RBM
architecture

2206 Speers Avenue
Saskatoon, SK

email:office@rbm-architecture.ca

ph 306.242.2636
fax 306.242.9130

Project Manual

POLICE BUILDING RENOVATIONS

BLAINE LAKE, SASKATCHEWAN

for

Government of Canada

Project No. 651B-12

Set No._____

TABLE OF CONTENTS

Pages

Division 09 - 21

Not Used.

Division 22 – PLUMBING

Division 23 – HEATING, VENTILLATION, AND AIR CONDITIONING (HVAC)

Division 26 - ELECTRICAL

Division 28 – ELECTRONIC SAFETY AND SECURITY

APPENDICIES

DRAWING INDEX

Architectural:
A000 – Cover Sheet, Legend, Abbreviations, General Notes and List of Drawings
A100 – Site Plan: Existing
A200 – Basement and Crawl Space: Existing / Proposed
A201 – Main Floor Plan: Existing / Demolition
A202 – Main Floor Plan: Existing / Proposed
A203 – Second Floor Plan: Existing / Reference
A204 – Basement Reflected Ceiling Plan: Existing / Proposed
A205 – Main Floor Reflected Ceiling Plan: Existing / Demolition
A206 – Main Floor Reflected Ceiling Plan: Existing / Proposed
A207 – Second Floor Reflected Ceiling Plan: Existing / Reference
A208 – Door, and Hardware Schedules
A209 – Room Finish Schedules and Assemblies
A400 – Details: Cell Finishes
A401 – Plan Details: Demolition Cell Assemblies
A402 – Plan Details: Proposed Cell Assemblies
A700 – Interior Elevations

Mechanical:
M200 – Basement Plan: Proposed Plumbing
M202 – Main Floor Plan: Proposed Plumbing
M200 – Basement Plan: Proposed HVAC
M202 – Main Floor Plan: Proposed HVAC
M400 – Mechanical Specification and Schedules

Electrical:
E200 – Basement Plan: Electrical
E201 – Main Floor plan: Electrical
E202 – Second Floor Plan: Electrical
E301 – Main Floor Plan: Security
E302 – Security Details

END OF TABLE

PART 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises selective demolition and renovation primarily within the detention area of the existing cells in the RCMP Building located in Blaine Lake, Saskatchewan and all associated works.

.2 Work also includes the upgrading and construction of a fire separation around the furnace area within the basement.

.3 Owner will be responsible for the moving and relocating of any computers, printers, and fax machines. The Contractor will be responsible for moving all other furniture.

1.2 WORK SEQUENCE

.1 Coordinate Progress Schedule.

.2 Maintain fire access/control.

1.3 CONTRACTOR USE OF PREMISES

.1 The building will remain operational for the duration of the work.

.2 Use of the site is restricted and under escort for the execution of the work. Coordinate use of premises under direction of Owner site authority. Contractor shall assume responsibility for premises assigned to them for the performance of the work.

.3 Work shall be scheduled during normal business hours unless prior approval is obtained from the Owner site authority. Owner site authority may approve work beyond normal working hours subject to conditions which may include supervision of off-hours work by security personnel, commissionaires, or security officers, approved by the Owner site authority and paid for by the Contractor.

.4 Do not unreasonably encumber site with material or equipment. Material lay-down area will be designated. Move stored products or equipment which interfere with the normal operations of the building.

.5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.7 Repair or replace portions of existing work

1.4 PERMIT AND FEES

.1 The Contractor shall obtain and pay for all building permits. Obtain and pay for all other permits, licenses, certificates, fees and governmental inspections or notices required for the performance of the work.

NOTE: Permit drawings are the property of the owner. Contractor to forward "approved" permit drawings and a copy of the building permit to the Consultant **prior** to the submission of the first request for progress payment.

PART 2 Products

2.1 NOT USED

.1 Not used.

PART 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 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 independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations, occupants, public and normal use of premises. Arrange with Owner to facilitate execution of work.

1.4 EXISTING SERVICES

.1 Notify, Owner and Consultant and utility companies of intended interruption of services and obtain required permission, minimum 72 hours in advance.

.2 Where Work involves breaking into or connecting to existing services, give Owner and Consultant 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for pedestrian and vehicular traffic as required to maintain continuous operations of facility.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Pre-planning and assembly of all materials and trades will be required to minimize time required for detention area closure.

.2 Restrict work area to areas of building being renovated. Do not permit worker access to other parts of building except as approved by Owner site authority.

.3 Carry out noise generating Work Monday to Friday before 07:00 hours and after 18:00 hours and on Weekends and Stat holidays, with prior approval from Owner site authority.

.4 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

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

.6 Cross contamination of dust/noise from construction zone is not allowed. Construction zone to be kept under negative pressure.

1.6 SECURITY CLEARANCES

.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will be required to enter premises.

.2 Personnel will be checked daily at the start of the work shift and provided with a pass which must be worn at all times. Pass must be returned at the end of the shift and personnel checked out.

.3 The Owner has the right to refuse any person not previously granted security clearance from entering the site.

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not allowed on site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Engineer are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

.1 Contractor will appoint and pay for services of testing laboratory for all required testing including the following:

- .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 conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by Contractor under the supervision of Engineer.
- .6 Additional tests specified in the following paragraph.

.2 Testing agency appointed by Contractor to be approved by Engineer.

.3 Additional independent inspection/testing agencies may be engaged by the Engineer for the purpose of inspecting and/or testing portions of Work.

.4 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 Engineer to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

- .1 Provide access to Work to be inspected and tested.
- .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 the appropriate agency and Engineer sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Allow the inspection/testing agencies access to all portions of the Work and manufacturing and/or fabrication plants. Co-operate to provide reasonable facilities for such access.

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

.5 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Engineer.

.6 Provide copy of all testing and inspection reports to Engineer within 3 days of test completion.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 DESCRIPTION

.1 Coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work.

1.2 PROJECT MEETINGS

.1 ADMINISTRATIVE

- .1 Distribute written notice of each meeting minimum five (5) working days in advance of meeting date to Owner, Engineer and required attendees.
- .2 Provide physical space and make arrangements for meetings.
- .3 Preside at meetings.
- .4 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .5 Reproduce and distribute copies of minutes within three working days after meetings and transmit to meeting participants and, affected parties not in attendance, including Owner and Engineer
- .6 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

.2 PRECONSTRUCTION MEETING

- .1 Within 10 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of the Owner, Engineer, 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 Agenda to include following:
  - .1 Appointment of official representative of participants in Work.
  - .2 Schedule of Work, progress scheduling
  - .3 Schedule of submission of shop drawings, samples, colour chips in accordance with Section 013300 - Submittal Procedures.
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 015100 - Temporary Utilities.
  - .5 Delivery schedule of specified equipment in accordance with Section 013100 – Project Management And Coordination.
  - .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements (GC).
  - .7 Owner provided products.
  - .8 Record drawings in accordance with Section 017800 - Closeout Submittals.
  - .9 Maintenance in accordance with Section 017800 - Closeout Submittals.

.10 Take-over procedures, acceptance, and warranties in accordance with Section 017700 - Closeout Procedures and Section 017800 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, and holdbacks (GC).

.12 Appointment of inspection and testing agencies or firms in accordance with Section 014500 - Quality Control.

.13 Insurances and transcript of policies (GC).

.14 Owner security requirements

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

.6 Comply with instructions of Engineer for use of temporary utilities and construction facilities.

.7 Coordinate field engineering and layout work with Engineer.

.3 PROGRESS MEETINGS

.1 During course of Work and prior to project completion, schedule progress meetings monthly.

.2 Contractor, major Subcontractors involved in Work Engineer and Owner are to be in attendance.

.3 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.

1.3 ON-SITE DOCUMENTS

.1 Maintain at job site, one copy each of the following:

.1 Contract drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed shop drawings.

.5 Change orders.

.6 Other modifications to Contract.

.7 Field test reports.

.8 Copy of approved Work schedule.

.9 Manufacturers' installation and application instructions.

.10 Labour conditions and wage schedules.

.11 Manufacturer’s Certificates

.12 Inspection Certificates

1.4 SCHEDULES

.1 Submit preliminary construction progress schedule to Engineer coordinated with overall project schedule.

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

.3 During progress of Work revise and resubmit as directed by Engineer.

.4 Provide digital copy in MS Project format to Engineer.

1.5 APPLICATIONS FOR PROGRESS PAYMENT

.1 Make applications for payment on account as provided in Agreement monthly as Work progresses.

.2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.

.3 Submit to Engineer, at least 14 days before first application for payment, Cost Breakdown, in detail as directed by Engineer, for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. After approval by Engineer, Cost Breakdown will be used as basis for progress payments.

.4 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Engineer may reasonably require to establish value and delivery of products.

1.6 SCHEDULE OF VALUES

.1 Make schedule of values out in such form and supported by such evidence as Engineer may reasonably direct and when accepted by Engineer, be used as basis for applications for payment.

.2 Include statement based on schedule of values with each application for payment.

.3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Engineer may reasonably require to establish value and delivery of products.

.4 Itemize separate line item costs for the following (but not limited to) items of Work. Item to be organized in relation to the specification section formatting.

.1 General Requirements

.1 Mobilization

.2 Bonds / Permits / Insurance

.3 Demobilization

.2 Rough Carpentry
.3 Joint Sealers
.4 Doors and Frames
.5 Detention Doors
.6 Door Hardware
.7 Gypsum Wallboard and Metal Studs
.8 Flooring
.9 Painting
.10 Mechanical
.1 Plumbing
.2 HVAC
.11 Electrical

1.7 SUBMITTALS

.1 Make submittal to Engineer for review.

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

.3 Submit requests for payment for review, and for transmittal to Engineer.

.4 Submit requests for interpretation of Contract Documents, and obtain instructions through Engineer.

.5 Process substitutions through Engineer.

.6 Process change orders through Engineer.

.7 Deliver closeout submittals for review and preliminary inspections, for transmittal to Engineer.

1.8 CONSTRUCTION PHOTOGRAPHS

.1 PROGRESS PHOTOGRAPHS
.1 Submit construction photographs in accordance with procedures and requirements specified in this Section.
.2 Submit progress photographs in one of the following formats:
.1 Digital Format
.1 Sizes: 2048 x 1536 pixels
.2 Format: .jpg, (quality: 80% minimum)
.3 Compatibility: Microsoft Windows
.4 Identification: file name must include project name, room number, cardinal direction, and date of exposure. Example: “MRB-103-West-10 Sept.jpg”

.5 Viewpoints: interior and exterior locations: viewpoints determined by Consultant. Number of viewpoints: Minimum Twelve (12).

.6 Frequency: monthly. E-mail digital photos to: Engineer

.3 All photographs to be focused and legible, with correct light exposure. Use a flash where necessary.

1.9 CLOSEOUT PROCEDURES

.1 Notify Engineer when Work is considered ready for Substantial Performance.

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

.3 Comply with Engineer's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Engineer of instructions for completion of items of Work determined in Engineer's final inspection.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 ADMINISTRATIVE

.1 Submit to Engineer submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Work affected by submittal shall not proceed 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 Engineer. 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 shall be considered rejected.

.6 Notify Engineer, 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 coordinated.

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

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

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

1.2 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 The Contractor shall arrange for the preparation of clearly identified shop drawings, each shop drawing shall display name and file number of project, as called for by the Contract Documents or as the Engineer may reasonably request.

.3 Submit shop drawings in PDF format by e-mail to the Engineer. Reviewed drawings will be returned to the Contractor to produce his required copies at his expense.

.4 Submit copies of shop drawings for structural work directly to the Structural Engineer. Submit copies of shop drawings for mechanical work directly to the Mechanical Engineer. Submit copies of shop drawings for electrical work directly to the Electrical

Engineer.
*NOTE: Copy of transmittal to Engineer.

.5 All shop drawings shall be submitted with a “continuous” format transmittal indicating:

.1 Reference specification section

.2 Shop drawing number

.3 Shop drawing description

.4 Number of copies sent

.5 Date sent

.6 Name sent by

.7 Name sent to

.8 Date received

.9 Number of copies received

.10 Additional information as the Contractor may require.

.6 Where applicable, identify each detail on the shop drawing by referring to sheet and detail numbers shown on the Contract Documents.

.7 Allow 5 working days for Engineer's review of each submission.

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

.9 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by 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.

.10 After Engineer's review, distribute copies.

.11 Submit 1 PDF copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Engineer where shop drawings will not be prepared due to standardized manufacture of product.

.12 Delete information not applicable to project.

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

.14 Facsimile Shop Drawings will not be accepted.

.15 Maximum sheet size 860 x 1120 mm.

.16 All submitted shop drawings and manufacturer’s data are to be compiled in both a hard copy and a soft copy (PDF) submission and submitted with the maintenance manuals.

1.3 SAMPLES

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

.2 Deliver samples prepaid to Engineer's business address.

.3 Notify Engineer 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 Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.

.6 Make changes in samples which Engineer 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.

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 014500 - Quality Control.

1.5 CERTIFICATES AND TRANSCRIPTS

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

1.6 MANUFACTURER’S FIELD SERVICES REPORTS

.1 Submit copies of written reports following all attendance at the site by the manufacturer’s representative.

.2 Submit copies to the Engineer, Contractor and appropriate Sub-Contractors.

.3 Field Service reports shall include (as a minimum):

.1 Name of Report

.2 Date of attendance at the site

.3 List all attendees at time of attendance to the site

.4 Observations of progress of the Work

.5 Recommendations or directives made to the Contractor and/or Subcontractors and actions required to ensure acceptable application or construction.

.4 Submit copies of manufacturer's standard recommendations for application / installation with initial field services report.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Province of Saskatchewan

.1 Occupational Health and Safety Act, 1993, S.S. [1993].

1.2 SUBMITTALS

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

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

.3 Submit copies of incident and accident reports.

.4 Submit WHMIS MSDS - Material Safety Data Sheets.

1.3 FILING OF NOTICE

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

1.4 SAFETY ASSESSMENT

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

1.5 REGULATORY REQUIREMENTS

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

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

1.7 RESPONSIBILITY

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

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

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Regulations, 1996.

1.9 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 of Work having jurisdiction and advise Engineer verbally and in writing.

1.10 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 minimum 2 years' site-related working experience specific to activities associated with this 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.

1.11 POSTING OF DOCUMENTS

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

1.12 CORRECTION OF NON-COMPLIANCE

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

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

.3 Engineer or Owner may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Engineer.

1.14 POWDER ACTUATED DEVICES

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

1.15 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 General

1.1 FIRES

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

1.2 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site unless approved by Engineer.

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

1.3 DRAINAGE

.1 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

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

1.4 SITE CLEARING AND PLANT PROTECTION

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

.2 Wrap in burlap, 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.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Engineer.

1.5 POLLUTION CONTROL

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

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

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

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 REFERENCES AND CODES

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

.2 Observe construction safety measures of NBC, applicable Worker's Compensation Board and Occupational Health and Safety Regulations requirements, and comply with all acts, regulations, bylaws and authorities having jurisdiction.

.3 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding handling, storage, use, and disposal of hazardous materials, and regarding labeling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.

1.3 FIRE EXTINGUISHERS

.1 Supply fire extinguishers, necessary to protect the work in progress and the contractor's physical plant on site.

1.4 FLAMMABLE AND COMBUSTIBLE LIQUIDS

.1 The handling, storage, and use of flammable and combustible liquids are to be governed by the National Fire Code of Canada.

1.5 HAZARDOUS SUBSTANCES

.1 Work entailing the use of toxic or hazardous materials, chemicals and/or explosives, which otherwise creates a hazard to life, safety or health, shall be in accordance with the National Fire Code of Canada.

.2 When work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers, equipped with sufficient fire extinguishers.

.3 When flammable liquids, such as lacquers or urethanes are to be used, provide proper ventilation and all sources of ignition are to be eliminated.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 ASSOCIATIONS

.1 ANSI - American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York, U.S.A. 10036 URL http://www.ansi.org

.2 ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, Georgia, U.S.A. 30329 URL http://www.ashrae.org

.3 ASTM - American Society for Testing and Materials, 100 Barr Harbor Drive West, Conshohocken, Pennsylvania 19428-2959 URL http://www.astm.org

.4 AWMAC - Architectural Woodwork Manufacturers Association of Canada, 516-4 Street West, High River, Alberta T1V 1B6 URL http://www.awmac.com

.5 AWPA - American Wood Preservers' Association, P.O. Box 5690, Granbury Texas, U.S.A. 76049-0690 URL http://www.awpa.com

.6 AWS - American Welding Society, 550 N.W. LeJeune Road, Miami, Florida U.S.A. 33126 URL http://www.amweld.org

.7 AWWA - American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado, U.S.A. 80235 URL http://www.awwa.org

.8 CCA Canadian Construction Association,75 Albert St., Suite 400 Ottawa, Ontario, K1P 5E7 URL http://www.cca-acc.com

.9 CGSB - Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, Quebec K1A 0S5 URL http://w3.pwgsc.gc.ca/cgsb

.10 CISC - Canadian Institute of Steel Construction, 201 Consumers Road, Suite 300, Willowdale, Ontario M2J 4G8 URL http://www.cisc-icca.ca

.11 CRCA - Canadian Roofing Contractors Association, 155 Queen Street, Suite 1300, Ottawa, Ontario K1P 6L1 URL http://www.roofingcanada.com

.12 CSA - Canadian Standards Association International, 178 Rexdale Blvd., Toronto, Ontario M9W 1R3 URL http://www.csa-international.org

.13 CSC - Construction Specifications Canada, 120 Carlton Street, Suite 312, Toronto, Ontario M5A 4K2 URL http://www.csc-dcc.ca

.14 CSDMA - Canadian Steel Door Manufacturers Association, One Yonge Street, Suite 1801, Toronto, Ontario M5E 1W7

.15 CSSBI - Canadian Sheet Steel Building Institute, 652 Bishop St. N., Unit 2A, Cambridge, Ontario N3H 4V6 URL http://www.cssbi.ca

.16 CWC - Canadian Wood Council, 1400 Blair Place, Suite 210, Ottawa, Ontario K1J 9B8 URL http://www.cwc.ca

.17 FCC - Fire Commissioner of Canada, Place du Portage, Phase II, 165 rue Hotel de Ville, Hull, Quebec K1A 0J2 http://info.load-otea.hrdc-drhc.gc.ca/fire-prevention/standards/commissioner.shtml

.18 IEEE - Institute of Electrical and Electronics Engineers, IEE Corporate Office, 3 Park Avenue, 17th Floor, New York, New York U.S.A. 10016-5997 URL http://www.ieee.org

.19 MPI - The Master Painters Institute, 4090 Graveley Street, Burnaby, BC V5C 3T6 URL http://www.paintinfo.com

.20 NABA - National Air Barrier Association, PO Box 2747, Winnipeg, Manitoba R3C 4E7 URL http://www.naba.ca

.21 NEMA - National Electrical Manufacturers Association,1300 N. 17th Street, Suite 1847, Rosslyn, Virginia 22209 URL http://www.nema.org

.22 NFPA - National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101Quincy, Massachusetts, U.S.A. 02269-9101 URL http://www.nfpa.org

.23 NFSA - National Fire Sprinkler Association, P.O. Box 1000, Patterson, New York, U.S.A. 12563 URL http://www.nfsa.org

.24 NLGA - National Lumber Grades Authority, 406-First Capital Place, 960 Quayside Drive, New Westminster, B.C. V3M 6G2

.25 NRC - National Research Council, Building M-58, 1200 Montreal Road, Ottawa, Ontario K1A 0R6 URL http://www.nrc.gc.ca

.26 QPL - Qualification Program List, c/o Canadian General Standards Board, Place du Portage, Phase III, 6B1, 11 Laurier Street, Hull, Quebec K1A 1G6 URL http://www.pwgsc.gc.ca/cgsb

.27 SCC - Standards Council of Canada, 270 Albert Street, Suite 2000, Ottawa, Ontario K1P 6N7 URL http://www.scc.ca

.28 TTMAC - Terrazzo, Tile and Marble Association of Canada, 30 Capston Gate, Unit 5 Concord, Ontario L4K 3E8 URL http://www.ttmac.com

.29 UL - Underwriters' Laboratories, 333 Pfingsten Road, Northbrook, Illinois, U.S.A. 60062-2096 URL http://www.ul.com

.30 ULC - Underwriters' Laboratories of Canada, 7 Crouse Road, Toronto, Ontario M1R 3A9 URL http://www.ulc.ca

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 INSPECTION

.1 Allow Engineer 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 timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Engineer 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 Engineer may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Engineer shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.

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

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

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

1.3 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.

1.4 PROCEDURES

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

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

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

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

1.6 REPORTS

.1 Submit 4 copies of inspection and test reports to Engineer.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

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

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

1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to Engineer.

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

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

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

1.9 MILL TESTS

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

1.10 EQUIPMENT AND SYSTEMS

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

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 WATER SUPPLY

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

.2 Existing building water supply may be used.

1.3 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.

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

.5 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.

.6 Permanent heating system of building, or portions thereof, may be used at Contractor’s expense subject to approval of the Engineer. Should the Engineer agree to the use of the

permanent heating system, the Engineer shall issue to the Contractor, written conditions for the use of the permanent heating system. Comply with such conditions as stated by Engineer. Be responsible for all damages thereto, upon completion Work or which the permanent heating system was used, replace all filters, clean and lubricate. Date of Warranties for heating system shall commence as of date of Substantial Completion.

.7 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.

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

1.4 TEMPORARY POWER AND LIGHT

.1 Existing building power may be used during construction for temporary lighting and operating of power tools and equipment.

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

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Engineer 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.

1.5 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, high speed internet access and fax hook up, lines and equipment necessary for own use and use of Engineer.

.2 Contractor to have immediate access to the equipment to be able to forward digital photographs from site to the Engineer.

1.6 FIRE PROTECTION

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

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

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1-GP-189M-[84], Primer, Alkyd, Wood, Exterior.

.2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)

.1 CAN3-A23.1-/A23.2-[94], Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.

.2 CSA-0121-[M1978], Douglas Fir Plywood.

.3 CAN/CSA-Z321-[96], Signs and Symbols for the Occupational Environment.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 SCAFFOLDING

.1 Provide and maintain scaffolding, ramps, ladders, platforms, and temporary stairs as required for the successful completion of the Work.

1.4 HOISTING

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

.2 Hoists and cranes shall be operated by qualified operator.

1.5 SITE STORAGE/LOADING

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

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

1.6 CONSTRUCTION PARKING

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

.2 Provide and maintain adequate access to project site.

1.7 SECURITY

.1 Contractor is responsible for all site security for the duration of the project.

1.8 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings (minimum 8 persons) and furnished with drawing laydown table. Locate office as directed by Owner.

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

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.10 SANITARY FACILITIES

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

.2 Location of sanitary facilities to be coordinated with Owner.

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

.4 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Engineer.

1.11 CONSTRUCTION SIGNAGE

.1 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.

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

.3 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 Engineer.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1.189M-[84], Primer, Alkyd, Wood, Exterior.

.2 CGSB 1.59-[97], Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)

.1 CSA-O121-[M1978], Douglas Fir Plywood.

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 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 partitions to localize dust generating activities, and for protection of workers, finished areas of Work, public and remaining operational areas..

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

1.7 FIRE ROUTES

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

1.8 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.

1.9 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 Engineer locations and installation schedule [3] days prior to installation.

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

1.10 RELICS AND ANTIQUITIES

.1 Protect relics, antiquities, items of historical or scientific interest found during course of work.

.2 Give immediate notice to Engineer and await Engineer's written instructions before proceeding with Work in this area.

.3 Relics, antiquities, and items of historical or scientific interest remain Her Majesty's property.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 014200 - 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 any product or system is in conformance with applicable standards, Owner reserves right to have such products or systems tested to prove or disprove conformance.

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

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

1.2 QUALITY

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

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

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

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

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

1.3 ACCEPTABLE PRODUCTS

.1 Products listed as acceptable products in various sections are to be used as a guide and does not imply exclusion of unlisted manufacturers, models or materials.

.2 Acceptable products mean that items named and specified by manufacturers reference meets the specification in all respects and is acceptable to the Engineer.

.3 Equipment or materials proposed shall meet the same standards.

.4 All products listed as **NO SUBSTITUTIONS** in various sections are to be supplied as specified.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Engineer 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 Engineer at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Engineer reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.5 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

.6 Store sheet materials and lumber 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 Engineer.

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

1.6 TRANSPORTATION

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

1.7 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.8 QUALITY OF WORK

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

.2 Do not employ anyone unskilled in their required duties. Engineer 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 Engineer, whose decision is final.

1.9 CO-ORDINATION

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

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

1.10 CONCEALMENT

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

.2 Before installation, inform Engineer if there is interference. Install as directed by Engineer.

1.11 REMEDIAL WORK

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

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

1.12 LOCATION OF FIXTURES

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

.2 Inform Engineer of conflicting installation. Install as directed.

1.13 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.

1.14 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.

1.15 PROTECTION OF WORK IN PROGRESS

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

1.16 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 pedestrian and vehicular traffic.

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

PART 2 Products

2.1 ACCEPTABLE PRODUCTS

.1 Products listed as acceptable products in various sections are to be used as a guide and does not imply exclusion of unlisted manufacturers, models or materials.

.2 Acceptable products means that items named and specified b manufacturers reference meets the specification in all aspects and is acceptable to the Engineer.

.3 Equipment or materials proposed shall meet the same standards. The decision of the Engineer is final regarding the approval of products proposed.

2.2 NO SUBSTITUTIONS

.1 All products listed “No Substitutions” in various sections are to be supplied as specified.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 EXISTING SERVICES

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

1.2 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 Engineer 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 Engineer.

1.3 RECORDS

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

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

1.4 SUBMITTALS

.1 On request of Engineer, submit documentation to verify accuracy of field Engineering work.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 SUBMITTALS

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

.2 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 013300 - 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 may 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, full thickness of the construction element.

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

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

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 PROJECT CLEANLINESS

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

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Engineer. 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 Provide and use clearly marked separate bins for recycling. Refer to Section 017419 – Construction Waste Management and Disposal.

.7 Remove waste material and debris from site and deposit in waste container at end of each working day.

