- .1 Aluminum Association alloy AA 6063-T5 seamless extruded aluminum tubing.
- .2 Fabricated from seamless extruded tubing in accordance with ASTM B241, alloy 6063 T6, having minimum tensile strength not less than 20 MPa and a yield point of 17 MPa. Heat treated and age hardened after fabrication.

.2 Isolation coating: alkali-resistant bituminous paint or epoxy resin solution.

2.2 DESIGN CRITERIA

.1 Flagpole, bases and anchorage devices to resist minimum wind velocity as outlined in the Alberta Building Code 2014 and National Building Code of Canada 2010 for the Elk Point area.

.2 Description:
- .1 Exposed Height: 7.5 m.
- .2 Butt Diameter: 100 mm.
- .3 Top Diameter: 60 mm.
- .4 Wall Thickness: 3.17 mm.
- .5 Flag Size: 914 mm x 1829 mm.

2.3 FABRICATION

.1 Fabricate flagpoles as complete unit including base anchorage and fittings.

.2 Cone tapered flagpole:
- .1 Seamless, uniform, straight line tapered section above cylindrical butt section.
- .2 Taper: uniform taper from 100 mm at bottom to 60 mm at top.
- .3 Provide internal splicing, self-aligning sleeve of same material as flagpole for snug fitting, watertight field joints.

2.4 ACCESSORIES

.1 Finial: 150 mm diameter ball.

.2 Provide revolving and non-fouling truck (with either sealed or ball bearings); stainless steel neoprene covered counterweight, lockable internal halyard; stainless steel aircraft control cable for flag halyard; nylon or brass pulleys; and lightning protection ground spike conforming to CAN/CSA B72.

.3 Cleat box: one per cleat. Furnish hasp for padlock, hinged cover, and tamperproof screws. Include lockable cleat box.

2.5 FINISHES

.1 Aluminum:
  .1 Finish exposed surfaces of aluminum components in accordance with AA DAF-45. Finish to be satin brushed “Sateen” textured finish.

2.6 FIELD FABRICATION

.1 Fabricate fixed ground-set foundation assembly for flagpole in accordance with manufacturer’s recommendations to accommodate local wind speeds and all other superimposed loading.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for flagpole installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
  .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 INSTALLATION

.1 Shop apply isolation coating to metal surfaces of flagpole and base.

.2 Check and adjust installed fittings for smooth operation of halyards.

3.4 CLEANING

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by flagpole installation.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 52 00 - Modified Bituminous Roofing

1.2 REFERENCES

.1 Alberta Occupational Health and Safety Part 9 2009 July 1 Revision.

.2 ASTM International:
.1 ASTM A666-15: Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.3 Occupational Health And Safety:
.1 29 CFR 1910.23: Occupational Health and Safety Standards for General Industry.
.2 29 CFR 1926: Safety and Health Regulations for Construction, Subpart M-Fall Protection.

.4 CSA Standards:
.1 CSA Z259.2.2-14: Self Retracting Lifelines.
.2 CAN/CSA259.12-11: Connecting Components for Personal Fall Arrest Systems.
.3 CSA Z259.13-04 (R2014): Flexible Horizontal Lifeline Systems.
.4 CSA Z259.16-04 (R2014): Design of Active Fall Protection Systems.

1.3 DESIGN REQUIREMENTS

.1 Fall Protection System: ensure Fall Protection Systems allows user(s) to walk uninterrupted the entire length of the system with secure anchorage to arrest a fall. Provide system compete with all components for a fully operational system.

.2 Performance: Must comply or exceed the requirements of Alberta Occupational Health and Safety Part 9 requirements including:
.1 CSA Z259.16-04 (R2014): Design of Active Fall Arrest Systems.
.2 CSA Z259.13-04 (R2014). Flexible Horizontal Lifeline Systems.
.3 CSA Z259.2.2-14: Self Retracting Lifelines.