.8 Dispose of waste materials and debris off site.

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

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

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

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

.13 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 Engineer. 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, floors, doors and ceilings

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

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

.11 Wax, seal, shampoo 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 a 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.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 DOCUMENTS

.1 Maintain at job site, one copy of following documents:

.1 Waste Reduction Workplan

1.2 USE OF SITE AND FACILITIES

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

.2 Provide temporary security measures approved by Owner.

1.3 SUBMITTAL

.1 Submit requested submittals in accordance with Section 013300 - Submittal Procedures.

.2 Prepare and submit the following submittals prior to project start-up:

.1 Submit 2 copies of completed Waste Reduction Workplan (WRW)

1.4 WASTE REDUCTION WORKPLAN

.1 Prepare WRW prior to project start-up.

.2 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.3 Describes management of waste.

.4 Identify opportunities for reduction, reuse, and/or recycling (3Rs) of materials. Based on information acquired from WA.

.5 Post workplan or summary where workers at site are able to review its content.

1.5 MATERIALS SOURCE SEPARATION PROGRAM

.1 Prepare MSSP and have ready for use prior to project start-up.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Consultant.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials.

.4 Provide containers to deposit reusable and/or recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition. Ship materials to site operating under Certificate of Approval. Materials must be immediately separated into required categories for reuse of recycling.

1.6 DISPOSAL OF WASTES

.1 Burying of rubbish and waste materials is prohibited unless approved by Consultant.

.2 Disposal of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers is prohibited.

1.7 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Consultant.

.2 Unless specified otherwise, materials for removal become Contractor's property. Owner is to have first right of refusal.

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

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

1.8 SCHEDULING

.1 Coordinate work with other activities at site to ensure timely and orderly progress of the work.

PART 2 Products

2.1 NOT USED

PART 3 Execution

3.1 APPLICATION

.1 Do work in compliance with WRW.

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

3.2 CLEANING

.1 Clean-up work area as work progresses.

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

3.3 DIVERSION OF MATERIALS

.1 Separate materials from general waste stream and stockpile in separate piles or containers, to approval of Consultant, and consistent with applicable fire regulations. Mark containers or stockpile areas. Provide instruction on disposal practices.

.2 On-site sale of reusable, recyclable material is not permitted.

3.4 SPEC CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Schedule E

Province	Address	General Inquires	Fax
Saskatchewan	Saskatchewan Environment and Resource Management 3211 Albert Street Regina, SK S4S 5W6	(306) 787-2700	(306) 787-3941

END OF SECTION

PART 1 General

1.1 INSPECTION AND DECLARATION

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

.1 Notify Engineer in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Engineer's Inspection.

.2 Engineer's Inspection: Engineer and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

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

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

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, other Authorities having Jurisdiction have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Engineer, and Contractor. If Work is deemed incomplete by Engineer, complete outstanding items and request re-inspection.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 SUBMISSION

.1 Two weeks prior to Substantial Performance of the Work, submit to the Engineer:

- .1 Four final copies of operating and maintenance manuals in English.
  - .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
  - .2 Copy will be returned with Engineer's comments.
  - .3 Revise content of documents as required prior to final submittal.
- .2 As-built drawings
- .3 Spare parts as indicated, complete with docket list.
- .4 Maintenance Materials as specified, complete with docket list.
- .5 Special Tools as specified.
- .6 One copy of all shop drawings organized into a 3-ring binder.

.2 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.3 If requested, furnish evidence as to type, source and quality of products provided.

.4 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.5 Pay costs of transportation.

1.2 FORMAT

.1 Organize data in the form of an 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. Identify contents of each binder on spine. All binders are to match.

.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. Bind in with text; fold larger drawings to size of text pages.

.9 Provide Construction photographs on CD.

.10 Provide one copy of entire maintenance manual submission in PDF format, organized as per paper copy, including shop drawings.

.11 Provide one copy of As-built drawings scanned to PDF format.

1.3 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 date of submission; names,

.2 addresses, and telephone numbers of Engineers 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 clearly 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. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 014500 - Quality Control.

.6 Training: Refer to Section 017900 - Demonstration and Training.

1.4 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Engineer one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to the Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.

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

.5 Keep record documents and samples available for inspection by Engineer.

1.5 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Engineer.

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

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

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

.1 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: legibly 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.

1.6 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. 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. Include regulation, control, stopping, shut-down, and emergency instructions. 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 coordination 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 014500 - Quality Control and 019100 - Commissioning.

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

1.7 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. 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.

1.8 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 all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 MAINTENANCE 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 all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.10 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 all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

1.11 STORAGE, HANDLING AND PROTECTION

.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 to satisfaction of Engineer.

1.12 WARRANTIES AND BONDS

.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 the applicable item of work.

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

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

.6 Co-execute submittals when required.

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

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.

.2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.2 QUALITY CONTROL

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

1.3 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Engineer’s approval.

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

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

.4 Record in video all instructions given, and include 2 digital copies with the maintenance manuals.

.5 Circulate attendance sheet with printed name, signature, and position of each attendee, including the instructor. Include copies with maintenance manuals.

1.4 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with appropriate Section.

.2 Testing, adjusting, and balancing has been performed in accordance with Section 019100 - Commissioning and equipment and systems are fully operational.

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

1.5 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.

.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.3 Review contents of manual in detail to explain all aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

1.7 TIME ALLOCATED FOR INSTRUCTIONS

.1 Ensure amount of time required for instruction of each item of equipment.

PART 2 Products

2.1 NOT USED

.1 Not Used.

PART 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI/NPA A208.1-[1999], Particleboard, Mat Formed Wood.

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

.1 ASTM A653/A653M-[05a], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.

.2 ASTM C36/C36M-[03], Standard Specification for Gypsum Wallboard.

.3 ASTM C578-[05a], Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C1289-[05a], Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.5 ASTM D1761-[88(2000)], Standard Test Methods for Mechanical Fasteners in Wood.

.6 ASTM D5055-[05], Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.7 ASTM D5456-[05a], Standard Specification for Evaluation of Structural Composite Lumber Products.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-[M87], Hardboard.

.2 CAN/CGSB-51.32-[M77], Sheathing, Membrane, Breather Type.

.3 CAN/CGSB-51.34-[M86], Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.4 CAN/CGSB-71.26-[M88], Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 Canadian Standards Association (CSA International)

.1 CSA A123.2-[03], Asphalt Coated Roofing Sheets.

.2 CAN/CSA-A247-[M86], Insulating Fiberboard.

.3 CSA B111-[1974(R2003)], Wire Nails, Spikes and Staples.

.4 CAN/CSA-G164-[M92(R2003)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.5 CSA O112 Series-[M1977(R2006)], CSA Standards for Wood Adhesives.

.6 CSA O121-[M1978(R2003)], Douglas Fir Plywood.

.7 CSA O122-[06], Structural Glued-Laminated Timber.

.8 CSA O141-[05], Softwood Lumber.

.9 CSA O151-[04], Canadian Softwood Plywood.

.10 CSA O153-[M1980(R2003)], Poplar Plywood.

.11 CAN/CSA-O325.0-[92(R2003)], Construction Sheathing.

.12 CSA O437 Series-[93(R2006)], Standards on OSB and Waferboard.

.5 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber [2005].

.6 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1113-[04], Architectural Coatings.

.2 SCAQMD Rule 1168-[05], Adhesives and Sealants Applications.

.7 Truss Design and Procedures for Light Metal Connected Wood Trusses, Truss Plate Institute of Canada.

.8 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S706-[97], Mineral Fibre Thermal Insulation for Buildings.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 017421 – Construction Waste Management and Disposal.

.2 Set aside damaged wood and dimensional lumber off-cuts for approved alternative uses (e.g. bracing, blocking, cripples, bridging). Store this separated reusable wood waste convenient to cutting station and area of work.

.3 Separate metal, plastic, wood and corrugated cardboard-packaging in accordance with the Waste Management Plan and place in designated areas for recycling.

.4 Do not burn scrap at the project site.

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

PART 2 Products

2.1 FRAMING AND STRUCTURAL MATERIALS

.1 Lumber: unless specified otherwise, 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 Indoor Environmental Quality Low - Emitting Materials: Composite Wood and Laminates Adhesives.

.1 SCAQMD Rule 1168, Adhesives and Sealants Applications.

.3 Glulam in accordance with Structural Glued-Laminated Timber CSA-O122.

.4 Wood I-joists in accordance with Prefabricated Wood I-Joists ASTM D5055.

.5 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", Truss Plate Institute of Canada.

.6 Structural Composite Lumber (SCL) in accordance with ASTM D5456.

.7 Framing and board lumber: in accordance with NBC, except as follows:

.1 SPF species, NLGA Construction Light Framing grade.

.8 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 S2S is acceptable

.2 Board sizes: "Standard" or better grade.

.3 Dimension sizes: "Standard" light framing or better grade.

.4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Indoor Environmental Quality Low - Emitting Materials: Composite Wood and Laminates Adhesives

.1 SCAQMD Rule 1168, Adhesives and Sealants Applications.

.2 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0.

.3 Douglas fir plywood (DFP): to CSA O121, standard construction.

.4 Canadian softwood plywood (CSP): to CSA O151, standard construction.

.5 Poplar plywood (PP): to CSA O153, standard construction.

.6 Insulating fiberboard sheathing: to [CAN/CSA-A247] [CAN/ULC-S706].

.7 Glass fibre board sheathing: non-structural, rigid, faced, fiberglass, insulating exterior sheathing board.

.8 Expanded polystyrene sheathing: to ASTM C578.

.9 Gypsum sheathing: to ASTM C36/C36M.

2.3 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 single ply type as indicated.

.2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.

.3 Sealants: Section 079210 – Joint Sealing.

.4 Subflooring adhesive: to CGSB-71.26, cartridge loaded.

.5 General purpose adhesive: to CSA O112 Series.

.6 Nails, spikes and staples: to CSA B111.

.1 Galvanized for exterior locations;

.2 Plain finish for interior locations;

.3 Size and type to suit application.

.7 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.1 Galvanized for exterior locations;

.2 Plain finish for interior locations;

.3 Size and type to suit application.

.8 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.9 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.10 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.11 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, type approved by Engineer.

2.4 WOOD PRESERVATIVE

.1 SCAQMD Rule #1113 - Architectural Coatings.

PART 3 Execution

3.1 PREPARATION

.1 Store wood products.

3.2 INSTALLATION

.1 Comply with requirements of NBC 2005 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

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

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install wall sheathing in accordance with manufacturer's printed instructions.

.7 Install roof sheathing in accordance with requirements of NBC.

.8 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

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

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

.10 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.11 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.

.12 Install sleepers as indicated.

.13 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

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

.3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.4 PRESSURE TREATED WOOD

.1 All wood blocking in contact with cementitious materials, or located on exterior side of air barrier or roof membrane, shall be “pressure treated”.

.2 Treat surfaces exposed by cutting, trimming, or boring with a liberal brush or dip application of preservative, compatible with pressure treatment, before installation.

3.5 SCHEDULES

.1 Roof and wall sheathing: indicated on plans

.2 Electrical equipment mounting boards:

.1 Plywood, CSP grade, square edge 19 mm thick.

.3 Wood Lintels:

.1 Span 0-1 m: use 44x184 SCL c/w 1 stud & 1 cripple

.2 Span 1-2 m: use 2-44x184 SCL c/w 2 stud & 2 cripple

.3 Span 2-3.2 m: use 3-44x302 SCL c/w 3 stud & 2 cripple

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC)

.1 ULC-S115-[1995], Fire Tests of Firestop Systems.

1.2 SAMPLES

.1 Submit samples in accordance with Section 013300 - Submittal Procedures.

.2 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 013300 - Submittal Procedures.

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Section 013300 - Submittal Procedures.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 017421 – Construction Waste Management and Disposal.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 Products

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended and conforming to special requirements specified in 3.5.

.2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.

.3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.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.

PART 3 Execution

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. 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 interuption to vapour barrier].

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.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 a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSPECTION

.1 Notify Engineer when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestop 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 floor slabs, ceilings and roofs.
- .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 cm2]: 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.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.2-[M87], Glazing Compound, Nonhardening, Modified Oil Type.

.2 CGSB 19-GP-5M-[76], Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.3 CAN/CGSB-19.6-[M87], Caulking Compound, Oil Base.

.4 CAN/CGSB-19.13-[M87], Sealing Compound, One-component, Elastomeric, Chemical Curing.

.5 CGSB 19-GP-14M-[76], Sealing Compound, One Component, Butyl-polyisobutylene Polymer Base, Solvent Curing.

.6 CAN/CGSB-19.17-[M90], One-Component Acrylic Emulsion Base Sealing Compound.

.7 CAN/CGSB-19.18-[M87], Sealing Compound, One Component, Silicone Base, Solvent Curing.

.8 CAN/CGSB-19.20-[M87], Cold-applied Sealing Compound, Aviation Fuel-resistant.

.9 CAN/CGSB-19.21-[M87], Sealing and Bedding Compound Acoustical.

.10 CAN/CGSB-19.22-[M89], Mildew Resistant, Sealing Compound for Tubs and Tiles.

.11 CAN/CGSB-19.24-[M90], Multi-component, Chemical Curing Sealing Compound.

.2 Department of Justice Canada (Jus)

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

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

.1 Material Safety Data Sheets (MSDS).

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.2 SUBMITTALS

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

.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 samples in accordance with Section 01 33 00 - Submittal Procedures.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.

.1 Instructions to include installation instructions for each product used.

1.3 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant. Mock-up may be part of finished work.

.3 Allow 24 hours for inspection of mock-up by Engineer before proceeding with sealant work.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 016100 - Common Product Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.5 ENVIRONMENTAL AND SAFETY 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 acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work as directed by Engineer by use of approved portable supply and exhaust fans.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Waste Management And Disposal.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.

.5 Place used hazardous sealant tubes and other containers in areas designated for hazardous materials.

PART 2 Products

2.1 SEALANT MATERIALS

.1 Sealants and caulking compounds must:

.1 Meet or exceed all applicable governmental and industrial safety and performance standards; and

.2 Be manufactured and transported in such a manner that all steps of the process, including the disposal of waste products arising there from, will meet the requirements of all applicable governmental acts, by laws and regulations including, for facilities located in Canada, the fisheries Act and the Canadian Environmental Protection Act (CEPA).

.2 Sealant and caulking compounds must not be formulated or manufactured with: aromatic solvents, fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium or their compounds, except barium sulfate.

.3 Sealant and caulking compounds must be accompanied by detailed instructions for proper application so as to minimize health concerns and maximize performance, and information describing proper disposal methods.

.4 Caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant shall not be used in air handling units.

.5 When low toxicity caulks are not possible, confine usage to areas which offgas to the exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.

.6 In the selection of the products and materials of this section preference will be given to those with the following characteristics: low Volatile Organic Compound (VOC) content, manufactured without compounds which contribute to ozone depletion in the upper atmosphere, manufactured without compounds which contribute to smog in the lower atmosphere, does not contain methylene chloride, does not contain chlorinated hydrocarbons.

.7 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Board for Joint Sealants. Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Sealant A: Polyurethane Elastomeric Sealant, Two Part to CAN/CGSB-19.24

.1 Non-sag or Self-Levelling as required by application

.2 Shore “A” Hardness at 14 Days: Non-sag 25 +/- 5, Self Levelling 40 +/- 5

.3 Colours to match adjacent materials, and as selected by Engineer.

.2 Sealant B: Silicone, One Part.

.1 To CAN/CGSB-19.22 (Mildew resistant).

.1 Non-sag, one component, moisture curing

.2 Shore “A” Hardness at 14 Days: 25 +/- 5

.3 Non-staining and non-bleeding

.4 Colours to match adjacent materials, and as selected by Engineer.

.3 Sealant C: Polyurethane, One Part to CAN/CGSB-19.13

.1 Non-sag, one component, moisture curing

.2 Shore “A” Hardness at 21 Days: 40 +/- 5

.3 Non-staining and non-bleeding

.4 Colours to match adjacent materials, and as selected by Engineer.

.4 Sealant D: Polyurethane, One Part **Security Sealant**

.1 Non-sag, one component, moisture curing

.2 Shore “A” Hardness at 21 Days: 50 +/- 5

.3 Non-staining and non-bleeding

.4 Colours to match adjacent materials, and as selected by Engineer.

.5 Pick Resistant

.6 Acceptable Products: NO SUBSTITUTIONS

.1 Tremco Permaquik 2252

.2 Pecora Dynapoxy EP-430 Fast

.3 Sika AnchorFix 3

.4 BASF Epolith G

.5 Sealant E: Acoustical Sealant to CAN/CGSB-19.21

.1 Non-sag, one component, moisture curing

.2 Shore “A” Hardness at 14 Days: 25 +/- 5

.3 Non-staining and non-bleeding

.4 Colours to match adjacent materials, and as selected by Engineer.

.6 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

PART 3 Execution

3.1 PROTECTION

.1 Protect installed work of other trades from staining or contamination.

3.2 PREPARATION OF JOINT SURFACES

.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 Cleanup.

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

3.7 SEALANT SELECTION

.1 Sealant A:

.1 Perimeters of exterior openings where frames meet exterior facade of building

.2 Control and expansion joints in exterior surfaces of unit masonry walls

.3 All exterior locations noted on drawings for sealant

.2 Sealant B:

.1 Vanity Back splashes

.2 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities)

.3 Cabinet work back splashes

.3 Sealant C:

.1 All interior joints between dissimilar materials.

.2 All interior locations noted on drawings for sealant

.4 Sealant D:

.1 All locations within secure areas where sealant is required.

.2 All locations in secure areas where joins between materials occur

.5 Sealant E:

.1 All locations on drawings where acoustic sealant is shown

.2 All locations in sound rated assemblies where sealant is required.

.3 All insulated wall assemblies where foamed in place insulation is unable to join two studs.(plates, cripples, etc.)

END OF SECTION

PART 1 General

1.1 REFERENCES

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

.1 ASTM A653/A653M-[01a], Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM E90-90 - Standard test for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

.3 ASTM E413-87 - Classification for Rating Sound Insulation

.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 G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W59-[M1989(R2001)], Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 Canadian Steel Door Manufacturers' Association, (CSDMA).

.1 CSDMA, Specifications for Commercial Steel Doors and Frames, [1990].

.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, [1990].

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN4-S104-[80(R1985)], Fire Tests of Door Assemblies.

.2 CAN4-S105-[85(R1992)], Fire Door Frames Meeting the Performance Required by CAN4-S104.

.6 CAN/ULC-S701-[01], Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.7 CAN/ULC-S702-[97], Thermal Insulation, Mineral Fibre, for Buildings.

.8 CAN/ULC-S704-[01], Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 013300 - Submittal Procedures.

.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware, fire rating, finishes, and STC rating.

.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing, fire rating, finishes and STC rating.

.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.3 REQUIREMENTS

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M [NFPA 252] for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 017421 – Construction Waste Management and Disposal.

PART 2 Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A653M, [ZF75], 1.2 mm 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].

2.2 DOOR CORE MATERIALS

.1 Honeycomb construction:

.1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m3 minimum sanded to required thickness.

.2 Stiffened: face sheets welded, insulated core.

.1 Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/m3.

.3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees Celsius at 30 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having 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 and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.4 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

.1 Field paint steel doors and frames in accordance with Section 099120 – Interior Painting. Protect weatherstrips from paint. Provide final finish shall be free of scratches or other blemishes.

2.6 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Exterior and interior top and bottom caps: steel.

.3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Metallic paste filler: to manufacturer's standard.

.5 Fire labels: metal riveted.

.6 Sealant: Section 079210 - Joint Sealing.

.7 Glazing: Section 088050 - Glazing

.8 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 countersunk stainless steel screws.

.2 Design exterior glazing stops to be tamperproof.

2.7 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Exterior frames: 1.6 mm welded type construction.

.4 Interior frames: 1.6 mm welded type construction.

.5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.6 Frame strike bucket to be able to accept 25 mm throw dead bolt.

.7 Protect mortised cutouts with steel guard boxes.

.8 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.9 Manufacturer's nameplates on frames and screens are not permitted.

.10 Conceal fastenings except where exposed fastenings are indicated.

.11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.12 Insulate exterior frame components with polyurethane insulation.

2.8 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 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.

2.9 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.

2.10 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior doors: hollow steel construction. Interior doors: honeycomb construction.

.3 Doors to be 45 mm thick.

.4 Fabricate doors with longitudinal edges locked seam and welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.5 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware.

.6 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.7 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.8 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.9 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.10 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.11 Manufacturer's nameplates on doors are not permitted.

2.11 DOORS: HONEYCOMB CORE CONSTRUCTION

.1 Form each face sheet for interior doors from 1.6 mm sheet steel with honeycomb or temperature rise rated core laminated under pressure to face sheets.

2.12 HOLLOW STEEL CONSTRUCTION

.1 Form each face sheet for exterior doors from 1.6 mm sheet steel.

.2 Form each face sheet for interior doors from 1.6 mm sheet steel.

.3 Reinforce doors with vertical stiffeners, securely welded to each face sheet at 150 mm on centre maximum.

.4 Fill voids between stiffeners of exterior doors with polyurethane core.

PART 3 Execution

3.1 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.

3.2 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 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.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

.6 Maintain continuity of air barrier and/or vapour retarder.

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 087110 - Door Hardware - General.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

.1 Hinge side: 1.0 mm.

.2 Latchside and head: 1.5 mm.

.3 Finished floor, top of carpet and thresholds: 13 mm.

.3 Adjust operable parts for correct function.

.4 Install louvres.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.5 GLAZING

.1 Install glazing for doors and frames in accordance with manufacturer’s recommendations.

END OF SECTION

PART 1 General

1.1 REFERENCES

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

.1 ASTM A653/A653M-[01a], 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 G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W59-[M1989(R2001)], Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 Canadian Steel Door Manufacturers' Association, (CSDMA).

.1 CSDMA, Specifications for Commercial Steel Doors and Frames, [1990].

.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, [1990].

.5 HMMA – NAAMM 863-98, ASTM F1450-97 – Grade 3 Level.

1.2 DESIGN REQUIREMENTS

.1 Perform all work to assure completed areas are vandal proof and that no items can be removed without special equipment.

.2 There shall be no sharp materials, rough or jagged items or material exposed within the detention area.

.3 All joins are to be caulked smooth with security sealant.

.4 Schematic drawings and details have been provided for reference only. All detention doors are to meet or exceed Level 3 NAAMM 863-98, ASTM F1450-97 baseline performance criteria. Manufacturer to submit certification.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 013300 - Submittal Procedures.

.2 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.3 Clearly show all pertinent dimensions, general construction, materials (including gauges and finish of material parts), component connections and locations, anchorage methods and locations, hardware locations, and installation details.

1.4 SAMPLES

.1 Submit samples in accordance with Section 013300 - Submittal Procedures.

.2 Submit 1 sample, 300 x 300 mm of top butt corner of door required for the project.
- .1 Show butt cutout.

.3 Submit 1 sample, 300 x 300 mm of top butt corner of frame required for the project.
- .1 Show anchors and butt cutout.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 017421 – Construction Waste Management and Disposal.

PART 2 Products

2.1 MANUFACTURERS

.1 Detention Hardware:
- .1 Chubb
- .2 Southern Folger
- .3 RR Brink.

2.2 SWINGING DETENTION DOORS

.1 Swinging Cell Door Frames: Welded construction, 12 gauge wipecoat galvanized steel, mortised to accept heavy weight security hinges and strike. Frame must be prepared for correct anchoring system compatible with the wall type.

.2 Swinging Cell Doors: 14 gauge wipecoat galvanized steel faces spot welded 6” on center to 20 gauge vertical interlocking steel stiffeners at 6” on center, voids between stiffeners filled with loose batt type fibreglass insulation. Longitudinal edges continuously welded the full height of the door, filled and ground smooth with no visible seams. Doors prepared for key operated spring deadlatch, keyed one side. Door prepared for and supplied with a 150 mm x 480 mm Viewport operable sliding shutter and complete with glazing unit, recessed food pass flap, and keyed lock.

.3 Hinges: Each door to be hung on three cast stainless steel hinges with concealed, non-removable, stainless steel pin with ball bearings and stainless steel bearing plates, hospital tip design and security studs. Hinge mounting screws Torx Tamperproof, flat head machine screws.
- .1 Acceptable Products:
  - .1 FA 4 1/2FM-ICS

.4 Locksets: Locksets tumbler paracentric, combination spring and deadlock with knob and rose one side only. Unlock with a half turn of the key and lock with a full turn of the key. Locks complete with mounting plate, strike and double notch escutcheon. All fasteners must be Torx Tamperproof, flat head machine screws.

.1 Acceptable Products:

.1 Chubb - 1080-1.

.2 Folger Adam - 82.

.3 Southern Steel - 1080-1.

.4 RR Brink - 7082.

.5 Glazing Unit: one layer of 6mm Marguard on cell side, 8mm air space, 6mm layer of Lexan. Glazing tape not required. Rabbet the cell side Marguard so the face of the Marguard is flush with the face of the cell door.

2.3 COMPONENTS

.1 Keying: Keying shall be factory registered and correspond with the Detachment Name or Location as the reference. Total of three keys per project are to be supplied. All locks are to be keyed alike.

2.4 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

.1 Field paint steel doors and frames with epoxy paint. Provide final finish shall be free of scratches or other blemishes.

2.6 ACCESSORIES

.1 Fasteners: All screws shall be Phillips or Allen head screws, compatible with the material they are fastening as well as the material they are securing into. Two of each size bit that is required shall be supplied.

.2 Metallic paste filler: to manufacturer's standard.

.3 Sealant: Section 079210 - Joint Sealing

PART 3 Execution

3.1 INSTALLATION GENERAL

.1 Install doors and frame Installation of materials of this section shall be by the manufacturer's approved installers, in strict accordance with manufacturer's installation instructions, and in accordance with Section 017303, Execution Requirements.

.2 The work of this section shall be performed by skilled workers with at least five (5) years successful installation experience with the type of materials specified herein.

.3 Submit evidence of experience and obtain Engineer’s approval before proceeding with work.

.4 Install doors, tracksets and hardware by factory trained and authorized installers.

3.2 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 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.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

3.3 DOOR INSTALLATION

.1 Install sliding detention doors, frames and hardware and frames in accordance with construction documents, shop drawings, manufacturer's recommendations and Section 017303, Execution Requirements

.2 Install detention doors, frames and hardware plumb and square, in correct locations and with maximum diagonal distortion of 2 mm. Ensure frames are securely and rigidly anchored to adjacent construction.

.3 Frames shall be solidly braced at time of installation both vertically and horizontally and solidly blocked within the frame opening to prevent bowing of the frame when it is grout filled.

.4 Bed anchors of hollow metal frames in mortar joints of masonry walls. Fill frame voids solid with mortar.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.5 GLAZING

.1 Install glazing for doors in accordance with Section 088050 - Glazing.

END OF SECTION

PART 1 General

1.1 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-69.17-[M86(R1993)], Bored and Preassembled Locks and Latches.

.2 CAN/CGSB-69.18-[M90]/ANSI/BHMA A156.1-[1981], Butts and Hinges.

.3 CAN/CGSB-69.19-[93]/ANSI/BHMA A156.3-[1984], Exit Devices.

.4 CAN/CGSB-69.20-[M90]/ANSI/BHMA A156.4-[1986], Door Controls (Closers).

.5 CAN/CGSB-69.21-[M90]/ANSI/BHMA A156.5-[1984], Auxiliary Locks and Associated Products.

.6 CAN/CGSB-69.22-[M90]/ANSI/BHMA A156.6-[1986], Architectural Door Trim.

.7 CAN/CGSB-69.24-[M90]/ANSI/BHMA A156.8-[1982], Door Controls - Overhead Holders.

.8 CAN/CGSB-69.26-[96]/ANSI/BHMA A156.10-[1991], Power-operated Pedestrian Doors.

.9 CAN/CGSB-69.28-[M90]/ANSI/BHMA A156.12-[1986], Interconnected Locks and Latches.

.10 CAN/CGSB-69.29-[93]/ANSI/BHMA A156.13-[1987], Mortise Locks and Latches.

.11 CAN/CGSB-69.30-[93]/ANSI/BHMA A156.14-[1991], Sliding and Folding Door Hardware.

.12 CAN/CGSB-69.31-[M89]/ANSI/BHMA A156.15-[1981], Closer/Holder Release Device.

.13 CAN/CGSB-69.32-[M90]/ANSI/BHMA A156.16-[1981], Auxiliary Hardware.

.14 CAN/CGSB-69.33-[M90]/ANSI/BHMA A156.17-[1987], Self-closing Hinges and Pivots.

.15 CAN/CGSB-69.34-[93]/ANSI/BHMA A156.18-[1987], Materials and Finishes.

.16 CAN/CGSB-69.35-[M89]/ANSI/BHMA A156.19-[1984], Power Assist and Low Energy Power Operated Doors.

.17 CAN/CGSB-69.36-[M90]/ANSI/BHMA A156.20-[1984], Strap and Tee Hinges and Hasps.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-69 / ANSI/BHMA A156, Builders Finishing Hardware, Latest Editions.

1.2 REQUIREMENTS REGULATORY AGENCIES

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.3 SAMPLES

.1 Submit samples in accordance with Section 013300 - Submittal Procedures.

.2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.3 After approval samples will be returned for incorporation in the Work.

1.4 HARDWARE LIST

.1 Submit contract hardware list in accordance with Section 013300 - Submittal Procedures.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.3 Hardware list shall be submitted with a minimum of one copy of manufacturers published literature for each item of hardware to be supplied.

.4 Hardware list shall be submitted with a complete list of abbreviations applicable to hardware list.

.5 Hardware list shall indicate angle at which door is restrained by hold open device.

.6 All hardware lists including key controls must be reviewed and signed off by Security Engineering Section to ensure continuity of security and hardware compatibility with existing division hardware.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for door closers, locksets, door holders and fire exit hardware for incorporation into manual specified in Section 017800 - Closeout Submittals.

.2 Brief maintenance staff regarding proper care, cleaning, and general maintenance.

.3 The supplier of Door Hardware is to examine the installation of all hardware on site and provide the Engineer with a Certificate of Inspection stating all hardware and accessories have been inspected and are installed in a manner consistent with requirements of the specifications, drawings and manufacturers recommendations. Hardware Certificate of Inspection shall be submitted prior to date of Interim Certificate of Completion.

1.6 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 017800 - Closeout Submittals.

.2 Supply two sets of wrenches for each different type of hardware, including door closers, locksets and fire exit hardware.

1.7 DELIVERY AND STORAGE

.1 Deliver, store, handle and protect materials in accordance with Section 016100 - Common Product Requirements.

.2 Store finishing hardware in locked, clean and dry area.

.3 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

1.8 WARRANTY

.1 For the work of this Section 087110 - Door Hardware - General, the 12 month warranty period is extended to 24 months.

1.9 WASTE DISPOSAL AND MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Waste Management And Disposal

PART 2 Products

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for all similar items.

.2 Locks shall be wrought brass with lever handles.

.3 Hardware except items otherwise specified shall be:

.1 ANSI 626 Satin Chromium

.4 Interior butts steel plated. Exterior butts and interior butts to all washrooms and showers to be stainless steel.

.5 Provide ULC approved hardware at all ULC labelled doors.

2.2 DOOR HARDWARE

.1 Butts and hinges:

.1 To ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.

.2 Type A1:

.1 Hager BB 1279
Mont-Hard BB 1079
Stanley FBB 179
114 x 102 663 1½ pairs to each door.

.2 Hager BB 1191 (stainless steel)
Mont-Hard STSBB991 (stainless steel)
Stanley FBB 191 (stainless steel)
114 x 102 630 1½ pairs to each door.

.3 Type A2:

.1 Heavy duty, 127 x 127 mm, stainless steel or bronze, five knuckle ball bearing, non-removable pin hinges 1½ pair to each door. Hager BB 1199

.4 Type A3:

.1 Full mortise continuous stainless steel hinge:
Model No. FM-300-32D by Markar Products Inc.

.2 Locks and latches:

.1 Auxiliary locks and associated products to: ANSI/BHMA A156.5, Grade 1, designed for function as stated in Hardware Schedule.

.1 Manufacturer: Corbin Russwin, CL3300 Series (LWR Levers) complete with L4 restricted keyway, **(no substitutions)**.

.2 70 mm Backset

.2 Mortise locks and latches to: ANSI/BHMA A156.13, Grade 1, designed for function as stated in Hardware Schedule.

.1 Manufacturer Corbin Russwin, ML2000 Series (LWR Levers) complete with L4 restricted keyway, **(no substitutions)**.

.3 Locks or cylinders having core removable functions are not acceptable.

.4 The same make and keyway must be used on all locks throughout the Contract. EXCEPTION: cell block and overhead door locks, and as indicated on Lockset Schedule.

.5 Cylinders must be “0” bitted L4 Cylinders.

.6 Norman strikes: box type, lip projection not beyond jamb.

.7 Cylinders key into keying system as directed.

.3 Door Closers and Accessories:

.1 Door controls (closers): to ANSI/BHMA A156.4, listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1.

.2 The force required to open any door shall not exceed 38 N for exterior doors and 22 N for interior doors. Closers at exterior doors shall be equipped with adjustable spring power assists (multi-sized to permit setting of spring power from size 2 through size 6).

.3 Closers for interior doors shall have a closing period of not less than 3 seconds measured from when the door is in an open position of 700 to the doorway, to when the door reaches a point 75 mm from the closed position, measured from the leading edge of the latch side of the door.

.4 Closer Finish: Painted to match finish of other hardware components.

.4 Kickplates: to ANSI/BHMA A156.6, listed in Hardware Schedule.

.1 1.3 mm thick aluminum rectangular kickplate with square corners and beveled edges (4 sides) – 40 mm less than width of door on stop side. Mount bottom of kickplate 2 mm above bottom of door. 1 side 250 mm high.

.5 Pushes and Pulls: to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in Hardware Schedule.
Push plates: 1.27 mm thick stainless steel:

.1 J1. Push/Pull: 25 mm diameter, 380 mm long pull Type J401, complete with 125 x 500 back plate Type J405, all stainless steel x 630.

.2 J2. Push Plate: 125 x 500 Type J301 rectangular push plate with square corners and beveled edges, stainless steel x 630.

.3 J3 Fully Recessed Door Pull: Stainless steel, minimum width 100mm, minimum depth 25mm. Fasteners to be security fasteners.

.6 Stops: In accordance with ANSI/BHMA A156.16, and A156.8 designated by letter K and numeral identifiers listed in Hardware Schedule:

.1 K1. L02141/L02161 floor type.

.2 K2. L02251 wall type (concave).

.3 K3. CO2541 (A156.8) overhead type.

Where doors are shown on drawings as stopping against solid walls or partitions, provide doors with a L02251 wall type (concave) stop. Where doors are shown on drawings as stopping against glazed screens, cabinetwork or plumbing fixtures, provide doors with a L02141/L02161 floor type stop.

.7 Weatherstripping:

.1 Weatherstripping: In accordance with ANSI/BHMA A156.22, as listed in Hardware Schedule or as listed and as specified:

.1 Doors as scheduled are to be provided with the following weatherstripping:

.2 Head and Jamb: R3C164/5, nominal 6 x 40 mm.

.3 Door Sills: R3B414/5, nominal 6 x 45 mm.

.4 Weather stripping on acoustically rated doors is to conform with STC rating of door.

.8 Thresholds: In accordance with ANSI/BHMA A156.21, and as specified:
Provide threshold J32100, fluted top at interior locations scheduled.
Width to match adjacent pressed steel frame.
Provide threshold J32190, thermal break and fluted top at exterior locations scheduled.
Width to match adjacent pressed steel frame.

.9 Auxiliary hardware: to ANSI/BHMA A156.16, to be included on all doors:

.1 Door Bumpers: L03011, standard resilient type rubber:
Place minimum of 3 single bumpers on single door frames. Space equally along strike jambs. Place minimum of 2 single bumpers on double door frames. Place on frame heads.

.10 Accessories: to ANSI/BHMA A156.16, designated by letter L and numeral identifiers, as listed in Hardware Schedule or as listed below:

.1 L1 - Door Viewer: L03221.

Acceptable Products:
Loxem 190 Available in Canada from:

Manufactured by
VSI Hardware Industries
12930 Bradley Avenue
P.O. Box 4445
Symlar, California 91342

Taymour Industries
1170 William Street
Vancouver, B.C.

Madison No.20 R35
Manufactured by:
Madison Products Company Limited
Available in Canada from:
Madison Products Company Limited
804-90th Avenue
LaSalle, Quebec

Madison Products Company Limited
3840 Jacombs Road
Unit 21 Richmond, B.C.

Madison Products Company Limited
550 Sheppard Avenue, Unit 25
Agincourt, Ontario

Ives No.698B3
Manufactured by:
Leigh Metal Products Ltd.
101 Brookside Street
London, Ontario, N6A 4Y3

Metallic Industrial Grade Door Viewer

.2 L3 - Aluminum Sliding Window shutter as detailed on drawings.

.3 L4 - Flush Bolts: Automatic UL rated.

.1 L4.2 Flushbolts: Manual UL Rated

.4 L5 - Astragal: Overlapping, extruded aluminum frame with pile insert, finished to match doors. Provide on all double doors

.5 L6 – Removable Mullion. Keyed to match door.

.11 Padlocks are to conform to L4 cylinders and be keyed as per Keying section.

2.3 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 hardware.

.3 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.

.4 Use fasteners compatible with material through which they pass.

.5 Secure astragals with non-removable screws, pop rivets and/or carriage bolts bolted from the interior.

2.4 KEYING

.1 Install “0” bitted cylinders to test for proper lock operation. Perimeter doors may be fitted with random bitted L4 cylinders if required for perimeter security.

.2 Provide 2 uncut key blanks for every lock in this Contract.

.3 Final keying will be provided by Owner.

.4 Key blanks to be stamped “DO NOT COPY”

PART 3 Execution

3.1 INSTALLATION INSTRUCTIONS

.1 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.2 Furnish manufacturers' instructions for proper installation of each hardware component.

.3 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.4 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.5 Remove construction cores when directed by Engineer; install permanent cores and check operation of all locks.

.6 Mitre or cope inside corners of weatherstripping at junction of head to jamb.

.7 Set thresholds in two continuous beads of sealant. Sealant in accordance with Section 079210 - Joint Sealing.

END OF SECTION

PART 1 General

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply and installation of plumbing system fixtures and accessories including but not limited to the following:

- Plumbing fixtures.
- Domestic hot, cold and potable water systems.
- Sanitary drainage systems.
- Other systems as indicated on the drawings and in the specifications.

1.2 REFERENCE STANDARDS

.1 National Plumbing Code 2005.

.2 APDI, American Plumbing and Drainage Institute.

.3 CSA, Canadian Standards Association and related standards as identified in the plumbing and drainage regulations.

.4 Department of Labour, Gas Safety Act, Occupational Health & Safety, Boiler and Pressure Vessel Act, Public Health Act.

.5 Local Public Health codes, regulations and by-laws.

1.3 RELATED SECTIONS

.1 Refer to other sections of the specifications for requirements relating and affecting the scope of this work.

1.4 GENERAL REQUIREMENTS

.1 Provide new fixtures, CSA approved, free from flaws and blemishes with finished surfaces clear, smooth and bright.

.2 Provide CSA approved plumbing fittings and accessories as required for a complete installation. Visible parts of fixture brass, pipe and accessories shall be heavily chrome plated.

.3 Fixtures shall be of one manufacturer. Fixture trim, in so far as possible, shall be product of one manufacturer.

.4 Protect fixtures from use and damage during construction.

.5 Provide connections to equipment furnished in the sections of this specification by the Consultant.

.6 Provide water hammer arrestors at fixtures sized to manufacturer's performance data. Use piston style for up to 32 WSFU fixture units and stainless steel bellows style for loadings greater than this.

.7 Provide vacuum breakers or backflow preventers on plumbing lines where contamination of domestic water may occur.

.8 Provide each fixture with its own trap and tail piece easily removable for servicing and cleaning.

.9 Provide chrome plated rigid or flexible supplies to fixtures complete with stops. Corrugated flexible supplies are not permitted.

.10 Provide polished chrome escutcheons at pipe penetrations through wall, floor or ceiling, size to suit pipe.

.11 Install wall mounted lavoratories, urinals, sinks, and water closets with approved wall carriers, model to suit application.

.12 Working pressure for fixtures, trim and accessories shall be no less than 552 kPa (80 psig).

PART 2 Products

2.1 SANITARY SEWER PIPING, BURIED AND ABOVE GRADE

.1 Cast iron pipe and fittings; hub-and spigot, neoprene gaskets; or hubless with neoprene gaskets and stainless steel clamp-and-shield assemblies.

.2 Systems XFR pipe and fittings; solvent weld joints.

.3 Copper tubing with cast bronze or wrought copper fittings; 50/50 solder joints; above grade only.

.4 ABS pipe and fittings; solvent weld joints.

.5 PVC pipe and fittings; solvent weld joints.

2.2 WATER PIPING, ABOVE GRADE

.1 Copper tubing type L hard drawn; with cast brass or wrought copper fittings; 95/5 solder joints.

2.3 FLANGES, UNIONS, AND COUPLINGS

.1 Pipe Size 50 mm and under: Malleable iron unions for ferrous piping; soldered bronze unions for copper pipe.

.2 Pipe Size over 50 mm: Forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping.

.3 Grooved and Shouldered Pipe End Couplings: Malleable iron housing, composition sealing gasket, steel bolts, nuts, and washers. Acceptable product: Victaulic.

.4 Dielectric Connections: Union with galvanized or plated steel threaded end, Copper solder end, water impervious isolation barrier.

2.4 BALL VALVES

.1 Valves Up to 50 mm: Bronze Stainless steel body, full port, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops where noted, solder or threaded ends with union.

2.5 FLOOR DRAINS

.1 FD1: Jay R. Smith Series 2005A-P050 Floor Drain, all duco coated cast iron body, reversible flashing clamp with seepage openings and adjustable 5" (127mm) diameter nickel bronze 1/4" (6.35mm) thick strainer, secured with S.S. screws, 4" (100mm) throat on strainer, trap primer connection.

.2 FD2: Jay R. Smith Series SQ-2-1717 04-P050-U-SG-M-ADJ Floor Drain, all duco coated large cast iron body, flashing clamp with seepage openings and adjustable 12-1/2"x13-3/4"(318mm x 349mm) top, 4" (102mm) outlet, trap primer connection, vandal proof secured ductile iron /w cast iron hinged bar grate .

.3 FD3: Jay R. Smith Series 2005AHD-P050-SS Floor Drain, all duco coated cast iron body, reversible flashing clamp with seepage openings and adjustable 5" (127mm) diameter stainless steel 1/2" (12.7mm) thick strainer, secured with S.S. Pin Torque screws and mounted using Loctite Liquid Thread Lockers Series 262, Mil-Spec S-46163A, Type II, Grade 0. 4" (100mm) throat on strainer, trap primer connection 'P'. Floor drain FD-3 shall have maximum of 12 mm grate openings.

2.6 CLEAN OUTS

.1 CO1 Floor Cleanout - Heavy Traffic Finished Areas: Jay R. Smith Series 4100 'Twis-To-Floor' Floor Cleanout, duco coated cast iron body and removable positive gasket seal closure plug and heavy duty 6" (150mm) with extra heavy nickel bronze cover and frame, secured with stainless steel screws, C.O. cast in cover. (For water-proofed areas provide 'FC' flange with flashing clamp).

.2 CO2 Line Cleanout: Jay R. Smith Series 4420 Line Cleanout, in cast iron ferrule with cast bronze tapered thread plug, with full size pipe opening. Where cleanouts are concealed behind finished walls access shall be made by Smith 4422 round stainless steel plate and slotted flat head stainless steel screw.

.3 Acceptable manufacturers:

- .1 Watts
- .2 Zurn
- .3 MiFab

2.7 BACK FLOW PREVENTERS

.1 Double Check Valve Assemblies: Bronze body with stainless steel springs; two independent check valves with intermediate atmospheric vent and two ball valves with test ports for isolation.

.2 Acceptable manufacturers:

.1 Conbraco
.2 Watts
.3 Febco

2.8 WATER HAMMER ARRESTORS

.1 Series SC manufactured by P.P.P. Inc..

2.9 WATER CLOSET (LWC)

.1 LWC-1 secure type with integral lavatory.

Acorn 'PENAL-WARE' #1440-(CT)-2-BPH-03-M-FV-FVT-SW-PBH Combination Basin and Toilet, floor mounted, back outlet, 14 gauge (1.9mm) type 304 S.S. with satin finish, complete with oval shaped hand basin, 4" (100mm) high splashback, self-draining soap tray, blow-out flush action bowl, 6L (1.6 gal.) per flush, with 4" (100mm) toilet waste wall outlet and integral contoured seat. C.P. penal filler bubbler. Concealed penal flush valve 1-1/2" (38mm) NPT female supply, factory set flow, quiet action diaphragm type with non-hold open feature, vacuum breaker, back-check angle stop and thru wall connector, air-controlled single temperature penal valve, 1.9 LPM (0.5 GPM) flow control, 1/2" (12.7mm) supplies, with metering, non-hold open hemispherical penal push buttons, timing adjustable from 5 sec. to 60 sec. (Galvanized steel wall sleeve for fixture mounting, and necessary fasteners for proper installation.) Provide Cast Brass 'p' Trap, 1-1/4” (32mm) with cleanout for basin located in pipe space.

For the fixture orientation refer to Drawing A201 and/or M201.

.1 Acceptable Product: Acorn Consultanting Co., Willoughby Industries – model ECW-1806-L/R -MOD-RCMP.

2.10 THERMOSTATIC MIXING VALVE

.1 Symmons Maxline Model 5-225-CK-F Thermostatic Mixing Valve with 12Ø (1/2”) female npt inlets/outlet and integral checks. All brass body with dual stainless steel strainers. Vandal-resistant cap/temperature adjustment handle. Standard finish rough brass. Dual certified to Asse. 0.03 – 0.88 l/s (0.5 – 14 gpm).

PART 3 EXECUTION

3.1 INSTALLATION

.1 Where floor drains are located over occupied areas, provide waterproof installation.

.2 Provide trap primers and related piping where required by code and/or where indicated on drawings.

.3 Set fixtures straight and true.

.4 Caulk with sealant to seal fixture to adjacent floor or wall.

.5 Field measure for all custom enclosures to ensure fit to ceiling, floor and mounting heights.

.6 Flush all potable water systems, clean all aerators and strainers prior to turnover to Owner.

.7 Isolate fixtures and related accessories during testing of piping systems.

.8 Cleanouts, floor drains, and similar fixtures, shall terminate flush with the final finish of the floor surface.

.9 Install shock arrestors at groups of fixtures, top of risers, solenoid valves, and other equipment as required. Locate for access and service.

.1 Unless indicated otherwise, rough-in fixture piping connections in accordance with the following table of minimum sizes or as required for particular fixtures.

Fixture	Hot Water	Cold Water	Waste	Vent
Service Sink	15 mm	15 mm	50 mm	40 mm
Water Closet (Flush Valve)	-	25 mm	75 mm	50 mm
Floor Drains	-	-	75 mm	40 mm

END OF SECTION

PART 1 GENERAL

.1 The General Conditions of the contract, Supplementary Conditions, General Requirements, Instructions to Bidders, and Form of Tender are part of this division of work.

.2 The responsibility and scope of each subtrade rests solely with the General Contractor. Extras will not be considered based on the grounds of difference in interpretation of specifications as to which trade involved shall provide certain specialities or materials.

.3 Contract documents of this division are diagrammatic and approximately to scale unless detailed otherwise. They establish scope, material and installation quality and are not detailed installation instructions. Follow manufacturer's recommended installation details and procedures for equipment supplemented by details given herein and on plans subject to approval of the consultant.

1.1 INTENT

.1 Provide for a complete and fully operational mechanical system with facilities described herein and in complete accord with all applicable codes and ordinances.

.2 Provide all labour, materials, tools, and equipment required to install test, and place into operation a complete mechanical system.

.3 These specifications are to be considered as an integral part of the drawings which accompany them; neither the drawings nor the specifications shall be used alone. Any item omitted from one but which is mentioned or reasonably implied in the other shall be considered as properly and sufficiently specified.

.4 Install equipment generally in locations and routes shown, close to building structure with minimum interference with other services or free space. Remove and replace improperly installed equipment to satisfaction of the consultant at no extra cost. Maintain maximum permissible head room and correct with consideration for servicing, inspection, and removal of serviceable components.

.5 Inform the consultant immediately in writing of any discrepancies between the plans, site conditions, drawings, or specifications. Any work done after the discovery shall be at the contractors risk until authorized. For discrepancies creating doubt as to the true intent or meaning, a ruling as to which shall govern shall be obtained from the consultant.

Failure to do so shall render the contractor liable for the expense of the installation of the more expensive alternate. Where discrepancies appear in catalogue numbers, provide the article in accordance with system requirements and to the standard of the specification.

1.2 QUALIFICATIONS FOR PERFORMANCE

.1 Only recognized mechanical contractors regularly engaged in heating, ventilating and sheet metal, plumbing work, or other specified work, employing accredited journeymen trades people shall be permitted to perform this work. Engage subcontractors to

perform specialty works where required or specified herein. Contractors and subcontractors shall have a minimum of five (5) years experience in their field of practice and in projects of a similar size.

.2 Manufacturers and suppliers of material and equipment shall have established offices or agents in Canada and shall have an operating organization for supplying replacement components and service in the province of installation.

1.3 MATERIALS AND WORKMANSHIP

.1 Replace materials and workmanship below specified quality and relocate work wrongly placed to satisfaction of the consultant.

.2 Materials and equipment installed shall be new, full weight and of the best quality specified. Use same brand or manufacturer for each specific application. Statically and dynamically balance rotating equipment for minimum vibration and low operating noise level. Provide vibration isolation for equipment where required.

.3 Each major component of equipment shall have manufacturer's name, address, catalogue and serial number in a conspicuous place.

.4 Use best practice and install materials and equipment in a neat and workmanlike manner by competent specialists and licensed tradesmen, in accordance with manufacturers printed installation instructions.

1.4 CUTTING AND PATCHING

.1 Locate and provide holes and sleeves, cutting and fitting required for mechanical work. Relocate improperly located holes and sleeves at no extra cost. Provide any flashing for work by this section.

.2 Drill for expansion bolts, hanger rods, brackets and supports.

.3 Do no cutting or burning of structural members or building frame without obtaining prior written approval from the consultant.

.4 Provide openings and holes required in concrete or precast members for mechanical work. Cast holes larger than 4" (100 mm) in diameter. Field-cut or cast 4" (100 mm) or smaller.

.5 All patching of finished construction of building shall be performed by the trades requiring same, utilizing qualified trades for finish material involved.

1.5 CODES, ORDINANCES AND INSPECTION FEES

.1 Give all necessary notices, obtain all necessary permits and pay all fees in order that work hereinafter specified may be carried out. Furnish any certificates necessary as evidence that the work installed conforms to the laws and regulations of all authorities having jurisdiction in the province. This must be done before final certificates will be issued.

.2 All changes and alterations required by any authorized inspector or any authority having jurisdiction, shall be carried out without charge or expense to the owner.

.3 All mechanical work shall comply with the requirements of the Canadian Standards Association, the Canadian Fire Underwriters Association, and The Department of Labour, and Environment and Public Safety.

.4 In the event that two or more rulings, regulations, or specifications apply, the more stringent shall be adhered to.

.5 The term "approved" shall mean approved by the Consultant, approved by authorities having jurisdiction and/or installed in a manner approved by the manufacturer.

1.6 LIABILITY

.1 Assume responsibility for laying out work and for any damage caused to the owner or other contractors by improper location or carrying out of work.

.2 Be responsible for prompt installation of work in advance of concrete pouring or similar work. Provide and set sleeves where required. Should any cutting or repairing of either unfinished or finished work be required, this contractor shall direct the particular contractors whose work in involved to do such cutting and repairing without expense to the owner. Before being undertaken, such work shall be laid out for the consultant's approval. See Cutting and Patching.