.3 Structural Performance:
.1 Design system provide all equipment for 2 simultaneous users, design system for a typical user mass of 310lbs (140kgs) each.
.2 Provide system designed as an integral energy absorber that limits loads at each anchorage to 2,248 lbs (10 kN) in the event of a fall.
.3 Provide load limiting in-line shock absorber to maximum 2300 pounds for multi-span or single span systems. Provide shock absorber which visually display deployment in the event a load such as a fall has occurred on the system.
.4 Design connection to the existing structure to support a load on the system of 2 times the maximum design load without failure.
.5 No Roof Penetrations allowed.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for fall arrest and restraint devices and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Indicate preparation instructions and recommendations.
- .3 Indicate storage and handling requirements and recommendations.
- .4 Indicate installation methods.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.
- .2 Indicate plans and details of entire fall protection layout, showing member sizes and part identification, fasteners, anchors, fittings and evidence of compliance with structural performance requirements.
- .3 Provide manufacturer's certifications that the ultimate strength of the fall protection system is equal to or greater than those specified.

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

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for fall arrest and restraint devices for incorporation into manual.

.3 Operation and Maintenance Data:
- .1 Include parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying part numbers.
- .2 Include technical information for servicing equipment.
- .3 Include legible as-built schematic of installed system. Include manufacturer's serial number, name and part number of each individual component used in the systems.
- .4 Include detailed operating procedures indicating proper use of equipment for safe operation of the system. Provide fall protection plan, and rescue plan as dictated by OH&S Alberta Part 9 (143.1). Training to be provided in conjunction of the design, and supply of all required equipment.
- .5 Installer to be an approved fall protection trainer and provide ACSA approved Industrial End User Fall protection Training for 16 workers. Training to be completed within 1 month of project completion.
- .6 Installer to provide two on-site system orientations for up to 16 workers. Training to be completed before system certified for use.

.7 Rescue training to be provided upon turnover of project to the Departmental Representative. Schedule at the Departmental Representative's discretion.

1.6 QUALITY ASSURANCE

.1 Design Requirements:
- .1 Design rooftop safety system in accordance with the local codes and regulations including CSA and Alberta OH&S. Ensure shop drawings and design are signed and sealed by a professional engineer registered in the Province of Alberta and who is employed/contracted by a firm that has designed and installed at least five projects of similar construction and scope.
- .2 Installer Company must have a minimum of five years incorporated experience in fall arrest and restraint device design and installation.

.2 Manufacturer Qualifications: Manufacturer ISO Certification: ISO Certification certifying manufacturer's quality management system is currently registered to ISO 9001 quality standards.

.3 Installer Qualifications: Specializing in the Work of this section and trained and certified by the fall protection system manufacturer.

.4 Installation company to provide current manufacturer's certification, and have comprehensive liability insurance of $ 5 000 000 specifically for fall protection design and installation. WCB coverage to be indicative for installation and inspection of fall arrest systems under WCB Industry Code 42109.

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect fall arrest and restraint devices from damage.
- .3 Protect prefinished surfaces with wrapping.
- .4 Replace defective or damaged materials with new.

1.8 PRE-INSTALLATION MEETINGS

.1 Convene minimum one week prior to commencing work of this Section.

.2 Require attendance of persons directly involved with Work of this Section.

.3 Review schedule of installation, installation procedures and conditions, and coordination with related Work.

1.9 FIELD MEASUREMENTS

.1 Verify field measurements prior to fabrication.

1.10 MAINTENANCE SERVICE

.1 Furnish service and maintenance for fall protection system and components for a period of two years from Date of Substantial Performance of the Work with an option for extending maintenance service on an annual basis thereafter.

.2 All maintenance and service to be completed by an approved and currently certified manufacturer's representative. Company to be qualified in high angle rescue in the event of an emergency.

.3 Subcontractor to provide ACSA/OSSA Fall Protection training and recertification for 16 workers as required and incorporate costs into the annual certifications.

2 Products

2.1 MATERIALS

.1 All Self Retracting Lifelines in addition to being certified to CSA Z259.2.2, and tested to meet or exceed a minimum 610 mm arresting distance. Manufacturers to provide testing information.