.3 Examine the site and local conditions affecting work under this contract. The contractor shall examine carefully the mechanical, electrical, structural, and consultantural drawings and satisfy himself that the work under this contract can be satisfactorily carried out without changes to the buildings as shown on these plans. Before commencing work, he shall examine the work of the other trades and report at once any defect or interference affecting the work of this section, or the guarantee of same. No extras will be subsequently allowed to cover any such error, omission or oversight on the thorough inspection of the grounds, building, conditions, etc.

.4 Arrange work in co-operation with other trades in the building in such a manner as not to interfere with other work being carried on in the building and places where other pipes and equipment are to be installed along with the pipes and ducts pertaining to this contract. Co-operate with the other contractors to get all the pipes, ducts, conduit, etc., installed to the best advantage. When open web structural joists or core floor construction is used, this contractor must obtain structural shop drawings to ensure space and openings are available for installation of pipes, ductwork and equipment.

.5 Where any pipes, ducts and equipment supplied by this contractor must be built into the work of other contractor's such as masonry, structural, or plastering, this contractor shall be responsible for supplying the equipment to be built in or measurements to allow the necessary openings to be left. All pipes and ducts which are to be concealed shall be installed neatly and closely to the building structure so that the necessary furring can be kept as small as possible. Any pipes, ducts or other work which are not, in the opinion of the consultant, installed as they should be, shall be taken out and replaced without cost to the

owner.

.6 Nothing herein, or in any contract documents, drawings, or specifications shall imply any third party liability between the Consultant or the Consultants firm, and the Contractor.

.7 Construction methods are the responsibility of the contractor.

1.7 LIABILITY INSURANCE

.1 Maintain such insurance as will fully protect both the owner and himself from any and all claims, all as noted within the General Conditions and Supplementary General Conditions.

1.8 MATERIALS AND EQUIPMENT STANDARDS

.1 The price submitted for this contract shall be based on the use of materials and equipment as specified. If this contractor wishes to quote on equivalent materials and equipment, he must quote on products approved by the consultant, in writing, as an equivalent to the product specified.

.2 Be fully responsible for all costs for any additional work or materials required to accommodate approved materials or equipment. Extras will not be approved to cover such work.

.3 Proposals to supply equivalent materials or equipment for any materials or equipment specified shall be made in writing to the consultant at least seven (7) days prior to the closing date of tender for the mechanical contract.

.4 The supplier/subcontractor shall in his quotation to the contractor indicate the type of approval obtained from the consultant; equivalent to or alternate to that specified. Quoting to a contractor without prior approval of product is not permitted and the party quoting without prior approval shall be liable to the contractor for any loss that the contractor may encounter, caused by the suppliers failure to inform the contractor about any qualifications to the consultant's approval of the product. The contractor will be held responsible to the owner to supply equipment as approved by the consultant.

.5 Requests for approval for tendering purposes shall be submitted in hard copy and all applicable technical data shall be submitted with the request for approval, including performance curves, physical details, etc.; reference to catalogue numbers is not considered sufficient.

1.9 SHOP DRAWINGS

.1 Prior to fabrication of any materials or equipment, submit through the General Contractor, ten (10) sets of shop drawings and data sheets covering all items of equipment furnished by him and intended for installation under this contract. Materials are not to be ordered, until reviewed shop drawings are received by this contractor from the consultant. Shop drawings shall be submitted no later than 90 days after contract signing. Refer also to Supplementary General Conditions; this section is the minimum requirement.

.2 All shop drawings submitted for review shall be certified by the manufacturer and carefully checked by this contractor, noting all changes required and shall bear the contractor's approval stamp and signature; drawings will not be considered if not previously checked by this contractor.

.3 Shop drawings shall include all information necessary to indicate the following:
- Dimensional data for roughing-in and installation.
- Technical data to enable the consultant to check that the equipment meets the requirements of drawings and specifications.
- Wiring, piping and service connection data for all trades.
- All motor sizes complete with voltage ratings.
- Job name, mechanical contractor, supplier or agent, manufacturer, Consultant.
- Schedules as applicable for coils, radiation, grilles, etc.
- Division of responsibility between trades.

.4 This contractor shall accept full responsibility for any equipment ordered where this procedure has not been allowed and no charges for cancellations, handling, restocking, etc. will be accepted for failure to carry out this procedure.

.5 A complete file of reviewed shop drawings shall be kept on site at all times and no shop drawings shall be used which do not bear the signed review stamp of the Consultant.

.6 The review by the consultant of such detail drawings or lists of equipment shall be for general arrangement and design only and shall not relieve the mechanical division of full responsibility for errors or of furnishing the materials and equipment and of performing the work as required by the plans and specifications.

1.10 DIMENSIONAL UNITS

.1 Submit all shop drawings, maintenance manuals, submittals, etc. in units consistent with the drawings.

.2 Where metric dimensions and units are used, supply items and submit information using S.I. (Systems International) units.

.3 All gauges, thermometers, recording, or indicating devices shall match the units consistent with the project. Dual units shall be permitted with preference on dual scales to S.I. units.

1.11 OPERATING AND MAINTENANCE MANUALS

.1 <u>General</u>

.1 Prepare proper documentation and assemble data for the proper operation and maintenance of each piece of equipment and system supplied and installed. Complete and turnover documentation prior to final inspection.

.2 Quality Assurance

.1 Provide operating and maintenance manuals as specified herein and in General Conditions, with consideration that the standards mentioned herein shall be the minimum requirement. All copies shall be submitted through the consultant.

.3 Contents

.1 Each binder shall be arranged according to the following index system. Minor variations in headings are permitted with written approval of the consultant, submit any changes as shop drawings.

.1 Front Page

.1 Title page with binder title, project name and location, project date in clear plastic cover.

.2 Second Page

.1 Building services isolation and main connections sketch showing location of all building service shut-off devices in clear plastic cover.

.3 Tab 1.0 Mechanical Systems

.1 General description of the manual and its contents.

.4 Tab 1.1 List of Mechanical Drawings

.1 List current revisions of drawings and contract documents.

.5 Tab 1.2 Description of Systems

.1 Provide a complete description of each system. Include description of components and how each interfaces to other complete systems. Include descriptions of all plumbing, drainage, domestic water, heating, ventilating, air conditioning, fire protection, life safety, and other systems as applicable to the project.

.6 Tab 1.3 Operation Division

.1 Provide complete and detailed operation of each major component. Include how to energize, how the component interfaces with other components, operation of controls, operating characteristics changes for summer or winter operation, trouble shooting sequences, set points and safe guards.

.7 Tab 1.4 Maintenance and Lubrication Division

.1 Provide maintenance and lubrication schedules for each of the major components to include daily, weekly, monthly, semi-annually and yearly

checks and tasks. Conform to manufacturer's recommendations. Explain how to proceed with each task required for each piece of equipment such as bearings, drives, motors and filters.

.2 Include maintenance descriptions for other items as fixtures, expansion tanks, thermofluids, etc. which require maintenance attention but not necessarily lubrication.

.8 Tab 1.5 List of Contractors and Suppliers

.1 Provide a complete list of contractors and suppliers for mechanical systems. Include consultant and general contractor. Include complete addresses and phone numbers.

.2 List of subcontractors and the scope of their work.

.3 List suppliers with a summary list of products supplied.

.9 Tab 1.6 Identification

.1 Provide a complete valve tag list.

.2 Provide a complete list of pipeline identification symbols and colour schedules with explanation of medium being carried. List alphabetically and in groups according to general service, eg.

Code	Colour	Legend
DCW	Dark Green	Domestic Cold Water

.3 Provide a complete list of all equipment with its identification symbol, description and general application. List alphabetically and in groups according to general service, eg.

Symbol	Description	Application
F-1	Exhaust Fan	Staff Room Exhaust

.10 Tab 2.0 Certification

.1 Description and index of certification items included.

.11 Tab 2.1, 2.2, etc.

.1 Include items as applicable to the project:
- Warranty Letter
- Piping Tests

.12 Tab 3.0 Shop Drawings and Maintenance Bulletins

.1 Provide material received in accordance to shop drawing requirements. Use

only approved or reviewed drawings. Include manufacturer supplied installation, operating and maintenance data.

.2 Include parts lists and equipment blow-ups for components as pumps, fixture trim or other equipment as required for proper servicing and ordering of parts.

.3 Include information on other components not necessarily submitted with shop drawings, but having maintenance related information or serviceable parts, eg. thermofluid, valves, side stream filters, etc.

.4 Divider Tabs

.1 Divider tabs shall be laminated mylar plastic with reinforced holes, coloured according to section. Colouring is as follows: Mechanical Systems: ORANGE; Certification: GREEN; Shop Drawings and Maintenance: YELLOW. Plastic tabs with typed insertions will not be acceptable.

.5 Binders

.1 Binders shall be maximum 100 mm thick with buckram hard cloth cover, expansion post style with metal reinforced spine. Where a single binder less than 40 mm is adequate use an D-ring in lieu of expansion post. Hinges shall be plated piano style.

.2 Colour of cover shall be as selected by the Consultant. In the absence of a specific colour selection, colour shall first, match the General Contractor manuals or second, shall be dark blue.

.3 Spine shall be gold embossed with:

MECHANICAL OPERATION AND MAINTENANCE MANUAL
PROJECT NAME
YEAR

.4 Cover shall be gold embossed with:

MECHANICAL OPERATION AND MAINTENANCE MANUAL
PROJECT NAME & LOCATION
PROJECT DATE
OWNER
CONSULTANT
MECHANICAL CONSULTANT
MECHANICAL CONTRACTOR

.6 Submittals

.1 Provide four (4) completed sets of operating and maintenance manuals as directed herein. Three (3) copies shall be forward to the Owner.

.2 Submit one draft copy for review and comment by the Consultant. Copy shall be returned to the Contractor for final revisions.

.3 Transmit all copies through the Consultant. Copies forwarded directly to the Owner without review will not be accepted. Three (3) copies shall be forwarded to the Owner. One (1) shall be retained by the Consultant.

.4 One copy to be provided in indexed PDF format on CD or DVD. See section 017800 Closeout submittals.

1.12 GUARANTEE

.1 As a condition precedent to final payment after completion of the work, provide the Owner with a written guarantee, warranting all apparatus furnished under the contract to remain in perfect and serviceable condition for a period of one (1) year from date of final acceptance of his work by the Consultant and Consultant. Refer also to Supplementary General Conditions.

.2 During the guarantee period this Contractor shall correct at his own expense, any imperfection by reason of defective workmanship, defective materials, defective arrangements of various parts of materials damaged as a result of these defects even though the work performed by this Contractor has been previously accepted as complete. This Contractor shall agree to correct any deficiencies or omissions with respect to the plans or specifications which may appear in the twelve (12) month period, including equipment which should fail to match the manufacturer's rating schedules.

.3 The period of this guarantee shall in no way supplement any other guarantee or warranty for a longer period but shall be binding on all other work not otherwise covered.

1.13 RECORD DRAWINGS

.1 Provide and maintain on site, one copy of contract drawings clearly identified as "Record Drawings", for no other purposes than recording deviations actually built into the work in materials, levels, dimensions, and recording actual field dimensions of location of buried services, as well as, piping and ductwork embedded in slabs.

.2 Record all deviations and field dimensions as soon as work progresses.

.3 Upon completion of work, obtain from the Consultant's office one set of reproducible copies of all contract drawings, and transfer all recorded information made on site to these drawings. Transfer of information shall be made by qualified drafting personnel, neatly and legibility executed. Completed record drawings to be presented to the Consultant prior to application for certificate for total performance of work, complete with two sets of white prints of these made at Contractor's cost.

.4 Provide and maintain on site a file to gather parts lists, operating and installation instructions that may be shipped to the site with equipment. Such information is to be incorporated into the operating and maintenance manuals.

1.14 CONTRACTOR'S SHOP AND REPRESENTATIVE

.1 Erect any temporary buildings and workshops that may be required for workmen, or for on the site operations, or for safe storage of materials, and as required to carry out the work of the contract.

.2 Establish near the site and keep open at all times during construction on the project, an office where all notices and instructions from the Consultant will be received and acknowledged by the authorized representative.

.3 Prior to commencing work, identify a qualified journeyman tradesmen to direct and monitor all aspects of the work and attend all site meetings for the duration of the project. Advise in writing of any changes in representative.

1.15 TEMPORARY HEAT

.1 Do not use permanent system for temporary heating purposes, without permission from the Consultant.

.2 Thoroughly clean and overhaul permanent equipment used during the construction period, replacing work or damaged parts. Exchange equipment or components operating improperly at final inspection with new equipment components.

.3 Use of permanent systems for temporary heat shall not modify terms of warranty.

.4 Operate heating systems under conditions which ensure no temporary or permanent damage. Operate fans at proper resistance with filters installed. Change filters at regular intervals. Operate with proper safety devices and controls installed and fully operational. Operate water systems with proper water treatment and maintain records for inspection by the Consultant.

.5 When air systems are used during temporary heating, provide filter media on return and exhaust air outlets. Clean ducts which have become dirty.

.6 Maintain proper supervision of permanent systems used for temporary heat and provide adequate alarms to indicate system failure.

1.16 PROTECTION OF MATERIALS AND EQUIPMENT

.1 Assume responsibility for the maintaining, safe storage and protection from construction and weather of all materials and equipment delivered to the site as part of this work.

.2 Protect all finished and unfinished work from damage giving special attention to building components, such as vapour barriers, water proof membranes, etc.

.3 Repair and replace damaged items as a result of failure to carry out the above to the satisfaction of the Consultant.

.4 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent

corrosion. Supply and install necessary extended nipples for lubrication purposes.

.5 Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not reuse existing materials and equipment unless specifically indicated.

1.17 PROTECTION FROM FREEZING

.1 Ensure that installed piping carrying fluids which can freeze, are installed in a manner safe from freezing. Provide any measures required to ensure freezing conditions cannot occur.

1.18 CHANGES AND EXTRAS

.1 The Consultant reserves the right to make changes in the design of the work or to omit any such part as he may see fit. In the event that work or material is added to or deducted from the work herein specified, a fair and reasonable evaluation of the same shall be added to or deducted from the amount of the contract as the case may require.

.2 State in writing, the cost of extras for additional work at the time requested to do this work. Extras will not be allowed unless approved by the Consultant. Charges for the pricing of changes will not be allowed. Do no work without approval.

.3 This breakdown shall provide the number of hours involved, the labour rate, the cost of the major components, and any miscellaneous material used. This breakdown shall also be provided by all sub-contractors quoting the change.

.4 The labour time shall be as described in the National Association of Plumbing, Heating, Cooling Contractors Labour Calculator with a local labour multiplication factor of 0.8.

.5 Any changes to contract documents, shall be issued with a written site instruction or notice of change. No deviations from the contract documents will be permitted without authorization by the Consultant. Carry all costs as a result of failure to obtain such approvals.

.6 Co-ordinate accordingly with other trades for changes or instructions affecting their work. Do not proceed with work in areas where notice of change or instructions indicate possible modifications to the work.

1.19 PRE-COMMISSIONING

.1 Prior to commissioning systems, perform the following work. Carry out other work as required to properly prepare systems and equipment for start-up.

.1 Grout, shim, and align equipment by qualified millwright. Record and submit certified reports.

.2 Clean existing and new fan plenums and duct systems of construction dust and install temporary filters.

.3 Remove restraints from noise, vibration, and flexible connection devices.

.4 Service and lubricate existing and newequipment as per manufacturer's data. Ensure grease connections are properly installed, accessible, and functioning. Extend where required.

.7 Remove preservative coatings from all unpainted machine finished surfaces. Spread machine oil over such surfaces to protect, except flange faces for piping which are to be made up dry.

.8 Co-ordinate with electrical contractor to bump electric motors to ensure proper rotation.

.9 Complete valve tagging and identifying of systems.

.10 Review and ensure access doors are suitably located and easily accessible, including plumbing clean-outs.

.11 Make necessary tests on equipment including those required by authorities. Obtain certificates of approval. Complete all testing of ductwork and piping systems.

.12 Check operations of plumbing and drainage systems and fixtures, and ensure fixtures are solidly supported.

1.20 COMMISSIONING

.1 Be responsible for the orderly start-up of all equipment and systems and place into operating condition.

.2 Notify the Consultant at least 48 hours in advance of the intended start-up sequence.

.3 Make all necessary arrangements with manufacturers and have them available to assist in start-up and operation of their equipment.

.4 Perform no start-up until electrical check-out of all components within a system has been completed.

.5 Start-up by system and start no systems until all components within that system are ready to operate.

.6 Start systems and equipment at part capacity and gradually run-in to design operating capacity or temperature meanwhile checking critical components.

.7 During the course of testing and start-up, record information in an equipment start-up test run log.

1.21 OPERATING AND MAINTENANCE INSTRUCTIONS

.1 Provide a minimum of two one-half day instructional sessions to ensure the Owner's operators are knowledgeable of the equipment and systems to the satisfaction of the Owner and Consultant. The first session shall be prior to final prove-out and the second shall be at the first major seasonal change.

.2 Arrange for sub-contractors and manufacturers representative to attend and explain the operation of special equipment and systems.

.3 At the time of final performance test, once all systems have been trial operated and adjusted, provide written and oral "hands-on" operating instructions to the Owner's operators.

.4 As a minimum, the training program shall include the following:
- Fan lubrication and maintenance,
- Valve repair and maintenance,
- Control system operating and maintenance,
- Explanation of maintenance manuals,
- Systems descriptions and sequences of operation,
- Seasonal change-over requirements,
- Major equipment and special systems operating and maintenance,
- Plumbing and fire protection systems and equipment operation and maintenance.

.5 Training shall be in a classroom atmosphere followed by a site tour for an explanation of the topics covered.

.6 Advise the Owner and Consultant in writing, a minimum of two (2) weeks in advance of the training sessions.

1.22 SEMI-FINAL INSPECTION (APPROXIMATELY 90% COMPLETION)

.1 Prior to semi-final inspection, ensure that as a minimum, the following items have been completed:

(It is not the intention of inspections to create a check list for the Contractor and inspection will be delayed if items are not reasonably completed to the satisfaction of the Consultant.)

.1 Complete pre-commissioning.

.2 Complete commissioning with alarm controls operating although systems do not necessarily have to be ready for final prove-out.

.3 Mail warranties to manufacturers and submit a copy of original warranty for equipment which has a warranty period longer than one (1) year.

.4 Submit a sample of operating maintenance manuals.

.5 Arrange performance test date and operating maintenance instructions and submit schedule for approval.

.6 Submit a list of items which will be deficient at the time of final inspection.

1.23 FINAL INSPECTION (APPROXIMATELY 95% COMPLETION)

.1 Prior to final inspection, perform the following:

.1 Indicate in writing at the time of request for final inspection that semi-final deficiencies have been completed.

.2 Clean equipment inside and out. Clean plumbing fixtures and brass. Have specified filters in place.

.3 Calibrate and adjust thermostats, thermometers, gauges, linkages and dampers. Control valves shall operate freely.

.4 Operate and test motors and speed switches. Check overload heaters in motor starters.

.5 Replace and clean filters. Clean fan wheel and coils.

.6 Remove and clean strainers.

.7 Fasten loose and rattling pieces of equipment.

1.24 SUBSTANTIAL PERFORMANCE INSPECTION (97% COMPLETION)

.1 Prior to substantial performance inspection, the following items must be completed or provided to permit beneficial use by the Owner.

.1 Approved and submitted maintenance and operating manuals.

.2 As-built drawings.

.3 Balancing reports.

.4 Equipment start-up test run logs and prove-out of all control system operating sequences.

.5 Contractor's warranty and certification in writing by the Contractor that all systems are complete and fully functional.

.6 Performance tests.

.7 First training session of operating and maintenance instructions to the Owner's operators.

1.25 TOTAL PERFORMANCE INSPECTION

.1 Prior to total performance inspection:

.1 Complete all deficiencies arising out of previous inspections.

.2 Clean or replace any filters or strainers that may have become dirty.

1.26 PRE-WARRANTY AND WARRANTY INSPECTIONS

.1 Be available and carry costs to attend pre-warranty and warranty inspections and to complete any deficiencies arising during the first year of operation.

1.27 SPECIAL TOOLS AND SPARE PARTS

.1 Furnish spare parts as follows:

.1 Spares as identified on the drawings and in the specifications.

.2 Minimum one (1) spare set of filters unless specified otherwise.

.2 Identify spare parts containers as to contents and replacement parts number.

.3 Provide one set of special tools required to service equipment as recommended by manufacturer. Mount in metal cabinet with doors near equipment.

END OF SECTION

PART 1 GENERAL

1.1 This section specifies the requirements for motors, drives and guards.

PART 2 & 3 PRODUCTS & EXECUTION

2.1 MOTORS

.1 This Contractor shall be responsible to supply all mechanical equipment complete with electric motors.

.2 Motors shall be suitable for hard and continuous services according to CEMA and CSA Standards and shall operate free of vibration. Motors shall open drip proof, totally enclosed fan cooled or explosion proof as required for the service indicated. Under full load the temperature rise shall not exceed 40^{o}C for open type and 50^{o}C for drip proof. Motors shall have pre-lubricated ball or roller type bearings. Motors used for similar functions such as fans, etc., shall be of the same temperature. Each motor shall be provided with a conduit terminal box.

.3 All motors shall operate at 1200 or 1750 rpm, unless specifically noted otherwise; motors 0.25 kW and smaller shall be 120 volts, single phase, 60 cycle and motors 0.56 kW and larger shall be 3 phase, 60 cycle, unless specified otherwise.

.4 The electrical trade shall be responsible to supply all motor starters and disconnect switches, for all motors for the project, unless otherwise noted. The Contractor shall review the electrical drawings and motor schedule and shall confirm with the electrical trade all motor voltages, phase, kW, switches, thermostats, etc., and location of electrical equipment for the work.

.5 Over current overload protective devices shall not be mounted on or form an integral part of the motor and shall be provided by the Electrical Contractor unless specifically specified otherwise.

.6 Motor noise criteria shall not exceed NC 60.

.7 Unless specifically noted otherwise, the following shall apply for electrical wiring for the mechanical equipment on the project:

.1 Circuit wiring to motors, starters (unless otherwise specified) and disconnect switches (unless otherwise specified) shall be provided by the Electrical Contractor. Mechanical Contractor to be responsible for motor location, and supply and installation of all automatic controls and associated safety devices, through the Controls Sub-Contractor.

.8 Motors shall be of the "Energy Efficient" type. All motors shall have a service factor of 1.15. The following shall be of a guide of minimum motor efficiencies accepted at full load: 0.75 kW (1 hp) to 1.5 kW (2 hp) - 82%; 2.24 kW (3 hp) to 5.6 kW (7.5 hp) - 86%; 7.5 kW (10 hp) to 18.65 kW (25 hp) - 90%; 22.4 kW (30 hp) to 37.3 kW (50 hp) - 91%; over 37.3 kW (50 hp) - 93%. Efficiencies for 50% load shall not be less than 2 percentage points lower than those listed for full load, ie. 0.75 kW motor minimum

efficiency to be 78% at 50% load. Fan manufacturers shall submit motor efficiency curves with certified prints.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the supply and installation of supports, anchors and seals, including pipe hangers and supports, duct hangers and supports, flashing, sleeving and concrete bases for mechanical products.

1.2 REFERENCE STANDARDS

.1 Power piping ANSI B31.

.2 Manufacturer's Standardization Society, MSS-SP58, SP-69, SP-89; pipe hangers and supports.

.3 SMACNA - Duct Construction Standards.

.4 CSA B149 for Propane and Gas Plumbing.

.5 Alberta Plumbing Code.

.6 Roofing and Sheet Metal Section of CONSULTANTural.

1.3 QUALITY ASSURANCE

.1 Selection and application of hangers and supports shall be by the Contractor subject to approval by the CONSULTANT.

.2 Submit shop drawings and selections for hangers and supports for review by the CONSULTANT for all piping 150 mm and over.

1.4 GENERAL REQUIREMENTS

.1 Provide hangers and supports to secure equipment in place, prevent vibration, maintain grade, provide for expansion and contraction and to accommodate insulation.

.2 Install supports of strength and rigidity to suit loading without unduly stressing building. Locate adjacent to equipment to prevent undue stresses in piping and equipment.

.3 Select hangers and supports to withstand static and dynamic loading to which the piping and associated equipment may be subjected and in accordance with the manufacturer's recommended maximum loading. Hangers shall have a safety factor of 5. Select so they cannot become dislodged by movement of pipe and select to provide the degree of control and movement that the piping system operating characteristics require.

.4 Fasten hangers and supports to building steel or inserts in concrete construction. Do no welding, cutting, or drilling of structural components without approval from the CONSULTANT.

.5 In corrosive atmosphere,or, below grade and under slab, hangers, supports, and rods shall be electro-galvanized, hot dipped galvanized and painted, or stainless steel.

.6 Provide and set sleeves required for equipment including openings required for placing equipment.

.7 Provide copper plated or copper hangers for copper piping. Use plastic grommets to isolate copper piping from steel studs.

.8 Obtain approval from the CONSULTANT prior to using percussion type fastening.

.9 Use of existing equipment, or piping, for hanger supports is not permitted.

.10 Use of perforated band iron, wire or chain as hangers are not permitted.

PART 2 PRODUCTS

2.1 PIPE HANGERS

Service	Nominal Pipe Size	Hanger Type
All Services	12 to 38	Adjustable wrought ring or clevis.
All Services	50 to 100	Adjustable wrought clevis.
Hot Piping	150 to 300	Adjustable steel yoke and pipe roll.
Cold Piping	150 to 300	Adjustable wrought clevis.
Cold Insulated Piping With Vapour Barrier; Refrigerant Hot Gas	All Sizes	Protection shield.
Hot Insulated Piping	150 to 300	Protection saddle
Riser Expansion to Horizontal Runs required).	All Sizes	Spring hangers (cushion, variable or constant support as
Fittings On Suspended AC Pipe	All Sizes	Double retaining hangers and/or retaining clamps.
Supported piping beneath structural slab on grade.	All Sizes	Adjustable ring or clevis hanger with rod and lock nut, all parts galvanized.

2.2 PIPE SUPPORTS

Use	Service	Nominal Size	Support Type
Wall	All Services	To 80 mm	Cast iron hook or steel and hanger.
Vertical	All Services		Riser clamp.

Use	Service	Nominal Size	Support Type
Floor	Hot Piping	To 75 mm	Adjustable pipe saddle, locknut floor flange and concrete pier to steel support.
Floor	Ambient and Cold Piping	All Sizes	Adjustable pipe saddle lock nut, floor flange and concrete pier to steel support.
Multiple Supports	All Services	All Sizes	Back to back steel channel with welded spacer; steel angle.
Grouped Piping Parallel to Walls	Unisulated All Services	To 50mm	Bracket and Clamp equal to "Unistrut".

2.3 HANGER RODS AND ATTACHMENTS

.1 Provide mild steel hanger rod threaded and sized to suit hanger, attachment and load, c/w locking nuts.

.2 Provide clamped attachments to building structural. Provide welded and bolt attachments only when approved by the CONSULTANT to the requirements of the CONSULTANT.

2.4 INSERTS

.1 Inserts shall be malleable iron case or galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.

.2 Size inserts to suit full size of threaded hanger rods.

2.5 DUCT HANGERS AND SUPPORTS

.1 Hangers: Galvanized steel band iron or rolled angle with rods.

.2 Wall Supports: Galvanized steel band iron or fabricated wall bracket.

.3 Vertical Supports at Floors: Rolled angle.

2.6 SLEEVES

.1 Through floors and nonload bearing walls: 18 Ga galv. steel.

.2 Through beams, load bearing walls, fire proofing, potentially wet floors: Steel pipe.

.3 Through footings, below grade walls and continually wet floors: Steel pipe with annular ring at midpoint; for floors, galvanized and extend 25 mm above finished floor.

.4 As Pipe Guides: Steel pipe with anchors to concrete.

.5 Removable Sleeves: Wood, plastic, plaster, or sheet metal; strength to withstand concrete pressure and to maintain clearances for expansion, movement, and where applicable, insulation.

.6 All sleeves for wet areas shall be galvanized.

.7 For Copper Piping: Removable sleeves; plastic grommets for steel studs; isolate from any steel sleeves.

.8 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint.

2.7 FLASHING

.1 Steel Flashing: 24 Ga galvanized steel.

.2 Lead Flashing: 25 kg/sq. meter sheet lead for waterproofing, 5 kg/sq. metre sheet lead for soundproofing.

.3 Safes: 25 kg/sq. metre sheet lead or 200 micrometre neoprene, closed cell.

.4 Caps: Steel 22 Ga thickness minimum, 16 Ga thickness at fire resistance structures.

2.8 CONCRETE

.1 Provide minimum 20 MPa concrete where required for bases, piers, thrust blocks, supports, or underslab ductwork.

2.9 STOPPING - FIRE RESISTANT STRUCTURES

.1 All packing and firestopping material shall be UL and ULC listed and labelled and approved for the use intended by authorities having jurisdiction. Submit shop drawings or systems proposed.

.2 Thermal Fibre Safing: Thermal mineral fibre safing insulation packed to leave no voids and covered with fire resistive mastic vapour barrier coating reinforced where required with woven glass fibre to ensure durable surface. Protect where accessible with closure plates.

.3 Cementitious Mixture: Factory premixed cementitious mixture requiring only the addition of water, specifically prepared for use in fire resistive structures.

.4 Expanding Synthetic Elastomers: Synthetic expanding elastomers in caulk, putty, and sheet form expanding when exposed to heat to provide fire, water and smoke barrier.

.5 Two Part Silicone Elastomer: Medium density two part product mixed upon application to expand and cure to a foamed elastomer.

.6 Under no circumstances will motar or concrete be allowed for fire-stopping.

.7 Fire-stopping of plastic piping through fire resistant structures shall be to the approval of the Department of Environment and Public Safety, (Department of Labour), authorities having jurisdiction, and the CONSULTANT.

2.10 STOPPING - OTHER

.1 For future use sleeves: Fill with gypsum plaster, firestop if in fire resistant structures.

.2 For piping exiting the building through below grade floors and foundation walls: Prefabricated water tight packing rings with multiple sealing links.

.3 For piping through finished surfaces: Chrome plated escutcheons.

.4 For piping and ductwork general: Grouting and gypsum plaster to match surface penetrated.

PART 3 EXECUTION

3.1 INSERTS

.1 Use inserts for suspended hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.

.2 Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying piping over 100 mm or ducts over 1500 mm wide.

.3 Where concrete slabs form finished ceiling, finish inserts flush with slab surface.

.4 Where inserts are omitted, drill through concrete slab form below and provide rod with recessed square steel plate and nut above slab.

3.2 PIPE HANGERS AND SUPPORTS

.1 Support horizontal piping as follows, to local code or manufacturer recommendations whichever is the more stringent:

.1 Sch. 40 Steel/Copper Type 'M' or 'L'

Pipe Size (mm)	Steel Sch. 40 (m)	Copper (m)
20 mm and smaller	1.8	1.2
25 to 40	2.1	1.5
50 to 65	3.0	2.1
75 to 100	3.5	2.7
150 to 200	5.0	-
250 to 300	6.0	-

.2 Cast Iron DWV/A/C Pipe

.1 At or adjacent to each hub or joint.

.2 Max. 1500 c-c.

.3 Max. 1000 c-c if pipe has mechanical joints and length between fittings is 300 mm or less.

.3 ABS or PVC Plastic Pipe

.1 Max. 1200 c-c unless specifically scheduled or indicated otherwise.

.2 At changes of direction or elevation at traps, and at changes to other piping material.

.3 12 mm & smaller - support full length.

.4 CPVC Plastic Pipe

.1 Max. 1000 mm c-c.

.2 Install hangers to provide minimum 12 mm clear space between finished covering and adjacent work.

.3 Place a hanger within 300 mm of each horizontal elbow, valve, control valves, specialties, etc. and at changes in direction or other concentrated loads requiring additional support.

.4 Use hangers which are vertically adjustable 40 mm minimum after piping is erected.

.5 Support horizontal soil pipe near each hub, with 1.5 m maximum spacing between hangers.

.6 Support vertical piping at every other floor. Support vertical soil pipe at each floor at hub.

.7 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

.8 Where practical, support riser piping independently of connected horizontal piping.

.9 Install plastic inserts between steel studs and walls.

.10 Where there is horizontal movement at a suspended hanger location, select components to allow for swing. If vertical angle of hanger rod exceeds 4 degrees, use a travelling device for horizontal movement. See detail for pipe penetrations through structural slab.

.11 Use copper plated,or equally a hangers on copper pipe.

.12 First hangers off of equipment shall not exceed 1/2 the allowable span.

3.3 HANGER RODS AND ATTACHMENTS

.1 Maintain with space permitting, a minimum hanger rod length of 150 mm.

.2 Provide sufficient threads on hanger rod to allow for an adjustment of levels.

.3 Provide double nut or lock nut arrangements and lock to position after adjustment.

3.4 DUCT HANGERS AND SUPPORTS

.1 General

.1 Select supports, hangers, rods, strap and attachments according to SMACNA, but no less than values listed in this part.

.2 Where rectangular duct insulation exceeds 38 mm on low pressure or 60 mm on medium or high pressure duct, **add** to hanger and support capacities for the extra load.

.3 Select hanger and support capacities to accommodate any extra anticipated external loads, eg. exterior acoustical insulation, wind, snow, etc.

.4 All hanger construction and fabrication shall conform to SMACNA, AISC, and AISI design manuals.

.5 Locate rod, strap, or anchor attachment within 50 mm of its duct load.

.2 Rectangular Duct Hangers to Pressure Class 500 Pa

Maximum Half of Duct Perimeter (mm)	Hanger Pair at 2400 mm Maximum Spacing		
P/2	Trapeze	Strap (mm)	Rod (mm)
1500	25 x 25 x 3	25 x 20 Ga	6
1800	40 x 40 x 3	25 x 20 Ga	6
2400	40 x 40 x 3	25 x 18 Ga	6
3050	40 x 40 x 3	25 x 18 Ga	9
4260	50 x 50 x 3	25 x 16 Ga	9
4870	50 x 50 x 5	40 x 16 Ga	12

.3 Rectangular Duct Hangers, Pressure Classes 750 Pa & Over

Maximum Half of Duct Perimeter (mm)	Hanger Pair at 2.4 m Maximum Spacing		
P/2	Trapeze Angle	Hanger Rod (mm)	Strap Hanger
To 1800	-	6	25 x 18 Ga
2100	50 x 50 x 6	9	25 x 18 Ga
3000	50 x 50 x 6	9	25 x 18 Ga
4260	65 x 65 x 5	9	25 x 16 Ga
4870	65 x 65 x 5	12	40 x 16 Ga

.4 Round Duct Hangers

Maximum Duct Dia. (mm)	Hanger Rod (mm)	Strap Hanger at Maximum 3.6 mm Spacing**
Up to 300	6	One - 25 x 22 Ga
600	6	One - 25 x 20 Ga
914	9	One - 25 x 18 Ga

**** For insulated ductwork, double hanger requirements.**

.5 Vertical Duct Supports

.1 Support duct risers from floor with angle iron supports and from walls with band or fabricated brackets with angle brace.

Maximum Half of Duct Perimeter P/2 mm	Pair of Floor Supports (mm)	Band	Bracket Angle Size
600	40 x 40 x 3	40 x 16 Ga	-
900	40 x 40 x 3	25 x 3 mm	25 x 25 x 3 mm

* Maximum unsupported length 3.6 m.

3.5 SLEEVES, STOPPING AND ESCUTCHEONS

.1 Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.

.2 Provide sleeves in steel beams to approval of CONSULTANT. Do no cutting or burning of structural without approval.

.3 Provide chrome plated escutcheons. Escutcheon must be installed flush to walls and floors.

.4 Provide stopping to suit structure penetrated by duct or pipe. Use approved firestopping at penetrations through fire resistive structures.

.5 Stop around fire dampers and firestop flaps to manufacturer's installation instructions.

.6 Be responsible for the proper size and location of openings provided by others.

.7 Carry insulation through all structure penetrations that are not fire resistive. Protect vapour barrier jackets from damage.

.8 Do not carry piping insulation through fire resistive structures. Terminate at structure and firestop. Seal open end of pipe insulation with vapour barrier jacket.

.9 Optional: Carry piping insulation continuously through the fire resistive structure and firestop using approved expanding elastomer in accordance to manufacturer's instructions. Method must be approved prior to use.

.10 For more than two pipes in an individual penetration, use approved expanding synthetic or two part silicone elastomer.

3.6 FLASHING

.1 Flash and counterflash where mechanical equipment passes through weather or water proofed walls, floors and roofs.

.2 For IRMA roof, provide specified vent sleeves, sealed & caulked for alternate built-up roof.

.3 Flash vent and soil pipes projecting 75 mm minimum above finished roof surfaces with lead worked 25 mm minimum into hub, 200 mm minimum clear on sides with minimum 600 x 600 mm sheet size. For pipes through outside walls turn flange back into wall and caulk. Where approved by the CONSULTANT, use aluminum dome flashing with neoprene seal for roof surface. Conform also to CONSULTANTural details.

.4 Flash floor drains over finished areas or basement with lead or neoprene 250 mm clear on sides with minimum 920 x 920 mm sheet size. Fasten flashing to drain clamp device.

.5 Provide continuous lead or neoprene safes below built-up mop sinks, shower stalls, floor drain located above finished rooms. Solder at joints, flash into floor drains and turn up 150 mm into walls or to top of curbs and caulk into joints. Where floors are membrane style, provide floor drain with clamping collar of style approved by the flooring manufacturer.

.6 Provide lead flashing around ducts and pipes passing from equipment rooms, installed according to manufacturer's data for sound control.

3.7 EQUIPMENT BASES AND SUPPORTS

.1 Provide for major equipment reinforced concrete housekeeping bases poured directly on structural floor slabs 100 mm thick extended 100 mm beyond machinery bedplates. Provide templates, anchor bolts, and accessories for mounting or anchoring equipment.

.2 Provide concrete for equipment inertia bases.

.3 Level housekeeping pads independent of grade slope.

.6 Edge of housekeeping pad shall have 25 mm chamfer.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for supply and installation of vibration isolation systems, including vibration isolators and inertia bases.

1.2 REFERENCE STANDARD

.1 Provide and install mechanical products so that average noise criteria curves, as outlined in ASHRAE Guide, are not exceeded.

1.3 SHOP DRAWINGS

.1 Submit to CONSULTANTing shop drawings which clearly indicate make, model, vibration isolation locations, load on each isolator and including installation instructions.

1.4 GENERAL REQUIREMENTS

.1 Supply vibration products by one supplier. Consider side loading of equipment being isolated when calculating maximum loads on isolators.

.2 Ensure equipment is sufficiently rigid for isolator point loading, provide reinforcing where it is evident that equipment is not sufficiently rigid.

PART 2 PRODUCTS

2.1 VIBRATION ISOLATORS

.1 Provide spring isolators, base mounted.

.2 Provide spring isolators, suspension hanger.

.3 Provide rubber-in-shear isolators.

.4 Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

.5 Colour code spring mounts, springs selected to operate at no greater than 2/3 solid deflection and have 6 mm ribbed neoprene pads for base mounting.

.6 Refer to isolation schedule for isolation requirements for major equipment.

.7 All spring isolators shall have vertical height and levelling adjustment and shall set on neoprene anti-sound pads, 2 mm or thicker. Sponge rubber will not be accepted for side snubbers. Spring isolation for ceiling mounted equipment shall have box frames and anti-sound spring seats. All hardware shall be corrosion resistant.

2.2 ISOLATION PADS

.1 Isolation pads to be neoprene steel neoprene.

2.3 INERTIA BASES

.1 Reinforced 21 Mpa concrete base with fill depth perimeter structural channel frame, with gusseted brackets and anchor bolts.

2.4 VIBRATION ISOLATION

.1 Vibration isolation shall be designed in accordance with the following table, unless otherwise indicated. The speed to determine static deflections shall be the lowest speed rotation of the equipment. Consideration shall be given to side loading of equipment, and inertia pads when calculating maximum loads on isolators; provide pairs of side snubbers and/or restraining springs where side torque or thrust may develop, when properly adjusted the equipment shall be level when operating.

Table of Isolator Operating Static Deflections (mm)

Location	900& Over	450-899	350-499	250-349	Under 250 rpm
Main Floor	25	50	75	100	125
Bsmt/ clg	25	50	75	100	125

PART 3 EXECUTION

3.1 APPLICATION

.1 Provide vibration isolators for mechanical motor driven products throughout, unless specifically noted otherwise.

.2 Provide spring isolators, base mounted or suspension type as required, for air handling units and fans.

.3 Provide flexible pipe connectors on pipes where indicated and at equipment with spring isolation.

.4 Select flexible pipe connectors at equipment so as not to inhibit performance of vibration isolators.

3.2 INSTALLATION

.1 Provide spring isolators on piping connected to isolated equipment as follows: Up to 100 mm diameter, first 3 points of support. Static deflection of first point shall be twice deflection of isolated equipment.

3.3 PERFORMANCE

.1 Vibration isolation efficiency shall be 95% for floor mounted equipment and 98% for suspended equipment having disturbing frequencies of 1200 cpm or greater.

.2 Equipment having disturbing frequencies below 1200 cpm and fitted with spring isolators shall be equipped with isolators having a static deflection between 25 mm and 32 mm.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for painting, labelling and indexing of piping, valves, ductwork, and equipment, etc. as required to provide rapid convenient and safe identification of system components.

1.2 REFERENCE STANDARDS

.1 Identification of piping CSA B53-1958.

.2 Colour coding schedule CGSB-1GP-12C.

.3 Primary colour paint CGSB-1GP-60M.

.4 Painting specifications section.

1.3 PAINTING

.1 All painting of mechanical piping, equipment, and ductwork shall be done by the Painting Contractor. This includes the painting of symbols and indentificaiton markings which shall be done in co-operation with the Mechanical Contractor. Work shall be done in accordance with this sections and painting specifications.

.2 Painting of exposed to view piping, ductwork and equipment in finished areas when specified by the Consultant shall be in accordance to the painting specification section with identification as specified herein.

.3 Painting of piping, ductwork and unfinished equipment in mechanical or other service rooms when specified by the Consultant, shall be in accordance with the painting specifications section and the schedule specified herein.

.4 Where pipe insulation is covered with a PVC jacket do no paint insulation jacket. Provide identification as specified herein.

1.4 CLASSIFICATION

.1 Markers shall identify the material hazard classification:

Medium	Primary Classification	
Dangerous Materials	Yellow	505-101
Low Hazard Materials	Green	503-107
Safe and Protective Materials	Blue	202-101

Secondary Classification Colours		Legend Type and Direction Arrows	
Orange	508-102	Black	512-101
Purple	511-101	White	513-101
Black	512-101		
Yellow	505-101		
White	513-101		

.2 Refer to the System Identification Schedule for reference in preparing the identification scheme. Submit a final schedule of colours, markers, and legends to the Consultant and Consultant for approval.

1.5 RECORD DRAWINGS AND SCHEDULES

.1 Provide for each system or suitable group of systems a coloured flow diagram of 11" X 17" (275 mm X 425 mm) minimum size mounted in glass frame in the mechanical room. Diagram shall include the colour schedule, valve tag, legend, valve number, service, function, normal operating position and location. A copy shall be included in the Maintenance Manuals.

PART 2 PRODUCTS

2.1 PAINTING AND STENCILLING

.1 Provide colours based on CIL CILUX maintenance finishes, ALKYD enamel or approved equivalent. Use high temperature aluminum where indicated or required to suit surface temperatures.

.2 Refer to section 09900 for additional painting specifications and requirements.

2.2 MANUFACTURED MARKERS

.1 Provide wrap around type plastic material with protective overcoating and waterproof contact adhesive undercoating suitable for continuous operating temperature of 15^{o}C and intermitted temperature of 200^{o}C. Apply to prepared surface.

.2 All bands shall overlap to secure margins. Locate markers and classifying colours so they can be seen from floor or platform.

.3 Legend shall be pre-fabricated for all common materials.

.4 Detailed selection of marker and band material shall suit pipe surface.

.5 Provide stainless steel bands for securing markers on piping larger than 150.

.6 Acceptable products: Brady, S.M.S.

2.3 SYMBOL SIZES

Pipe Diameter	Letter Height (mm)	Manufactured Band Width (mm)	Manufactured Marker Width (mm)
15 - 20	10	40	40
25 - 64	20	60	60
75 - 130	50	60	60

2.4 SMALL PIPING TAGS

.1 For pipe sizes 20 mm and smaller, use tags minimum 40 mm square or round, colour coded plastic or anodized aluminum. Tag colour and legend to match pipe identification code and show valve number. Fasten with #6 nickel plated bead chain.

2.5 NAMEPLATES

.1 Provide phenolic plastic laminate machine engraved black plate with white letters. Mechanically fasten to surface with chrome or nickel screws; where not possible use #6 nickel plated key chain.

.2 Minimum nameplate letter heights to be as follows:

- Electric and pneumatic control devices, instruments, switches, remote push button stations, relays, control valves. (Key to control schematics on which items are numbered in sequence.)
- 6 mm
- Fans and all other major equipment.
- 12 mm

.3 Plate height to be 1-1/2 times the letter height for each line. Where length and height exceed 150 mm, use two plates.

.4 In finished areas, colour of lamacoid nameplates shall be by the Architect.

2.6 VALVE TAGS

.1 Provide 40 mm square or round stamped aluminum or brass tags with black letters. Tag shall show pipe medium code and valve number, secure with #6 nickel plated bead chain.

.2 For piping 20 mm dia. and smaller tag shall be coloured plastic or anodized aluminum to match pipe identification colour.

PART 3 EXECUTION

3.1 GENERAL

.1 All equipment such as fans, air conditioning units, access doors, motors, etc. shall have prime coat of paint applied at the factory before shipment. If this prime coat has been damaged during shipment or installation, touch up all parts with red lead or other suitable

primer and leave for painting by the subcontractor-section 09900; colours shall be selected by the Architect.

.2 When delivered pre-finished, touch up any factory painted baked enamel finish with matching colours where same has been damaged during shipment or installation, subject to the approval of the Consultant, and if not acceptable, replace. Where specified by the Architect, include to repaint pre-finished equipment.

3.2 PIPING IDENTIFICATION

.1 Ensure that piping identification colour codes conform to material hazard classifications. The Mechanical subcontractor shall ensure that all piping systems are properly classified. Consult the Consultant where there is doubt as to the exact characteristics of the material.

.2 Identify all piping systems with manufactured wrap around type markers showing name of service, hazard identification and flow direction.

.3 Apply bands on finished piping surfaces immediately adjacent to all inlets and outlets of each piece of equipment including all valves, fittings, etc. at the entrance and exit of every room and a 6 m intervals within a room or on each side of a barrier of obstruction.

.4 Identify at 15 m intervals, before and after passing through walls, at access doors, changes in direction or at intervals closer than 15 m in equipment rooms.

.5 Identify all valves and control components, except at plumbing fixtures and radiations. Use flags and valves and nameplates for control components.

.6 Identify piping runs at least once in each room or space.

.7 Identify piping at starting and ending points of runs and at each piece of equipment.

3.3 DUCTWORK IDENTIFICATION

.1 Identify ductwork functions and service with 50 mm high black stencilled lettering and directional flow arrow 150 mm long.

.2 Identify ducts at each side of dividing walls or partitions and beside each access door.

.3 Stencil over final finish only.

.4 Identify all operators, regulators, controllers, access openings, etc. associated with air handling systems. Indicate function and operating positions. Variable position controllers shall be provided with graduated indication of damper position.

.5 At access doors to fire dampers, stencil "Fire Damper".

.6 Maintain 15 m maximum distance between markings.

3.4 EQUIPMENT IDENTIFICATION

.1 Provide nameplates for all major items of equipment. Identify equipment type, number, service, and area of zone served .

.2 Fasten nameplates securely in a conspicuous place.

.3 Identify all equipment with a motor.

3.5 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify control devices, instruments, switches, remote stations, control valves with nameplates key to control schematics. Identify setpoints on the nameplate.

.2 Switches in finished areas shall be identified.

.3 Thermostats in finished areas controlling room temperature need not be identified unless otherwise indicated.

.4 Thermostats in finished areas controlling equipment eg. fans, shall be identified.

3.8 STANDARD SCHEDULE OF COLOURS AND CODES

Legend	Painted Marker Colour	Legend (Letter) Colour	Primary Band Colour	Code
Dom. Cold Water	Green	White	Green	DCW
Dom. Hot Water	Green	White	Green	DHW
Sanitary Sewer	Green	White	Green	SS
Sewer Vent	Yellow	White	Green	SV

3.9 NO PAINT ITEMS

.1 Do not paint: fire extinguishers, equipment nameplates, equipment name tags, escutcheons, items with chromed finish.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the systems and performance testing of the work under this contract.

1.2 QUALITY ASSURANCE

.1 Test equipment and material where required by specification or authority having jurisdiction to demonstrate its proper and safe operation.

.2 Test procedures in accordance with applicable portions of ASME, ASHRAE, and other recognized test codes as far as field conditions permit.

.3 Perform tests on site before and witnessed by the Consultant. Provide minimum 72 hours notice.

.4 Piping, fixtures or equipment shall not be concealed or covered until inspected and approved. Provide ample written notice to the Consultant before tests.

1.3 SUBMITTALS

.1 Obtain certificates of approval, acceptance, and comply with rules and regulations from authorities having jurisdiction and include in Operating and Maintenance Manuals.

.2 Written logs and data shall be made and recorded at the site for all pressure and performance tests and these shall become the property of the Owner. The logs shall contain the detailed data of each test including the time test was performed and personnel responsible for the tests. Include in Operating and Maintenance Manuals.

1.4 LIABILITY

.1 Take charge of plant tests, assume responsibility for damages in event of injury to personnel, building or equipment and bear cost for liability, repairs, and restoration in this connection.

PART 2 PRODUCTS

.1 Not applicable.

PART 3 EXECUTION

3.1 GENERAL

.1 Provide equipment, materials, and labour for tests and pay expenses. Use test instruments by approved laboratory or manufacturer and furnish certificate showing degree of accuracy. Install permanent gauges and thermometers used for tests just prior to tests to avoid possible changes in calibration.

.2 Carry out hydraulic tests for 8 hour periods and maintain pressure with no appreciable pressure drop. Where leakage occurs, repair and retest. Hydrostatic test pressures shall not be less than 1.5 times the design pressure or as specified by the applicable code, but arrange so as to not exceed the maximum allowable test pressure of any non-isolated component.

.3 When using water as test medium for system not using water or steam, excavate and dehydrate the piping and certify the lines are dry. Use agency specializing in this type of work.

.4 Should tests indicate defective work or variance with specified requirements, make changes immediately to correct the defects. Correct piping leaks by remaking joints in screwed fittings, cutting out and rewelding welded joints, remaking joints in copper lines. Do not caulk. Remake and/or reseal ductwork joints and seams to effectively close to meet test standards. Retest.

.5 During heating and cooling piping system tests, check linear expansion at elbows, U bends, expansion joints, and offsets for proper clearance.

.6 Check systems during application of test pressure including visual check for leakage of water test medium; soap bubble test for air or nitrogen test medium and halide torch for refrigerant medium.

.7 Final testing of high and low pressure duct systems shall be witnessed by an independent testing and balancing agency, preliminary tests shall be by the Contractor.

3.2 PRESSURE TESTS

.1 Domestic Water Piping: Test to 860 kPa water pressure measured at system low point.

.2 Drainage Systems: Test by filling with water to produce water pressure of 1.5 W.C. minimum and 8 m W.C. maximum, and as required by authorities having jurisdiction.

.3 Low Velocity Ducts: (Pressure Class 500 Pa & lower) Test for tightness such that leakage is inaudible and not detectable by feel.

.4 Refrigerant Piping: Test with nitrogen to 2068 kPa on high pressure side and 1034 kPa on low pressure side. Excavate to 715 mm of HG for 12 hours. Use electronic detector test for leaks.

.5 Water, Sanitary and Storm Sewer Services:Test to requirements of local authorities and as specified. See Site Services - Services Connections section.