.2 Harnesses to be tested for a minimum D-ring slippage of 500 mm, manufacturers to provide test data or letter of conformity.

.3 Requests for roof anchor substitutions will be considered in accordance with provisions of manufacturer and accepted by the Departmental Repesentative.

.4 All Fall Protection Training to be Alberta Construction Safety Association approved #6116 and meet the Oil Sands Safety Association guidelines as well.

2.2 FALL PROTECTION SYSTEM

.1 Components: All system connectors, cables and bolts stainless steel conforming to ASTM A 666, Type 316. Fabricated supports required for additional support of carbon steel with a corrosion resistant. Exposed material to painted in two part epoxy paint, or Hot Dipped Galvanized or electroplated in accordance with ASTM 153A Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
    .1 Posts: Provide complete with required components including:
        .1 End Anchors.
        .2 Variable anchors.
        .3 Intermediate Anchors.
        .4 Corner anchors.
        .5 End anchors.
    .2 Tension Indicator: Provide system with a tension indicator that will allow the user to physically inspect that the correct cable tension is achieved.

.3 Cable: Stranded marine grade 316 stainless steel cable 8mm with a minimum breaking strength of 10100 pounds and sized for system design complete with swaged ends and clevises and turnbuckle assemblies. No substitutions allowed.
.4 Cable Corner Brackets: Provide one piece 90 degree brackets.
.5 Variable cable bracket: Provide variable cable brackets for cable turns of 0 to 80 degrees.
.6 D-Ring and Hanger: Provide as required for intermediate cable support.
.7 Material Control: Identify all system components with individual serial numbers, permanently stamped or engraved, identifying the component and this specific project.
.8 Two sets of equipment including Transfasteners to be provided for each location.

.2 Post Base Plate Connectors: Provide complete with required components for weatherproof mounting to the following surfaces:
.1 Modified Bituminous Roofing.

.3 Accessories: Provide accessories for 2 workers at each location such as fall harness and lanyards as required for each designed user.
.1 Deceleration Device: Appropriate length lanyards that meet or exceed applicable standards of CAN/CSA .Z259.11.05
.2 Harnesses: Full body harnesses with single back D-ring that meet or exceed applicable standards of CAN/CSA .Z259-10.
.3 Z259.2.2 Self-Retracting Devices for Personal Fall-Arrest Systems.

2.3 FABRICATION

.1 Fabricate all components prior to delivery so that only limited assembly and drilling is required on site.

.2 Provide system components of same material unless otherwise indicated.

.3 Ensure exposed work is true to line and level with accurate angles, surfaces and with straight square edges.

.4 Coordinate and confirm system location with the Departmental Representative.

.5 Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.

.6 Fabricate joints in a manner to discourage water accumulation. Provide weep holes to drain any water, which could accumulate in the exposed joints.

.7 All exposed metals onsite to be provided with anti corrosion paint.

3 Execution

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 Verify that fall arrest system is a minimum of 2 m from any edge and that the design coincides with manufacturer's design protocols and CSA Z259.16 Design of Active Fall Arrest Systems.

.3 Verify that roof surface is suitable for intended purpose.

.4 If substrate preparation is the responsibility of another installer, notify Departmental Representative of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Before installation, inspect all parts to insure no damaged parts are used.

.3 Constant force posts must be secured to roof surface with waterproof mechanical connectors as accepted by the Departmental Representative.

.4 All roof anchors must be secured to all other components and to base with mechanical connectors.

.5 Install equipment with no irregularities or projections capable of inflicting personal injury. Finished surfaces and edges of all accessible parts must be regular and smooth.

.6 Isolate dissimilar materials as required to prevent electrolytic corrosion.

.7 After installation, check system for signs of corrosion, wear, deformation and other defects to all system components.

3.4 MANUFACTURER'S FIELD SERVICES

.1 Provide testing and certification under supervision of the fall protection manufacturer or original installer.

.2 Examine system components annually. Clean, inspect and adjust and recertify the equipment and overall system in accordance with manufacturer's requirements.