3.3 PERFORMANCE TESTS

.1 Conduct performance tests to demonstrate equipment and systems meet specified requirements after mechanical installations are completed and pressure tested. Conduct tests as soon as conditions permit. Make changes, repairs, adjustments, and replacements required as tests may indicate prior to operating tests.

.2 Make operating tests during heating season of first year of operation and at times when directed, for proper settings of controls under peak load conditions. Tests shall be for a minimum of five (5) continuous eight (8) hour days.

.3 Conduct final operating tests in presence of the Consultant or Consultant. Vary loads to illustrate start-up and shutdown, sequence, and simulate emergency conditions for safety shutdowns with automatic and manual reset. Repair and test defects until satisfactory. Make final adjustments to suit exact building conditions.

.4 Provide services of one job mechanic, ladders, tools, and associated equipment required to assist in the final tests.

TESTING REPORT

(COPIES OF TEST REPORTS SHALL BE INCLUDED IN MAINTENANCE MANUALS)

PROJECT _____ DATE

GENERAL CONTRACTOR

MECHANICAL CONTRACTOR

SYSTEM TESTED

TEST MEDIUM

DATE AND TIME TEST BEGUN

DATE AND TIME TEST TERMINATED

DURATION OF TEST TEST PRESSURE

TESTED BY OF

WITNESSED BY OF

REMARKS:

SKETCH:

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for supply and installation of duct, piping and mechanical equipment insulation, including adhesive, tie wires, tape and recovering, as specified herein.

1.2 QUALITY ASSURANCE

.1 Insulation shall be installed by skilled workmen regularly engaged in this type of work.

.2 Conform to the applicable and related standards of:

.1 Canadian Standards Specification Board (CGSB).

.2 National Fire Protection Association NFPA 90A, NFPA 90B.

.3 Underwriters' Laboratories of Canada (ULC).

1.3 SHOP DRAWINGS

.1 Submit shop drawings to Consultant, including product data, list of products proposed and thickness of products for individual services.

1.4 DEFINITION

.1 References to round duct shall also apply to flat oval ductwork unless otherwise indicated.

PART 2 PRODUCTS

2.1 GENERAL

.1 Deliver products to job site in original nonbroken factory packaging, labelled with manufacturer's density and thickness.

.2 Insulation products and adhesives shall bear composite fire and smoke hazard ratings not exceeding 25 for flame spread and 50 for smoke developed. Adhesives shall be waterproof.

2.2 MATERIALS

.1 Cold Piping: Fin fibrous glass insulation, with factory applied vapour barrier jacket, moulded to conform to piping, "K" value at 25^{o}C. maximum 0.035 W/m^{o}C.

.2 Hot Piping: Fine fibrous glass insulation with factory applied general purpose jacket, moulded to conform to piping, "K" value at 24^{o}C. maximum 0.036 W/m^{o}C.

.3 Vents: Flexible fibrous glass insulation, "K" value at 24^{o}C. maximum 0.037 W/m^{o}C, with factory applied reinforced aluminum foil vapour barrier.

.4 Recovering Jackets: 203 g/m^2 ULC listed thermal canvas; for valves and fittings use 135 g/m^2; apply with fire resistive lagging adhesive, sized and prepared for painting in exposed areas.

.5 Metal Jackets: 0.4 mm embossed aluminum or 0.3 mm stainless steel jacket to 500 mm dia. Over 500 mm, 0.6 mm embossed aluminum or 0.4 mm stainless steel. With joints lapped 50 mm, joints sealed with silicon and secured with bands or pop rivets. Painted to colour by Consultant.

.6 Reinforced Fabric Jacket: Two coats of 3 mm asphaltic mastic with glass reinforced fabric between coats, lapping joints 50 mm minimum, applied over rigid insulation, painted two coats. Colour by Consultant.

.7 Rectangular Ducts: Rigid fibrous glass insulation with a maximum thermal conductivity of .035 W/m degrees Celsius (installed), with factory applied reinforced aluminum foil vapour barrier for systems conveying air at less than room temperature.

.8 Round Ducts - Indoors: Flexible fibrous glass insulation with a maximum thermal conductivity of .037 W/m degrees Celsius (installed), with factory applied reinforced aluminum foil vapour barrier for systems conveying air at less than room temperature.

.9 Round Ducts – Outside air: Vertical fibre high temperature rigid glass fibre insulation suitable for 345^{o}C service temperature and with all service jacket; at 24^{o}C conductivity shall not exceed 0.039 W/m degrees Celsius.

.10 Flexible Ducts: By Section 23 31 13.

PART 3 EXECUTION

3.1 PREPARATION

.1 Do not install covering before piping and equipment has been tested and approved.

.2 Ensure surface is clean and dry prior to installation of insulation. Ensure insulation is dry before and during application, complete insulation installation with systems at operating conditions.

3.2 INSTALLATION

.1 Perform work at ambient and equipment temperatures as recommended by adhesive manufacturer. Repair separation of joints or cracking of insulation due to thermal movement of poor workmanship to the satisfaction of the Consultant,

.2 Ensure insulation continues through inside walls except fire rated construction and fire walls, pack around pipes with fire proof self-supporting material, properly sealed. Stapling of insulation will not be accepted in any form.

.3 Insulate fittings, finish with PVC fitting covers. Do not insulate unions, flanges, flexible connections, and expansion joints. Terminate insulation neatly with plastic insulation trowelled on a bevel. Where grooved pipe fittings are used, insulation shall be chamfered at coupling and in the immediate area of equipment connection where piping may be

required to be disassembled. In other locations, outer surface of insulation shall be flush over couplings with a reinforced or double cover at couplings.

.4 Finish insulation neatly at hangers, supports and other protrusions.

.5 Locate insulation cover seams in least visible locations.

.6 Provide recovering jackets on exposed insulation throughout. Wall cavities, pipe shafts, and suspended ceilings are the only space not considered exposed. Crawlspaces, unless otherwise indicated, shall be considered concealed, except those areas within 2 m of equipment and walkways shall be considered exposed. Use pre-sized paper under recovering at uneven insulated surfaces.

.7 Cold Piping: Cover fittings and valves with equivalent thickness of insulation material. Cover with open mesh glass cloth sealed with vapour sealant. Seal lap joints with 100% coverage of vapour barrier sealant and adhesive. Seal butt joints with 100 mm wide strips of vapour barrier sealed with vapour barrier adhesive. For exposed fittings and valves, apply hydraulic setting cement paste over insulation before applying PVC fitting cover..

.8 Hot Piping: Cover fittings and valves with equivalent thickness of insulation. Recover. For exposed fittings and valves, apply hydraulic setting cement paste over insulating material before applying PVC fitting cover.

.9 Multi-layer applications shall have all joints staggered.

.10 Rectangular Ducts: Secure rigid insulation on exterior of duct with 50% coverage of adhesive and 12 gauge galvanized impale anchor tabs on 300 mm centre. Point up joints and breaks with hydraulic setting cement.

.11 Round Ducts - Indoors: Adhere flexible insulation to exterior of ductwork with adhesive applied in 150 mm wide strips on 300 mm centres. Provide 16 gauge annealed tie wire tied, spiral wound at 400 mm centres for securing duct insulation until adhesive sets. Butt insulation and seal joints and breaks in ducts conveying air at less than room temperature with 50 mm lap of foil adhered over joint.

.12 Round Ducts - Outdoor: Secure to duct with 150 mm wide strips of adhesive on 300 mm centres. Tie with 16 Ga annealed wire in spiral wound at 400 mm centres. Butt insulation. Seal joints and breaks with lap of foil. Finish with reinforced fabric or metal jacket.

.13 Piping, ductwork and equipment insulation exposed to outdoors, including refrigerant piping insulation shall be covered with 20 Ga aluminum jacket. Joints shall be sealed with exterior silicon sealant, jacket shall be stainless steel banded.

3.3 APPLICATION

.1 General

.1 Piping exposed to the outdoors, including insulated refrigerant piping, shall be finished with metal jackets.

.2 Ductwork exposed to the outdoors, shall be covered with 100 mm insulation and finished with reinforced fabric jackets. Where specified or identified, finish with metal jackets. Finish shall be painted two (2) coats. Colour by Consultant.

.2 Equipment and Duct Application Schedule

	Item	Insulation Thickness
.1	Combustion air duct.	50 mm on exterior
.2	Exhaust ducts from point of building discharge back 3 m from exterior walls and openings.	50 mm on exterior
.3	Outside air intake ducts.	50 mm on exterior
.4	Supply air (from end of acoustic supply duct to terminal units)	25 mm
.5	Supply air flexible ducts.	N/A unless noted
.6	Rectangular return and transfer ducts.	25 mm on interior where shown

.3 Piping Application Schedule

		Pipe Sizes	Insulation Thickness
.1	Domestic cold water piping.	Up to 50 mm Over 50 mm	15 mm 25 mm
.2	Domestic hot water piping (including DHW Recirc.)	All sizes	25mm
.3	Refrigerant suction.	Up to 25 mm Over 25 mm	12 mm 25 mm
.4	Plumbing vents within 3 m of roof outlet.	All Sizes	25 mm

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section describes the requirements for ductwork, fittings, plenums and related components for heating, cooling, ventilating and air-conditioning service.

1.2 DEFINITIONS

.1 Pressure Classes (PC) for duct construction shall be based on the maximum working static pressure to be encountered according to the following categories:

- 250, 500, 750 Pa, positive or negative
- 1000, 1500, 2500 Pa, positive

.2 Duct Sizes: Inside clear dimensions for acoustically lined or internally insulated ducts, maintain sizes inside ducts unless indicated otherwise.

1.3 QUALITY ASSURANCE

.1 NFPA 90A, Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B, Warm Air Heating and Air-Conditioning Systems.

.3 SMACNA, HVAC Duct Construction Standards, First Edition, 1985.

.4 ASHRAE, 1988 Equipment, Chapter 1, Duct Construction.

.5 SMACNA, HVAC Air Duct Leakage Test Manual, First Edition, 1985.

.6 NFPA 96, Standard for the Installation of Equipment for the Removal of Smoke and Grease Laden Vapours from Commercial Cooking Equipment.

.7 National Building Code 2005, Part 6 and other related parts.

.8 CGA Natural Gas B149.1; Propane B149.2; CSA B139 Oil Burning Equipment.

1.4 ALTERNATIVES AND CONFIGURATION

.1 Variation of duct configuration or sizes will be permitted only with written approval of the Consultant.

.2 When round and rectangular ducts are approved to be interchanged, sizing shall be in accordance to the ASHRAE table of equivalent sizes.

.3 Prior to the fabrication of ductwork, check all spaces and heights and avoid conflictions with other trades. Ductwork not properly installed shall be rectified at the Contractor's expense. Any additional offsets, transitions, changes in direction or ductwork to avoid conflictions shall be made without additional cost.

.4 Items in this section may supersede the requirements of referenced standards. Where two items conflict, the more stringent shall apply. Any deviations must be approved.

1.5 REFERENCE SECTIONS

.1 Section 23 05 93 - Testing of Systems and Performance.

.2 Section 23 05 29 - Supports, Anchors and Seals.

.3 Section 23 33 00 - Ductwork Accessories.

1.6 SHOP DRAWINGS

.1 Contractor shall submit shop drawings of intended fabrication and installation techniques and accessories; drawing shall include:
- Ductwork metal gauges
- Joint reinforcement - intermediate and transverse
- Fittings and branch connections
- Ductwork accessories
- Duct sealant
- Flexible connectors
- Other related components

PART 2 PRODUCTS

2.1 MATERIALS

.1 Galvanized Ductwork: G60 coated (both sides) galvanized steel of lock forming grade conforming to ASTM A-525 and ASTM A-527; galvanized fasteners.

.2 Aluminum Ductwork: Alloy 3003-H14 aluminum sheet metal, aluminum fasteners; Alloy 6061-T6 or galvanized steel for structural members.

.3 Fiberglass Ductboard: Preformed fiberglass duct system with fire resistant scrim reinforced foil jacketing; provide material by one manufacturer in accordance to manufacturer's instructions. Conform to UL-181 standard. Nominal thickness: 25 mm.

.4 Flexible Ductwork: Not allowed unless specifically approved by the Consultant or specified. Flexible duct connectors are allowed.

.5 Fasteners:

.1 Steel rivets and bolts throughout; sheet metal screws accepted on pressure class 250 and lower.

.2 Pre-consultanted fastening system with clips and corner flanges; Ductmate.

.3 Stainless steel or galvanized if in humid or corrosive areas.

.4 Nylon draw band on non-metallic flexible duct; No. 8 sheet metal screws on metallic flexible duct.

.5 Sealant:

.1 Pressure class 750 and under: Multi-purpose air duct sealant conforming to ULC-S102, flexible, suitable for application to 5°C, non-toxic; Atlas multi-purpose MP duct sealer.

.2 Pressure class over 750 Pa: Water based vinyl acrylic sealant filled with inert reinforcement material, UL classified adhesive, suitable for application to 5°C, non-toxic; United McGill UNI-GRIP duct sealer.

.3 Fabric: Fiberglass woven fabric material suitable for use as reinforcing agent with duct sealants.

.6 Flexible Duct Connectors:

.1 Metal: Corrugated (triple lock) metal flexible ducting constructed without use of adhesive; Flexmaster T/L.

.2 Fabric: Flexible vinyl coated fiberglass cloth or aluminum foil/mylar/fiberglass combination; supported by exterior helical wound steel wire; Flexmaster FAB-3, FAB-4, FAB-5.

.4 Insulation: Insulated ducts shall have flexible fiberglass insulation with seamless vinyl vapour barrier jacket.

Duct Ambient	Insulation	
25 mm	13°C to 30°C	25 mm
40 mm	7°C to 12°C	40 mm
50 mm	6°C & lower	50 mm

.5 Operating pressure of flexible duct shall be minimum 1.5 times the pressure class of the duct it is connected to, but no less than 750 Pa.

.6 All flexible ductwork and components shall conform to ULC-S110 and ULC-181 as Class I Duct Material or as Class I Duct Connector and shall be suitable for the use intended.

2.2 FABRICATION

.1 Complete metal ducts with themselves with no single partition between ducts. Where width of duct exceeds 450 mm, cross break for rigidity. Open corners are not acceptable.

.2 Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

.3 Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centreline. Where not possible and where rectangular elbows are used, provide approved single thickness turning vanes.

.4 Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible. Maximum divergence upstream of equipment to be 30 degree and 45 degree convergence downstream.

.5 Rigidly construct metal ducts with joints mechanically tight, substantially air tight, braced and stiffened so as not to breathe, rattle, vibrate, or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

.6 Provide easements where low pressure ductwork conflicts with piping and structure where easements exceed 10% duct area, split into two ducts maintaining original duct area.

.7 For pressure classes under 1000 Pa, fittings shall be reinforced similarly to sections of straight duct. Duct gauge is determined by the greater fitting dimension.

.8 For pressure classes 1000 Pa and over, fabricate continuously welded round and oval duct fittings of one gauge heavier than gauges indicated for duct size. Joints shall be brazed or electric weld. Prime coat welded joints. Fabricate 90 degree elbows of five piece construction. "ECCO" manufactured standing seam fittings sealed with interior high velocity duct sealant are also approved.

.9 Transverse joints on rectangular ductwork with a dimension over 1000 mm shall be DUCTMATE.

.10 Fabricate rectangular and round ductwork with material thickness and reinforcements in accordance with SMACNA 1985 Duct Construction Standards, with any modifications as noted herein. Reinforcement spacing shall not exceed 1525 mm unless otherwise noted.

.11 Round Duct - Mitred Elbows:

Duct Velocity	R/D Ratio Centreline Radius To Duct Diameter	Number of Mitred Pieces		
		90	60	45
Up to 1500 fpm (Up to 460 m/s)	1.0	4	3	2

.12 Round ductwork 200 mm diameter and larger, and for pressure classes over 500 Pa shall be spiral lock duct. Spiral may also be used in smaller sizes or lower pressure classes.

.13 Pressure Classes:

.1

Application	Pressure Class (PC)
- Special cases	as noted on drawings
- Low velocity supply, return and exhaust max. 10 m/s (2000 fpm).	500 Pa

.2 In all cases, supply ductwork pressure class shall be suitable for minimum 1.5 times the working pressure at the air handling equipment connection.

.3 Pressure class for ductwork on the suction side of air handling equipment shall be no less than the discharge side static pressure losses.

PART 3 EXECUTION

3.1 GENERAL

.1 Provide a complete system of ductwork, fittings, and related accessories as specified herein and as indicated on the drawings for a complete and operational system.

.2 Provide openings in ductwork where required to accommodate sensors, indicators, and control devices. Provide pitot tube openings where required for testing of systems, complete with air stop. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

.3 Clean duct systems and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning.

.4 If additional cleaning is required, clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt, filter or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

.5 Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities. Provide ladders, platforms, etc. on ductwork to maintain access routes to serviceable components where ductwork restricts normal access.

.6 Use flexible ductwork only where specifically noted or approved by the Consultant (this does not refer to flexible duct connectors).

.7 On "DUCTMATE" flanges, bend corners of clips so they are mechanically secured and cannot loosen with time.

3.2 TESTING

.1 Provide testing to verify integrity of systems, reference related section.

3.3 SUPPORTS, ANCHORS & SEALS

.1 Provide supports, anchors and seals, reference related section.

3.4 COMBUSTION AIR/RELIEFS

.1 Provide combustion air and relief to all fuel appliances.

.2 Provide baffles around piping at floor levels and to protect appliances with pilot lights from drafts.

3.5 SEALING

.1 Seal all duct joints with specified sealant. Reinforce with reinforcing fabric as required.

.2 Provide neat finish with straight edges on sealant for ductwork in exposed areas.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section describes the requirements for duct accessories including access doors, fire dampers, balancing dampers, back draft dampers and flexible connections.

1.2 QUALITY ASSURANCE

.1 Fire dampers shall be UL listed and constructed in accordance with ULC Standard S112 "Fire Dampers".

.2 Fusible links on fire dampers shall be constructed to ULC Standard S505.

.3 Demonstrate resecting of fire dampers to authorities having jurisdiction and Owner's representative.

.4 Access doors shall be UL labelled. UL labelled when installed in rated assembly.

.5 Accessories shall meet the requirements of NFPA 90A, Air Conditioning and Ventilating Systems.

.6 Fabricate in accordance with ASME handbooks and SMACNA duct manuals.

1.3 SUBMITTALS

.1 Submit shop drawings of factory fabricated assemblies.

.2 Submit samples of shop fabricated assemblies as requested.

PART 2 PRODUCTS

2.1 ACCESS DOORS

.1 Provide factory fabricated rigid and close fitting doors of galvanized steel with sealing gaskets and suitable quick fastening locking devices. Install minimum 25 mm thick insulation with suitable sheet metal cover.

.2 Fabricate with two butt hinges and two sash locks for sizes up to 450 mm, two hinges and two compression latches with outside and inside handles for sizes up to 600 x 1200 mm and an additional hinge for larger areas.

2.2 FIRE DAMPERS

.1 Fabricate of galvanized steel or prime coated black steel weighted to close and lock in closed position when released by fusible link.

.2 Fire dampers in low pressure ductwork may be multi-blade or curtain type.

.3 Fabricate combination fire and balancing dampers with linkage readily adjustable in open position.

.4 Fire dampers in medium and high pressure ductwork shall be curtain type.

.5 Curtain fire dampers shall have blades retained in a recess so free area of connection ductwork is not reduced.

.6 Fusible links shall be set for 72 Cel., 52 Cel. in return air and exhaust ductwork and at least 20 Cel. above highest anticipated operating temperature in area of installation.

2.3 BALANCE DAMPERS

.1 Fabricate of galvanized steel, minimum 1.6 mm and provide with adjustable quadrants, lock nut and end bearing; provide ball bearing bushings on dampers 500 mm and larger.

.2 Fabricate splitter dampers of double thickness sheet metal to streamline shape, properly stiffened to avoid vibration. Size on basis of straight air volume proportioning.

.3 Fabricate single blade dampers for duct sizes to 240 x 760 mm.

.4 Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 150 x 1800 mm. Assemble centre and edge crimped blade in prime coated or galvanized channel frame with approved type hardware.

.5 Fabricate multi-blade, parallel action gravity balanced backdraft dampers with blades a maximum of 150 mm width having felt or flexible vinyl sealing edges, linked together in rattle free manner and with adjustment to permit setting for varying differential static pressure.

.6 Multi-blade damper bearings shall be oil impregnated sintered bronze.

2.4 FLEXIBLE CONNECTIONS

.1 Fabricate of approved neoprene coated flame proof fabric approximately 50 mm wide tightly crimped into metal edging strip and attach to ducting and equipment by screws or bolts at 150 mm intervals.

2.5 BACKDRAFT DAMPERS

.1 At terminations to outdoors; any dimension over 300 mm: Manufactured, insulated blade in 635 mm insulated extruded aluminum frame; side frame and blade seals; Delrin (ACETAL) arm & bearings; aluminum blades, twin PVC linkage tracks; maximum 0.8% leakage at 1000 kPa; counterbalanced: Tamco Series 8000 HD.

.2 At terminations to outdoors: less than 300 mm dimension. Manufactured backdraft damper with lapped polymer blade seal and lapped side seals, aluminum frame, blade and bar linakge; counterbalanced: Wallace Series 3000; Tamco Series 8000 HD.

.3 In-duct System: Manufactured multi-blade all metal, bronze or acetal bushings counterbalanced, blade linkage: Tamco Series 7000 HD.

PART 3 EXECUTION

3.1 APPLICATION

.1 Provide adequately sized access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Review locations and submit to Consultant for approval.

.2 Provide 100 x 100 mm quick opening access doors for inspection at balancing dampers 600 mm x 600 mm and over.

.3 Provide fire dampers at locations shown (+10%), and where required where ducts and outlet pass through fire rated components, and where required by authorities having jurisdiction. Fire dampers shall be complete with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

.4 At each point where ducts pass through partitions, the joints around the duct shall be sealed with noncombustible material.

.5 Provide balancing dampers at points on low pressure supply, return and exhaust systems where branches are taken from larger duct as required for proper air balancing.

.6 Install ducts associated with fans and equipment subject to forced vibration with flexible connections, immediately adjacent to equipment and where indicated on the drawings.

.7 Install backdraft dampers on all exhaust and relief openings through the building walls and roof c/w blade seals.

.8 Install fire dampers in the closed position. Contractor shall open fire dampers before fan systems are started.

.9 Provide access doors at all fire dampers of adequate size for servicing fusible link. Demonstrate as requested.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section describes the requirements for access doors and panels.

1.2 GENERAL REQUIREMENTS

.1 Provide access panels for furred ceilings or spaces for servicing equipment and accessories or for inspection of safety, operating or fire devices.

.2 Access for maintenance or adjustment of all parts of the mechanical systems shall be provided. This shall apply but not be limited to valves, volume dampers including splitter dampers, fire dampers, cleanouts and controls.

.3 Where equipment is concealed by removable tile ceiling, the location of equipment shall be indicated by coloured markings.

.4 Where equipment is concealed by a continuous structural or architectural surface, supply access doors of design to suit the surface in which they will be installed.

1.3 SCHEDULE

.1 Provide a schedule of access doors showing location, type and size, together with samples, to the Consultant for approval before installation.

PART 2 PRODUCTS

2.1 GENERAL

.1 200 mm x 200 mm minimum for inspection and hand access; larger as required and to approval of Consultant.

.2 600 mm x 600 mm minimum, larger is indicated on drawings, where body entry is required access is difficult and for servicing of terminal units, fan coils or similar equipment.

.3 Size to suit masonry modules when located in a masonry wall.

.4 Co-ordinate with architectural requirements affecting location of door to be installed.

.5 Submit shop drawing of access doors and panels for architectural approval prior to installation.

2.2 FINISHED SURFACE TYPES

.1 Acoustical tile and drywall surface: SMS Series 106.

.2 Plastered surfaces: SMS Series 101 with plaster key.

.3 Fire rated construction: SMS-UL, UL fire rated access door.

.4 Wood finishes: A steel frame with flush steel panel to which the finishing can be fastened. Panel to be screwed to the frame instead of hinged.

.5 When located in a finished floor with tile, stone work, terrazzo, etc., a recessed bearing type access door is required. The door surface shall have a recess to take the particular surface material and pattern.

2.3 CONSTRUCTION TYPES

.1 Flush steel: framed panel.

.2 For ductwork provide access doors to SMACNA as detailed on drawings.

.3 Cam type: Screwdriver operated locking device on the side opposite the hinges.

.4 Prime coat of rust inhibiting paint.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Access doors and panels required by this section and installed in architectural walls, floors, or ceilings are to be supplied by the contractor for installation by others.

.2 Access doors and panels in walls, floors, ceilings, (eg. acoustic plenums) provided by the Mechanical Contractor, shall be installed by the Mechanical Contractor.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for:

- Diffusers
- Grilles and Registers
- Outside Louvres

1.2 QUALITY ASSURANCE

.1 Air flow and sound level measurement shall be made in accordance with applicable ADC equipment test codes and ASHRAE Standards.

.2 Unit rating shall be approved by ADC (Air Diffusion Council).

.3 Manufacturer shall certify catalogued performance and ensure correct application of air outlet types.

1.3 JOB CONDITIONS

.1 Review requirements of outlets as to size, finish and type of mounting prior to submitting shop drawings and schedules of outlets.

.2 Positions indicated are approximate only. Check location of outlets and make necessary adjustments in position to conform with architectural features, symmetry and lighting arrangement.

PART 2 PRODUCTS

2.1 GENERAL

.1 Base air outlet application on space noise level of NC 35 maximum.

.2 Provide supply outlets with sponge rubber seal around the edge.

.3 Provide baffles to direct air away from walls, columns or other obstructions within the radius of diffuser operation.

.4 Provide plaster frame for diffusers located in plaster surfaces.

.5 Provide anti-smudge frames or plaques on diffusers located in rough textured surfaces such as acoustical plaster.

.6 Refer to schedules for additional details.

2.2 LOUVRED SUPPLY, RETURN, EXHAUST GRILLES

.1 Grilles and registers shall have streamlined and individually adjustable blades, depth of which exceeds 20 mm maximum spacing. Provide spring tension or other device to set blades. Provide units with double deflection bar style grilles.