.3 Repair or replace parts whenever required. Use manufacturer's parts produced by manufacturer of original equipment. NO SUBSTITUION ALLOWED.

.4 Provide emergency call back service at all hours for this maintenance period.

.5 Perform maintenance work using competent and qualified personnel under supervision of the fall protection manufacturer or original installer.

3.5 OPERATOR TRAINING

.1 Provide a minimum of 4 hours of operator training after system has been installed and tested. Training is to be for the users of the system conducted at the installation site.

3.6 PROTECTION

.1 Protect installed products until completion of project.

.2 Touch-up, repair or replace damaged products before Substantial Performance of the Work.

.3 Ensure all surfaces exposed by Installer are properly protected.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for foot mats and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit maintenance data in the form of manufacturer’s printed instructions for cleaning and maintaining foot mats.

.3 Samples:
- .1 Provide four (4) 450 mm^2 samples of foot mats, in colour selected by the Departmental Representative.

.4 Shop Drawings:
- .1 Submit shop drawings showing layout of mats and frames, including details of construction relative to materials, direction of traffic, spline locations, profiles, anchors, accessories and location schedules.

.5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for foot mats for incorporation into manual.

1.3 QUALITY ASSURANCE

.1 Standard rolling load performance: 600 lb./wheel; (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).

.2 Single source responsibility: Obtain foot mats and frames from one source of a single manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
- .1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect foot mats from damage.
- .3 Protect prefinished surfaces with wrapping.
- .4 Replace defective or damaged materials with new.

1.5 PROJECT CONDITIONS

.1 Field measurements; check actual field measurements for foot mats by accurate field measurements prior to fabrication. Record actual measurements on final shop drawings. Coordinate fabrications schedule with construction progress to avoid delay of the Work.

.2 Coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

2 Products

2.1 MATERIALS

.1 Foot mats: Recessed mounted 11 mm thick roll back mats with no frame, complete with heavy duty carpet inserts and square vinyl end trims. Colour and type as indicated in the Finish Schedule.

3 Execution

3.1 INSTALLATION

.1 Install foot mats level, rigid, and true to line, in strict accordance with the manufacturer's directions and the reviewed shop drawings. Install flush with adjacent floor finish.

.2 Provide all required framing.

.3 Install mats of sizes indicated on the reviewed shop drawings.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Remove protective material from materials where present.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry

1.2 REFERENCES

.1 ASTM International
.1 ASTM C297/C297M-04(2010), Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for detention furniture and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for detention furniture for incorporation into manual.

.3 Supply part numbers of furniture to allow for replacement of worn or damaged detention furniture parts.

.4 Supply instructions detailing procedures for repairing or replacing worn detention furniture parts.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect detention furniture from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Wall Mounted Detention Benches:
- .1 300 mm wide x 1220 mm long.
- .2 Type 304, #3 finish, 2.8 mm thick stainless steel fabrication.
- .3 13 mm diameter wall mounting holes.
- .4 2 wall mounting flanges.
- .5 Provide 2 - 150 mm x 150 mm stainless steel handcuff rings welded to front underside of bench.
- .6 Manufacturer and type: KrytoMax Model GAT-FWB-100.

.2 Floor Mounted Detention Stool
- .1 300mm diameter x 450mm high.
- .2 Type 304, #3 finish, 2.8 mm thick stainless steel fabrication.
- .3 203mm x 203mm floor plate.
- .4 13 mm diameter wall mounting holes.
- .5 50mm STD 40 Stainless Steel Pedestal Pipe
- .6 Provide stainless steel handcuff rings welded to underside of stool top.

.3 Fasteners: Stainless steel type, tamperproof fasteners, of size and type to suit installation and to support all superimposed loading.

3 Execution

3.1 INSTALLATION

.1 Install wall mounted benches to locations indicated, in strict accordance with manufacturer’s recommendations.

.2 Securely fasten in place using specified fasteners, level and true to line, at heights indicated. Install to withstand all superimposed loading.

END OF SECTION