.2 Provide 32 mm margin frame with countersunk screw holes.

.3 Fabricate of aluminum with 1.0 mm minimum frame, or heavy aluminum extrusions.

.4 Provide grilles with integral, gang operated opposed blade dampers with removable key operator, operable from face.

.5 Finish in factory finish, as per schedules.

2.3 LINEAR SUPPLY RETURN OR EXHAUST GRILLES

.1 Linear supply grilles shall have streamlined blades with deflection, specified.

.2 Fabricate of heavy aluminum extrusions.

.3 Provide 32 mm margin frame (except heavy for floor mounting), with countersunk screw holes.

.4 Provide grilles with integral gang operated opposed blade damper with removable key operator, operable from face.

.5 Provide mounting frame suitable for casting in concrete floor.

2.4 GRID CORE AND EXHAUST GRILLES

.1 Fabricate fixed grilles of 15 x 15 mm louvres.

.2 Provide lay in frame for suspended grid ceilings.

.3 Fabricate of aluminum.

.4 Provide exhaust grilles, where not individually connected to exhaust fans, with integral, gang operated opposed blade dampers with removable key operator, operable from face.

2.5 SECURITY GRILLES

.1 Provide approved security-type grille in the cells.

.2 Fasteners shall be Chubb or S & C flathead steel spanners, or equivalent.

.3 Use high yield grout to fill any space between the back of the face plate and mounting surface.

.4 Spanner tools for the installation/removal of flathead steel spanners shall be provided to match the grille fasteners.

.5 All grilles must be stamped with manufacturers and model number on the faceplate of the grille.

.6 Approved security grilles – there will be no substitute or equals for Type "A" Grille. Approved manufacturers
- Chubb OP-20V, www.gunnebo.com
- Simpson model V-2, www.simpsoninstall@email.com, p: 902-664-6266
- Eneround security-type ventilating grille, www.dthompson@heatingproducts.nf.net, p: 709-754-9100
- VirtucomSCO security, www.virtucom-inc.com

2.6 FOR GRILLE SCHEDULE - REFER TO DRAWINGS

PART 3 EXECUTION

3.1 PRIMING & PAINTING

.1 Paint ductwork visible behind outlets, matt black.

.2 Security Grilles to be powder coat finish.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This Section covers items common to Sections of Division 26. This section supplements requirements of Division 1.

1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with CSA C22.1-2012 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1-2010 except where specified otherwise.

.3 Within these specifications reference is made to the following standards:

.1 CSA - Canadian Standards Association.

.2 CEMA - Canadian Electrical Manufacturers Association.

.3 NEMA - National Electrical Manufacturers Association.

.4 IEEE - Institute of Electrical and Electronic Engineers.

.5 IPCEA - Insulated Power Cable Engineers Association.

1.3 CARE, OPERATION AND START-UP

.1 Instruct operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

.4 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.5 Manufacturers to provide demonstrations and instructions on all equipment and systems..

.6 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.7 Operating Personnel shall be contacted at the beginning of the project and encouraged to come on site at least once a week for the duration of the project. During these periods, they shall be given full explanation of the various systems as the project progresses.

.8 Two weeks prior to substantial inspection, operating personnel shall be given instruction for a period of three(3) days with minimum of two(2) hours per day. Instruction to be provided during regular work hours.

.9 Maintain log of all site visits. Maintenance personnel to login/out and be witnessed by Contractor. Provide log as requested.

1.4 SETTING OUT THE WORK

.1 Thoroughly examine the drawings and specifications and especially check figure dimensions immediately after awarding of the contract. Report any discrepancies to the Consultant. No pleas as to the action or direction of the Consultant will be submitted in justification of any errors in construction where departure is made from the drawings, specifications or contract.

.2 In setting out the Work, make reference to the Electrical, and Architectural drawings. Consult with respective trades in setting out of location of the conduit runs, lighting fixtures, panel assemblies, etc. so that conflicts are avoided and symmetrical even spacing is maintained.

.3 Conduit shall be laid out to avoid interference with other trades and to maintain maximum head room. In the ceiling space, conduit shall be arranged to conserve space, to be serviceable and to avoid crossovers.

.4 Where outlets occur in exterior walls, utilize vapour boxes.

.5 No structural member shall be cut or drilled without the knowledge and consent of the Structural Consultant.

.6 No holes shall be cored in the existing slab unless slab is x-rayed first. Electrical contractor is responsible for costs of performing x-ray services related to his work.

1.5 DRAWINGS AND SPECIFICATIONS

.1 Should any discrepancies occur in the drawings and/or the specifications which leaves doubt as to the true intent and the meaning of the drawings and/or specifications, obtain a ruling from the Consultant before submitting tender.

.2 Electrical drawings indicate the location and route to be followed by conduit and/or wire and do not show all structural and mechanical details. In some cases, conduit or wiring is not shown or is shown diagrammatically on a schematic or riser diagram. Install each conduit and wire to provide a complete operating component or system and to conserve head room within furring spaces, etc.

.3 In order to provide sufficient details and maximum degree of clarity on the drawings, the symbols used for various electrical devices, particularly wall mounted devices, take up more space on the drawings than the device does on the wall. In these instances, locate the device on the wall as indicated on detail floor plans or elevations and/or with primary regard for convenience of operations rather than stringing the devices out along the wall so as to coincide with the scale location of electrical symbols.

1.6 CLEANUP

.1 At all times during construction, keep the site free from debris boxes, packing, etc., resulting from the work of Division 26.

.2 At the completion of the Work, the electrical installation shall be left in a clean and finished condition to the satisfaction of the Consultant.

1.7 SHOP DRAWINGS AND PRODUCT DATA

.1 In accordance with Section 01330 – Submittal Procedures

1.8 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.9 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Consultant will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.

.4 Notify Consultant of changes required by Electrical Inspection Department prior to making changes.

.5 Furnish Certificates of Acceptance from Electrical Inspection Department authorities having jurisdiction on completion of work to Engineer and Consultant.

1.10 MATERIALS AND EQUIPMENT

.1 Equipment or material specified by technical description only, to be of the best commercial quality obtainable for the purpose.

.2 All electrical equipment, materials and systems specified and shown on the drawings shall be new and be certified by an accredited standards development organization (SDO) by the Standards Council of Canada (SCC).

.3 Factory assemble control panels and component assemblies.

.4 Where an equipment manufacturer has been identified in the bid, substitutions will subsequently be permitted only where it can be shown that unusual or unforeseen circumstances will cause unacceptable delays in completion of the work.

1.11 ALTERATIONS

.1 Alterations entailing additional work or deletions shall be carried out only upon the written request of the Consultant. Additional work or deletions shall be settled in the manner described in the General Conditions.

.2 Any prices submitted for additional work or alterations shall include a price breakdown for all labour and material and where required, shall be justified by invoices, time sheets, etc. No extras will be allowed without prior written authorization from the Consultant.

1.12 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.

.2 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 25 and shown on mechanical drawings.

1.13 MECHANICAL EQUIPMENT

.1 Check mechanical drawings for sizes and locations of all motors, controls, and other equipment requiring electrical wiring and connections.

.2 Review mechanical specifications to ensure compliance with all clauses requiring work by the electrical contractor.

.3 Ensure that tendered price includes for all requirements for electrical work noted in mechanical plans and specifications.

1.14 FINISHES

.1 All electrical fittings, supports hanger rods, pullboxes, channel frames, conduit racks, outlet boxes, brackets, clamps, etc. to have galvanized finish or enamel paint finish over corrosion-resistant primer.

.2 All panelboards, distribution centres, transformers, motor control centres, etc. to be factory finished in gloss air dry enamel applied over corrosion-resistant primer. Matte or flat type finish paint not acceptable. Factory finished units that are scratched or marked during installation or shipping to be touched up with matching spray-on air dry lacquer or, if required to provide a satisfactory job, completely refinished. Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 All 347/600 volt equipment to be finished in grey, CIL-BH 94351.

.4 All 120/208 volt equipment to be finished in grey, CIL-BH 94351.

1.15 EQUIPMENT IDENTIFICATION

.1 Clearly identify switchboards, power distribution centres, power panels, distribution panels, lighting panels, disconnect switches, starters, contactors, motor control centres,

terminal cabinets, junction boxes, 'On/Off' switches, transformers and receptacles by screw attached lamicoid nameplates as follows:

.2 Nameplates:

.1 Lamicoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

EXAMPLES
Size 1 - Manual Starter Designation Label
Size 2 - Junction Boxes, Cabinets, Circuit Distribution
Size 3 - Power Generator (Meter, Alarm, Indicating Lights and Minor Controls)
Size 4 - Disconnect Switches, Contactors
Size 5 - Power Generator (Alternator, Breakers, Program Selector Switch)
Size 6 - Reclosers
Size 7 - Transformers, Switchgear, Service Entrance Boards

.3 Labels:

.1 Embossed plastic labels with 6 mm high letters unless specified otherwise.

.4 Wording on nameplates and labels to be approved by Engineer/ Consultant prior to manufacture.

.5 Allow for average of twenty-five (25) letters per nameplate and label.

.6 Identification to be English.

.7 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.8 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.9 Terminal cabinets and pull boxes: indicate system and voltage.

.10 All receptacles: indicate panel designation and circuit numbers. Identify receptacle circuits with clear self-adhesive mylar tape with black lettering.

1.16 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour code: to CSA C22.1, red, black, blue with neutral white.

.4 Use colour coded wires in communication cables, matched throughout system.

1.17 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Gray	
Standby Power	Gray	Red
Telephone	Green	
Intercommunication and Sound	Green	White
Television	Green	Blue
Structured Wiring System	Green	Black
Low Voltage Lighting Systems	Black	
Fire Alarm	Red	
DC emergence Lighting	Black	Red
Security Systems	Black	Blue

1.18 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.19 MANUFACTURERS AND SCC LABELS

.1 Visible and legible, after equipment is installed.

1.20 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department and Engineer Consultant.

.2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

1.21 UNIFORMITY OF EQUIPMENT

.1 Unless otherwise specifically requested, uniformity of manufacture shall be maintained for any particular item or type of equipment throughout the building.

1.22 ELECTRICAL DIAGRAMS

.1 Provide fire alarm plan and zoning of building at fire alarm control panel and annunciator locations. Fire alarm plan to show graphic of building floorplans with all zones indicated in separate colors. Plan to be made from plastic laminate and be supplied by the fire alarm manufacturer. The fact that the system is an addressable fire alarm system does not relieve the contractor of this requirement. All addressable devices are to be zoned partitioned for the purpose of aiding the fire department via this building plan.

.2 Provide fire alarm riser at location of main fire alarm control panel. Riser to show all devices in system.

.3 Drawings: 600 x 600 mm minimum size, framed with plexiglass cover securely affixed to walls at required locations.

1.23 LOCATION OF OUTLETS

.1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation. Obtain information from Consultant prior to rough-in of outlet.

.3 Determine direction of door swings from architectural drawings or on site, not from electrical drawings. Locate light switches, fire alarm manual stations, and disconnect devices in mechanical room, on latch side of each door or as detailed on elevations or detail floor plans.

1.24 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

- .1 Local switches: 1200 mm.
- .2 Wall receptacles:
  - .1 General: 350 mm.
  - .2 Above top of continuous baseboard heater: 200 mm.
  - .3 Above top of counters or counter splash backs: 175 mm.
  - .4 In mechanical rooms: 1400 mm.
- .3 Panelboards: as required by Code or as indicated.
- .4 Communication outlets: 350 mm.
- .5 Wall mounted telephone and interphone outlets: 1500 mm.
- .6 Fire alarm stations: 1500 mm.
- .7 Fire alarm bells: 2100 mm. Confirm with Architectural Elevations.
- .8 Television outlets: 350 mm.
- .9 Wall mounted speakers: 2100 mm. Confirm with Architectural Elevations.
- .10 Clocks: 2100 mm. Confirm with Architectural Elevations.
- .11 Door bell pushbuttons: 1500 mm.

1.25 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases within 15% of each other and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.26 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.4 Obtain prior approval from Consultant before installing any equipment or conduit through roofing membrane. Provide pitch pockets or roof jacks where approval is given.

1.27 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

.2 The work of this division to be carried out by a contractor who holds a valid Electrical contractor license as issued by the Province in which the work is being completed.

.3 Conduct and pay for following tests:

- .1 Circuits originating from branch distribution panels.
- .2 Lighting and its control.
- .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .4 Systems: fire alarm system.
- .5 Insulation resistance testing.
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.4 Carry out tests in presence of Engineer/Consultant.

.5 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.7 In co-operation with the Mechanical trade, take clip-on ammeter readings on all phases of all mechanical equipment motors with motors operating under full load conditions. Test readings to be submitted to Mechanical section and to the Consultant. Results are also to be recorded in the O&M manual.

.8 During construction and up to substantial performance of the work, Contractor shall be required to make accessible any equipment or wiring for inspection purposes.

.9 Contractor shall at all times have a member of his supervisory staff available to assist the Consultant in inspecting the work.

.10 All high and low voltage switchgear, transformers, motor controllers, and feeder conductors (down to but not including branch circuits) after final installation shall have their insulation tested by means of DC over-potential testing, in accordance with the levels recommended in the current addition CSA Standard C37.20, but at levels not to exceed the manufacturers recommendation.

.1 If ground resistance is less than .2 megohms on any lighting, power or control circuit, such circuits shall be considered as being defective and must be replaced. A 600 volt megger shall be provided for equipment up to 350V, and a 1000volt megger shall be provided for 600V testing.

.2 Contractor shall be responsible for retaining and paying for a qualified testing service satisfactory to the consultant to perform high potential tests. Suitable records are to be kept of all tests by the contractor and turned over to the consultant.

.11 Where specifically called for in specialized portions of the installation the Contractor shall arrange and pay for the services of the manufacturer's personnel to supervise the initial start-up of the installation and to check, adjust, balance and calibrate all components, including all related wiring, controls, etc. and to instruct the Owner's operating personnel.

.12 These services shall be provided for such period and for as many visits as may be necessary to put the applicable portion of the installation into complete working order and to ensure that the operating personnel are fully conversant with all aspects of the operation, care and maintenance thereof. In general, this shall include all communication equipment such as intercom system, fire alarm system, etc.

.13 Submit test results for Engineer's / Consultant's review.

1.28 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

1.29 WARRANTY

.1 Furnish a written warranty to the owner stating:

.1 That all Work will be free from defects for a period of one year or for a period as specified in individual sections of the work, from the date of Substantial Performance of the Work as defined by the Consultant.

.2 This section agrees to repair and replace at own expense, all such defective work and other work damaged which fails or becomes defective during the term of the guarantee provided that such failure is not caused by improper usage.

.3 The period of the warranty specified above shall in no way supplant any other warranty of a longer period but shall be binding on work not otherwise covered.

.2 Include original copy of warranty in O&M manual in accordance with this section.

1.30 MAINTENANCE MANUALS

.1 Contractor shall provide three sets of maintenance manuals containing the following information:

.1 Names of the pieces of equipment used in the project, the manufacturer's name on each piece of equipment and the name and address of the supplier of the equipment. Wherever pieces of equipment form part of a complete system, the system name shall be used on the list: i.e. Fire Alarm System.

.2 Part numbers of all replaceable items.

.3 Manufacturer's cut sheets and rating tables including brochures of all major equipment supplied for the project.

.4 Serial numbers of all principal pieces of equipment.

.5 Manufacturer's pictures and descriptive data, along with all equipment and engineering data on every light fixture supplied and installed on the project.

.6 Recommended maintenance procedures for various systems.

.7 Results of all tests performed.

.8 All testing certificates and Inspection Department Acceptance

.9 Contractors Warranty

.10 Other articles and documents listed elsewhere in these project specifications.

.2 Refer to Section 017800 – Closeout Submittals

1.31 AS BUILT DRAWINGS

.1 As built drawings as per Section 017800 – Closeout Submittals.

.2 Contractor to provide 1 set of marked up electrical as-built drawings. Provide sets of white prints of the construction drawings. Mark thereon all changes as work progresses and as changes occur. This shall include changes to all electrical systems as shown in the tender documents. Ensure that items marked correspond to the drawing title.

.1 Use different colour waterproof ink for each service on a per drawing basis.

.2 Make mark-ups available for reference purposes and inspection at all times.

.3 Present finalized as-built mark up drawings to Engineer/Consultant at time of Substantial Performance inspection.

.4 Up-to-date, as built drawings are to be present and on-site at all times, and must be available upon request of the Consultant when performing site construction reviews.

This item will be requested, and status reflected, for reviewing of progress claims throughout the project period.

1.32 CONTRACT BREAKDOWN

.1 Provide separate material and labour breakdown for the total Division 26 sub-contract as indicated below. This breakdown is to meet the satisfaction of the Consultant and is to be submitted within 14 days of contract award.

.2 The breakdown will be used in the computing of progress claims. Progress claims are to be itemized with separate labour and material listing against each item of the contract breakdown. Progress draws will not be reviewed if they are not presented as per the following breakdown:

.1 Lighting and Branch
.2 Power Branch Circuitry
.3 Fire Alarm System
.4 Emergency Lighting
.5 Mechanical equipment provisions

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 Remove component as required by architect and mechanical work.

.2 Reinstallation of any Electrical to be retained, that was temporarily removed for accommodation of other trade's work as defined under the scope of the contract drawings.

.3 Any existing conduit and wiring which feeds existing equipment to remain in service shall be maintained either by relocating and extending existing circuits or by running new circuits and wiring.

.4 Remove all electrical fixtures in areas which are to be provided with new light fixtures and remove all outlets on walls which are to be demolished.

1.2 PROTECTION

.1 Do not interfere with use of building. Maintain safe passage to and from.

.2 Disconnect active utilities in areas of demolition. Co-ordinate interruption of services with Owner's requirements.

.3 Preserve in operations all active utilities. Protect property including communications and electrical equipment and services.

.4 Any property damaged as a result of work by this Section, shall be repaired or replaced to satisfaction of Consultant.

1.3 EXISTING SERVICES

.1 Co-ordinate with other Divisions for disconnecting, removing and/or making safe services within area of demolition. Notify the Owner in advance and obtain approval before commencing the work.

.2 Existing services are to be maintained by this Contractor through any necessary combination of existing, new, or temporary conduits, lighting fixtures, circuits, panelboards, feeders, transformers and service connections.

1.4 SCHEDULE

.1 Work shall be scheduled in a manner to maintain Owners access to building and to provide the least possible interruption to the building's function.

Part 2 Products

2.1 MATERIALS

.1 Boxes, fittings, electrical equipment and accessories which become redundant shall be completely removed. All such material shall become the property of the Contractor and he shall remove it from the site.Execution

2.2 PREPARATION

.1 Carry out demolition work in a manner to cause as little inconvenience to the adjacent occupied building area as possible.

2.3 DEMOLITION

.1 Demolish to the extent required to accommodate the new work, including that required for connection to the existing building. Demolition to be carried out in an orderly and careful manner.

.2 Perform demolition in accordance with applicable local and provincial authorities having jurisdiction.

.3 Repair all demolition performed in excess of that indicated or required, to the approval of the Consultant and at no cost to the Owner.

.4 Remove all demolished materials, tools and equipment from site upon completion of work. Leave site in a condition acceptable to the Consultant.

.5 Remove all existing light fixtures, devices and all related conduit and wiring in areas which are being demolished.

.6 The Contractor shall visit the site prior to submitting a bid to determine the amount of demolition work involved.

.7 For any system, remove all redundant conduit and wire to the source of supply. Where conduit is embedded in concrete or other inaccessible locations, it shall be abandoned.

2.4 RENOVATION WORK.

.1 Wherever possible, all wiring shall be run concealed in existing areas.

.2 Where the existing construction prohibits the use of concealed wiring, the wiring shall be run in a manner and location as directed by the Consultant.

.3 Re-usable items of electrical equipment shall be reinstalled where indicated on the drawings or turned over to the Owner.

.4 Where existing equipment is shown to be reinstalled, only the best quality items shall be selected for re-use.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.2 No .0.3-96, Test Methods for Electrical Wires and Cables.

.2 CAN/CSA-C22.2 No. 131-M89(R1994), Type TECK 90 Cable.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 26 05 00 – Common Work Results – Electrical.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

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

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 TECK CABLE

.1 Cable: to CAN/CSA-C22.2 No. 131.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper , size as indicated.

.3 Insulation:

.1 Chemically cross-linked thermosetting polyethylene rated type RW90, 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking galvanized steel.

.6 Overall covering: polyvinyl chloride material.

.7 Fastenings:

.1 One hole malleable iron straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 1500 mm centers.

.3 Threaded rods: 6 mm dia. to support suspended channels.

.8 Connectors:

.1 Watertight (where applicable) approved for TECK cable.

2.3 MINERAL-INSULATED CABLES

.1 Not allowed.

2.4 ARMOURED CABLES

.1 Conductors: insulated, copper size as indicated, minimum #12 AWG.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

2.5 CONTROL CABLES

.1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket, and optional armour of closely wound aluminum wire.

.2 Low energy 300 V control cable: solid annealed copper conductors sized minimum #16 AWG, with PVC insulation, flamer retardant to 105 degrees C.

2.6 FIRE ALARM CABLE

.1 Conductors: 300V rated multi-conductor, insulated, colour coded, copper conductor, minimum size to be #16 B & S gauge for device loops and #14 for signal circuits.

.2 Insulation: 105 degrees C flame retardant PVC

.3 Outer Jacket: 105 degrees C flame retardant PVC Red.

.4 Armour: Interlocking Aluminum without overall Jacket. For drops to devices in suspended ceilings from conduit system.

.5 Certified by CSA as fire alarm and signal cable type FAS 105 to CSA C22.2 #208

2.7 NON-METALLIC SHEATHED CABLE

.1 Not Permitted.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34.

.2 In cable trays in accordance with Section 26 05 36

3.2 INSTALLATION OF TECK CABLE 0 -1000 V

.1 Install cables.

.1 Group cables wherever possible on channels.

.2 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors – 0-1000 V.

3.3 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.

.2 Terminate cables in accordance with Section 26 05 20 – Wire and Box Connectors – 0-1000 V.

.3 Armoured cables are only allowed for light fixture drops in suspended ceilings or applications specifically indicated elsewhere within the contract documents.

3.4 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield at one end only.

END OF SECTION

Part 1 General

1.1 Section Includes

.1 Materials and installation for wire and box connectors.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2 No.18-2004, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.

.2 CSA C22.2 No.65-03, Wire Connectors.

.2 National Electrical Manufacturers Association (NEMA)

.1 Selection and Installation Guidelines for Fittings for Use with Flexible Electrical Conduit and Cable.

1.3 Waste Management And Disposal

.1 Separate and recycle waste materials.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

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

Part 2 Products

2.1 Materials

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

Part 3 Execution

3.1 Installation

.1 Wire Connectors

.1 Remove insulation carefully from ends of conductors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.3 Install fixture type connectors and tighten. Replace insulating cap.

.2 Armoured Cable Box Connectors

.1 When preparing to install armoured cable to boxes, ensure adequate amount of cable for conductors to be terminated in the box. Ensure minimal stress on the cable's interlocked armour as well as the cable/fitting connection. Ensure cable is supported within 300 mm of box.

.2 Prepare cable for installation of armoured cable fittings by following manufacturer's instructions. Metal jacket to be squared-off neatly and to be seated squarely against stop. Ground connection to be continuous between armoured cable, fitting and box.

.3 Carefully tighten securement screw.

.4 Follow manufacturer's instructions for attachment to box.

.5 Re-examine fittings for secureness at the end of construction. Fitting shall hold firmly to cable and enclosure.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling.

.4 Divert unused metal materials from landfill to metal recycling facility as approved by Engineer.

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

Part 2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended, set in poured concrete walls and ceilings.

.2 All hardware shall be galvanized or equal.

Part 3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow, solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 2 m on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.14 Where screw fastenings are used on metal decking, screws are to be set in lower flutes only.

.15 Equipment and conduits to be installed to maintain head room, neat mechanical appearance and sized to support equipment loads as required.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Section 26 05 00 – Common Work Results – For Electrical.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

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

Part 2 Products

2.1 SPLITTERS

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

.2 Main and branch lugs and/or Connection bars to match required size and number of incoming and outgoing conductors as indicated.

.3 At least three spare terminals on each set of lugs in splitters less than 400 A.

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

2.3 CABINETS

.1 Sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting.

.2 Backboards: 19 mm G1S fir plywood, one-piece backboards shall be installed in telephone cabinets only. All other cabinet shall have a removable raised metal back panel.

.3 All cabinet shall be approved for the type of wiring and equipment to be housed therein.

.4 Terminal strips:

.1 Below 50 volts - screw terminal type, Armaco T12-2 or Cinch Series 500.

.2 Above 50 volts - 250 volt screw terminal type with barriers between each set of terminals with individual terminal points for each conductor, Weidmuller SAK 2.5 #2796.2 terminals C/W rail, end plates and holding clamps.

2.4 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Install size 2 identification labels indicating system name voltage and phase.

2.5 WIRING IDENTIFICATION

.1 In cabinets, identify terminal strips with permanent numbers.

.2 Provide wiring diagram on inside of terminal cabinet door showing units and conductors connected to terminal cabinets.

Part 3 Execution

3.1 SPLITTER INSTALLATION

.1 Install splitters and mount plumb, true and square to the building lines.

.2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor.

.3 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes and as per the requirement of the Canadian Electrical Code.

.4 Terminate conduit in cabinet with locknuts and Bushings and/or locknuts and grounding bushing where required.

.5 Terminate wiring on screw tight terminal blocks or strips.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 CSA C22.1-2009, Canadian Electrical Code, Part 1.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

.6 Use 102mm square deep-type boxes for structured wiring system.

2.2 SHEET STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster walls.

.5 Sectional boxes and handy boxes are not permitted.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

.2 In masonry utilize ‘deep’ style boxes approved for masonry use.

2.5 BOXES FOR RIGID STEEL CONDUIT

.1 Cast FS or FD aluminum or feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

2.6 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 All outlet boxes to be flush mounted in all areas excluding mechanical rooms, electrical rooms and above removable ceilings.

.3 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.4 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.5 Adjust position of outlets in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve net openings for all boxes. All cutting of masonry work for installation of electrical fittings to be done using rotary cutting equipment.

.6 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

.7 Boxes shall not be mounted back to back.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

- .1 CAN/CSA C22.2 No. 18-98, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
- .2 CSA C22.2 No. 45-M1981(R1992), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-1977(R1999), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R1999), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-M1984(R1999), Rigid PVC (Plasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-M91(R1999), Flexible Nonmetallic Tubing..

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Ensure emptied containers are sealed and stored safely for disposal away from children.

.3 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, steel, liquid-tight flexible metal.

.5 Non metallic duct: rigid PVC, FRE duct and “superduct”

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm and smaller. Two hole steel straps for conduits larger than 53 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 2 m oc.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90º bends are required for 27 mm and larger conduits.

.3 Set screw connectors and couplings for EMT except where not allowed by the Canadian Electrical Code. Water-tight fittings for all outdoor and weatherproof EMT requirements.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and areas of open structure.

.3 Where surface conduits are used in finished areas of open ceiling structure, conduit is to be inconspicuous and tucked neatly along structural members – hidden if possible. Finish of conduit and boxes in these areas to match architectural finish of ceiling.

.4 Use rigid galvanized steel threaded conduit where specified.

.5 Use electrical metallic tubing (EMT) except where subject to mechanical injury.

.6 Install and attach surface mounted conduit with clamps for exposed runs.

.7 Underground conduit shall be FRE or PVC, sand buried, with the concrete cap.

.8 Use liquid tight flexible metal conduit for connections to motors or vibrating equipment.

.9 Co-ordinate installation of conduit in masonry work to avoid horizontal runs.

.10 Minimum conduit size for power circuits: 21 mm.

.11 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.12 Mechanically bend steel conduit over 21 mm dia.

.13 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.14 Install fish cord in empty conduits.

.15 Run 2-27 mm spare conduits up to ceiling space and 2- 27 mm spare conduits down to ceiling space from each flush panel. Terminate these conduits in 300x300x100 mm junction boxes in ceiling space.

.16 Clean out conduit before installation of conductors. Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.17 Alter routing to avoid structural obstructions keeping crossovers to a minimum.

.18 Seal conduit with fibreglass where conduits leave heated area and enter unheated area.

.19 Flashing and pitch-pockets making watertight joints shall be provided by General Contractor where conduits pass through roof or waterproofing membranes.

.20 Install CSA approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.

.21 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.22 All conduits shall enter properly and be secured to all fittings, outlet boxes, panel tubs, etc., by means of locknuts and bushings. All unused openings shall be sealed with a threaded plug.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

.4 Where conduit is located in wall cavities in occupied spaces, route to avoid contact with plumbing and other services to the drywall and studs. The plumbing and other services are being installed clear of drywall and studs and electrical conduit can provide a solid connection to transmit noise from the plumbing to the drywall if routed without adequate clearance.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-C22.2 No.42-99(R2002), General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No.55-M1986(July 2001), Special Use Switches.
- .4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 26 05 00 - Common Work Results - Electrical

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Engineer.

Part 2 Products

2.1 SWITCHES

.1 General Purpose:

- .1 15 A, 120 V, single pole, double pole, three-way, four-way switches to: CSA-C22.2 No.55 and CSA-C22.2 No.111.
- .2 Manually-operated general purpose ac switches with following features:
  - .1 Terminal holes approved for No. 10 AWG wire.
  - .2 Silver alloy contacts.
  - .3 Urea or melamine molding for parts subject to carbon tracking.
  - .4 Suitable for back and side wiring.

.5 White toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Standard Switches of one manufacturer throughout project.

.5 All switches to be specification grade

.6 Steel, nickel plated corrosion resistant bridge, prominent amperage marking,colour coded base, one piece rivetless copper alloy spring contact arm and terminal plate, one piece integral grounding terminal with #8 brass screw, stainless steal automatic grounding clip to assure grounding continuity between mounting strap and metal wall box, silver cadmium oxide contacts, back wire entrance for terminations to accept two wires for feed through capability (avoiding pig-tailing) and large brass binding head screws with deep slots.

.7 Acceptable materials: Hubbell 1201, Leviton 1201 or Cooper 1201 Series.

.2 Switches with double throw:

.1 For control of cell fixture.

.2 3 position maintained contact type.

.3 Provide pilot light for top and bottom positions.

.4 Acceptable materials: Hubbell 1381-I.

.3 Switches with Pilot Lights:

.1 Pilot lights as indicated, with neon type 0.04 W, 125 V lamp and red plastic jewel flush type.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:

.1 White moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

.4 Compact heavy duty design with heavy duty wrap around bridge locked into body, Thick wall thermoset base, 0.8mm thick brass triple wipe power contacts with #8 brass screws, eight hole clamp type back wiring and anchor hole to help form solid wire around terminal screw, brass centre rivet, all brass grounding system with pretensioned contacts and impact resistant nylon face.

.5 Standard of acceptance:

.1 Specification Grade: Hubbell 5252 Series, Leviton 5252 Series, P&S 5252 or Cooper 5252 series.

.6 Identify all receptacles as to panel and circuit number on clean plastic mylar sticker, permanently affixed to the device cover plate.

2.3 SPECIAL WIRING DEVICES

.1 Transient protected receptacles:

.1 common and normal mode protection, 210 Joules/13000 Amps per mode, audio & visual status indicators, alarm silencing, 500 V maximum suppressed voltage (UL 1449 testing), duplex outlet.

.2 Standard of Acceptance: Hubbell 5262S, Leviton 7280, Cooper 5262S or approved equivalent.

2.4 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm thick cover plates cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

.5 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical as indicated.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical as indicated.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Mount Receptacles with u-ground on bottom of receptacle.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.

.2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.

1.2 SUBMITTALS

.1 Submit product data in accordance with Section 26 05 00 - Common Work Results – Electrical.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

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

Part 2 Products

2.1 DISCONNECT SWITCHES

.1 Fused switches are indicated on the contract drawings. It is not acceptable to provide fused disconnect switches in lieu of breakers. Confirm locations with contract drawings.

.2 Fusible, non-fusible, horsepower rated disconnect switch in CSA Enclosure 1, 3R, or 4, to CAN/CSA C22.2 No.4 as required; size as indicated.

.3 Provision for padlocking in off switch position by locks.

.4 Mechanically interlocked door to prevent opening when handle in ON position.

.5 Fuses: size as indicated, in accordance with Section 26 28 14 - Fuses - Low Voltage.

.6 Fuseholders: to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.

.7 Quick-make, quick-break action.

.8 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

Part 3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

END OF SECTION

Part 1 General

1.1 SCOPE

.1 Work includes the coordination of all equipment and devices as required for project completion in accordance with mechanical scope of the project.

Part 2 Products

2.1 MATERIALS

.1 Install thermostats for Mechanical heating/cooling equipment provided by Mechanical Contract where specifically indicated on the drawings and/or indicated on the Mechanical drawings.

.2 Install connections to air valves and branch circuit selectors where applicable. Coordinate with Mechanical drawings and trades to ensure locations of equipment prior to rough-in.

.3 Electrical shall supply and install all switches, starters, motor controllers and control apparatus required for satisfactory completion of work as outlined in drawings and specifications. All electrical equipment supplied or installed shall have CSA approval for use in its intended location.

.4 Mechanical Sections will provide as required any necessary wiring diagrams required for equipment.

.5 Refer to Mechanical drawings and specs for wiring requirements with reference to thermostat and control wiring of heating equipment.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1-97, Electric Lamp Ballasts-Line Frequency Flourescent Lamp Ballast.

.2 ANSI C82.4-92, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41-1991, Surge Voltages in Low-Voltage AC Power Circuits.

.3 American Society for Testing and Materials (ASTM)

.1 ASTM F1137-88(1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 United States of America, Federal Communications Commission (FCC)

.1 FCC (CFR47) EM and RF Interference Suppression.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings in accordance with Section 26 05 00 - Common Work Results – Electrical.

.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for approval by Engineer. Data MUST be available as .IES files and submitted for incorporation in standard lighting simulation software.

.3 Photometric data to include: VCP Table spacing criterion.

1.3 COORDINATION WITH OTHER DIVISIONS

.1 Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer and defer ordering until certified.

.2 Supply plaster frames, trim rings and backboxes to other trades as the work requires.

.3 Coordinate with Mechanical to avoid conflicts between luminaires, supports, fittings and mechanical equipment.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 LAMPS

.1 Fluorescent T-8.

.1 Acceptable manufacturers: Sylvania, Philips, GE.

.2 32 Watt – Instant start, 4100°K, low mercury, TCLP compliant, 48” nominal length, with the following minimum requirements: 2800 initial lumens, 20,000 hour life for 3 hr average operation time on a instant start programmed start ballast, except where noted otherwise. 85 colour rendering index (CRI), medium bipin.

.2 Fluorescent T-5.

.1 28 Watt – High Output, Programmed start, mini bipin, 4100°K, low mercury, TCLP compliant, 46” nominal length, with the following minimum requirements: 2900 initial lumens, 20,000 hour life, 82 colour rendering index (CRI).

.2 54 Watt - High Output, programmed start, 4100°K,low mercury, TCLP compliant, 46” nominal length, with the following minimum requirements: High Output, 5000 initial lumens, 20,000 hour life, 82 colour rendering index (CRI), mini bipin.

.3 Compact Fluorescent

.1 Shape and Wattage as indicated on fixture schedule. Base to match fixture requirements. Lamp colour temp. shall be 4100°K. Low mercury, TCLP compliant . Minimum requirements of 10,000 hour life and 82 CRI

2.2 BALLASTS

.1 T8 Instant Start fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic.

.1 Rating: voltage, number of lamps as indicated on drawings.

.2 Instant Start.

.3 For operation of one or two lamps, using parallel lamp circuitry.

.4 RFI/EMI suppression circuit to: FCC (CFR47) Part 18, sub-part C, Class A and Part 15, sub-part B, Class B.

.5 Totally encased and designed for 40 deg C ambient temperature.

.6 High Power factor.

.7 Crest factor: 1.5 maximum current, 2.0 maximum voltage.

.8 Capacitor: thermally protected.

.9 Thermal protection: non-resettable on coil.

.10 Harmonics: 10 % maximum THD, including 49th for electronic discrete and hybrid ballasts, 25 % maximum THD including 49th for electromagnetic ballasts.

.11 Operating frequency of electronic ballast: 21 khz minimum.

.12 Normal Ballast Factor.

.13 Sound rated: Class A.

.14 Mounting: integral with luminaire.

.15 Acceptable manufacturers: Sylvania, GE, Advance.

.2 T5HO Fluorescent ballast: CBM and CSA certified, energy efficient type, IC electronic

.1 Rating: Wattage, voltage, number of lamps as indicated on drawings.
.2 Programmed start.
.3 End-of-life lamp sensing circuit.
.4 High Power Factor
.5 Normal Ballast Factor
.6 For operation of one or two lamps.
.7 Total Harmonic Distortion less than 10%.
.8 Sound rated: Class A.
.9 Mounting: integral with luminaire.
.10 Standard of Acceptance:
.1 Sylvania Quicktronic Pro QTP_x__T5__/UNV

.3 Compact Fluorescent ballast: CSA certified, IC electronic

.1 Rating: Wattage, voltage and number of lamps as indicated on fixture schedule.
.2 Programmed start.
.3 End-of-life lamp sensing circuit.
.4 Total Harmonic Distortion less than 10%.

.4 In accordance with Section 26 52 01: Unit Equipment for Emergency Lighting.

2.3 FINISHES

.1 Baked enamel finish:

.1 Conditioning of metal before painting:
.1 For corrosion resistance conversion coating to ASTM F1137.
.2 For paint base, conversion coating to ASTM F1137.
.2 Metal surfaces of luminaire housing and reflectors finished with high gloss baked enamel polyester powdercoat, or alzak aluminum to give smooth, uniform appearance, free from pinholes or defects.
.3 Reflector and other inside surfaces finished as follows:
.1 White, minimum reflection factor 85%.
.2 Colour fastness: yellowness factor not above 0.02 and after 250 hours exposure in Atlas fade-ometer not to exceed 0.05.
.3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.
.4 Gloss not less than 80 units as measured with Gardner 60 deg gloss meter.
.5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
.6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

.2 Alzak finish:

.1 Aluminium sheet fabricated from special aluminum alloys and chemically brightened, subsequently anodically treated to specifications established by Alcoa, to produce:

.1 Finish for mild commercial service, minimum density of coating 7.8 g/m2, minimum reflectivity 83% for specular, 80.5% for semi-specular and 75% for diffuse.

.2 Finish for regular industrial service, minimum density of coating 14.8 g/m2, minimum reflectivity 82% for specular and 73% for diffuse.

.3 Finish for heavy duty service, minimum density of coating 21.8 g/m2, minimum reflectivity 85% for specular, 65% for diffuse.

.3 Specular Interior Reflectors:

.1 95% reflectivity as per fixture schedule requirements.

2.4 LIGHT CONTROL DEVICES

.1 Design:

.1 Lens thickness: 2.41 mm or as indicated on fixture schedule.

.2 Material: as indicated by the requirements on the fixture schedule.

2.5 LUMINAIRES

.1 As per schedule on the drawings.

2.6 EXTERIOR LUMINAIRES

.1 Provide luminaires complete with gaskets forming weatherproof assembly where exposed to weather.

.2 Luminaire finishes to be non-corrosive types.

.3 Provide low temperature ballasts as required.

2.7 SPARES

.1 Lamps

.1 Spare fluorescent lamps, of each type specified in fixture schedule. Provide a minimum number of spares calculated as follows, and rounded up to the next highest integer:

.1 Linear fluorescent - 5% times the total number for installation, minimum 10 lamps.

.2 Compact fluorescent – 5% times the total number for installation, minimum 10 lamps.

.2 Ballasts and Accessories

.1 Spare fluorescent ballasts, of each type specified in fixture schedule. Provide a minimum number of spares calculated using the following percentages, and rounded up to the next highest integer:

.1 Fluorescent ballasts – 5% times the total number for installation.

.2 Compact Fluorescent ballasts – 5% times the total number for installation.

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Coordinate the location of all lighting fixtures with the sprinkler installer to meet the clearance requirements of ANSI/NFPA 13.

.3 Supply ballasts of compatible design to lamps and fixtures specified.

.1 High intensity discharge ballasts to be mounted complete with rubber grommets to reduce noise transmission.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Bx (AC90) may be used for drops to fixtures in suspended ceiling installations. (Maximum 3 meter drop)

.2 Otherwise provide RW90 XLPE in conduit.

.2 Surface mounted luminaires are to be fed via conduit tucked neatly against structural members, and protruding at right angles from such structure for fixture connection. Contractor to ensure conduit is painted as per ceiling finishes.

.1 For fixture drops provide separate junction box for each fixture or row of fixtures where mounted end to end.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations support luminaires independently from ceiling.

.2 Support luminaires mounted in continuous rows once every 1219mm or as per manufacturer recommendation in the case of extruded aluminum or steel.

.3 Provide plaster frames or plaster trim as required and turn same over to the ceiling section for installation.

.4 Support all ceiling mounted luminaries by two hangers per luminaire minimum independent of ceiling structure of tee bars.

.5 At plaster or drywall ceiling systems incandescent fixtures are to be outlet box supported where surface mounted.

.6 Surface mounted fluorescent fixtures are not to be supported by T-bar clips at T & T ceiling systems.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines, unless otherwise indicated.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for emergency lighting systems.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-M1985(R1999), Unit Equipment fo Emergency Lighting.

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 26 05 00 - Common Work Results – Electrical.

.2 Data to indicate system components, mounting method, source of power and special attachments.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

1.5 WARRANTY

.1 For batteries, the 12months warranty period prescribed in subsection GC32.1 of General Conditions"C" is extended to 120months, with a no-charge replacement during the first 5 years and a pro-rate charge on the second 5 years.

Part 2 Products

2.1 EMERGENCY BATTERY PACKS

.1 Emergency lighting equipment: to CSA C22.2 No.141.

.2 Supply voltage: 120V, ac.

.3 Output voltage: 24V dc.

.4 Operating time: 30 min.

.5 Wattage:

.1 Battery Pack #1 (BP#1) = 144 Watts minimum.

.6 Battery: sealed, maintenance free with 10 year life expectancy.

.7 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.

.8 Solid state transfer circuit.

.9 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.10 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.

.11 Lamp heads: integral on unit and remote, 345º horizontal and 180º vertical adjustment. Lamp type: Mini halogen with quartz bi-pin housing, 8 watts, voltage to match battery unit output voltage.

.12 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.13 Housing: Rugged use / Tamper resistant, polycarbonate housing with lamps enclosed within clear, cube-shaped, polycarbonate lenses. Finish: white.

.14 Finish: white.

.15 Auxiliary equipment:

- .1 Ammeter.
- .2 Voltmeter.
- .3 Test switch.
- .4 Time delay relay.
- .5 Battery disconnect device.
- .6 AC input and DC output terminal blocks inside cabinet.
- .7 Shelf/ Bracket where required.
- .8 Cord and plug connection for ac.
- .9 RFI suppressors.

.16 Standard of Acceptance: Lumacell, Emergi-Lite, Luxnet, ReadyLite.

2.2 WIRING OF REMOTE HEADS

.1 Conduit: type EMT, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: RW90 type in accordance with Section 26 05 21 - Wires and Cables 0-1000 V, sized a minimum of #10 awg. Install with conductors sized to maintain current flow with maximum 5% voltage drop.

Part 3 Execution

3.1 INSTALLATION OF EMERGENCY BATTERY PACKS AND REMOTE HEADS

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Connect exit lights to unit equipment with conductors sized to maintain current flow with a maximum of 5% voltage drop.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Atomic Energy Control Board Regulations

.2 Canadian Code for Preferred Packaging

.3 Canadian Standards Association (CSA)

.1 CSA C22.2 No.141- M1985(R1992) , Unit Equipment for Emergency Lighting.

.2 CSA C860- 96 , Performance of Internally-Lighted Exit Signs.

.4 National Fire Protection Association (NFPA) requirements

1.2 SUBMITTALS

.1 Submit product data in accordance with Section 26 05 00 - Common Work Results – Electrical.

.2 Submit product data sheets for exit lights. Include product characteristics, performance criteria, physical size, limitations and finish.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

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

Part 2 Products

2.1 STANDARD UNITS

.1 Exit lights: to CSA C22.2 No.141 and CSA C860, packaged in accordance with the Canadian Code for Preferred Packaging guidelines.

.2 Housing: cold rolled steel minimum 1.0 mm thick, white enamel finish.

.3 Lamps: LED, over 75,000 hours.

.4 Pictogram: Green pictogram “Running Man”.

.5 Each unit shall be self-contained and have an automatic power failure device, test switch, pilot light, and fully automatic high/low solid-state trickle charger in a self-contained

power pack. Battery shall be the NiCad type and shall be maintenance-free for a period of not less than 5-years under normal operating conditions. Normal operation shall be with 120 volts.

.6 Ceiling and wall (surface) mounted as indicated on the drawings.

.7 Single or Double face, as indicated on drawings.

.8 Downlight: translucent acrylic in bottom of unit.

.9 Knockout Chevrons: as required.

.10 Standard of Acceptance: Lumacell , EmergiLite, Luxnet or ReadyLite equivalents.

Part 3 Execution

3.1 INSTALLATION

.1 Install exit lights.

.2 Connect fixtures to exit light circuits.

.3 Ensure that exit light circuit breaker is locked in on position.

.4 EXIT light circuits are to contain no other electrical loads.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 SYSTEM DESCRIPTION

.1 Provisions for owner supplied equipment as it relates to the Security, CCVE system in the facility.

.2 Components covered under this section are identified on the drawings utilizing a hexagon.

1.3 GENERAL REQUIREMENTS

.1 Wherever practical and reasonable, all cabinets and electrical boxes shall be installed in the locations shown on the attached floor plans.

.2 Drawings show conduit connection requirements Actual conduit runs shall run parallel to building lines.

.3 Unless specified otherwise, all conduits shall be sized according to the number of cables in the run. Maximum conduit fill is 50%.

.4 Unless specified otherwise, all junction boxes (J1, J2, etc.) shall be steel and shall be sized according to the number of conduits they must accommodate.

.5 Unless noted otherwise, all cables pulled to a splitter trough in Room 120 shall have no less than 4500mm of cable slack in the splitter trough.

.6 Unless noted otherwise, all cables terminating in a 'T' Type cabinet (T1, T2, T3,, etc.) shall have no less than 1200mm of slack in the ‘T’ cabinet.

.7 Unless noted otherwise, all cables terminating in a device or outlet shall have no less than 300mm of slack in the device/outlet box.

.8 All cables terminating in a cabinet, a splitter trough, a device box, a utility box or an outlet box shall be labelled.

The contractor will be responsible to ensure that all cables are tested for opens, grounds and shorts. The contractor will be required to repair, at no charge, any cables found defective by PTSS.

Part 2 Products

2.1 CONDUIT

.1 Unless specified otherwise, all conduits shall be EMT.

2.2 Junction, Outlet and Pull Boxes

.1 Unless specified otherwise, all outlet, device and pull boxes shall be steel.

2.3 Splitter Troughs

.1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.

2.4 Ground Bar

.1 Hoffman ASG8

2.5 Cable

.1 All telephone type (Cat3) cables shall be NORDX D-INSIDE CABLE, **24 AWG**, CMR, Category 3 solid copper with a grey jacket (or equivalent).

.2 All LVT cables shall be four (4) conductor #18 solid AWG Standard Control LVT cable.

.3 All coaxial cable shall be Provo 5911 (or equivalent).

.4 All single pair shielded cable shall be Provo 7722 cable (or equivalent).

2.6 PULL CORD/TAPE

.1 Polypropylene type, 200 lb tensile strength minimum.

Part 3 Execution

3.1 A5 - Splitter Trough

.1 Supply and install one Hoffman AST283R 610 X 152 X 114mm splitter trough surface mounted 150mm below finished ceiling.

.2 Provide 4 modular data jacks directly below the splitter trough. Provide cabling from data jacks to patch panel in LAN Room. Provide patch cords and cross connected from patch panel to data switch.

3.2 F1 – FIRE ALARM CONNECTION

.1 Supply and install conduit from the main fire alarm control panel to the splitter trough in Room 107 (as per floor plans).

.2 Supply, install and label **one** 4 pair telephone (Cat3) cable in the conduit from the main fire alarm control panel to the splitter trough on the A5 backboard. Leave 1200mm of cable slack inside the main fire alarm control panel.

3.3 T7 – "T" Cabinet (300H x 300W x 100D)

.1 Supply and install one recessed 300H X 300W X 100Dmm Type 1 Telephone cabinet, complete with 3/4" wood back, centered 2250mm A.F.F..

.2 Supply and install one duplex 120VAC receptacle in the top left corner inside this cabinet (mount receptacle on the side of the cabinet not the back). This duplex receptacle shall be wired to a separate 120VAC circuit, on its own breaker.

.3 Supply, install and connect a 24VAC 75VA transformer and a RELECO C3-A30X/24VAC 3PDT relay (or equivalent) inside this cabinet.

.4 Connect Riot Alarm Panic pushbuttons, Riot Alarm horns and the Riot Alarm RESET pushbutton to the 3PDT relay inside the T7 cabinet as per detail drawing "SCHEMATIC - CELL BLOCK RIOT ALARM" and as per floor plans.

.5 Supply and install one 13mm conduit from the T7 cabinet to the A5 splitter trough (as per floor plans).

.6 Supply, install and label two 4 pair telephone (Cat3) cable(s) in the conduit from the T7 cabinet to the A5 splitter trough.

.7 Test **each** Riot Alarm Panic Switch for proper operation. The panic pushbuttons latch the horn(s) and the Reset pushbutton silences the horn(s).

3.4 04 – Riot Alarm Horn

.1 Supply, install and connect one Edwards 870P-G5 24VAC vibrating alarm horn (or equivalent) in a recessed **4-11/16**" square outlet box (T&B Iberville CI-72171-1 or equivalent) mounted 100mm below finished ceiling but no higher than 2400mm A.F.F..

.2 Supply and install conduit from the outlet box to a Riot Alarm Reset Pushbutton outlet box in the area **OR** to the T7 cabinet (as per floor plan).

.3 Supply, install and label one 4 conductor **18 AWG** solid copper LVT cable in the conduit from the outlet box thru all junction boxes and terminate at the T7 cabinet.

Connect vibrating alarm horn to the 3PDT relay in the T7 cabinet as per attached detail drawing "SCHEMATIC - CELL BLOCK RIOT ALARM".

3.5 53 Riot Alarm Panic Pushbutton

.1 Supply, install and connect one **red** 57mm mushroom head "Square D" 9001KR25R momentary pushbutton with **two** "Square D" 9001KA2 normally open contact blocks and **one** "Square D" 9001K25 Flush Plate in a recessed 100 X 50 X 63mm single gang device box centered 1350mm A.F.F..

.2 Supply and install conduit from the device box to another device box in the area **OR** to the T7 cabinet (as per floor plans).

.3 Supply, install and label one 4 pair telephone (Cat3) cable in the conduit from the device box thru all junction boxes and terminate at the T7 cabinet.

.4 Connect the panic switch to the 3PDT relay in the T7 cabinet as per attached detail drawing "SCHEMATIC - CELL BLOCK RIOT ALARM".

3.6 73 Riot Alarm Reset Pushbutton

.1 Supply, install and connect one **green** 57mm mushroom head "Square D" 9001KR25G momentary pushbutton with **one** "Square D" 9001KA3 normally closed contact block and **one** "Square D" 9001K25 Flush Plate in a recessed 100 X 50 X 63mm single gang device box centered 1500mm A.F.F..

.2 Supply and install conduit from the device box to the T7 cabinet (as per floor plans).

.3 Supply, install and label one 4 conductor **18 AWG** solid copper LVT cable in the conduit from the device box thru all outlet/junction boxes and terminate at the T7 cabinet.

.4 Connect the reset pushbutton to the 3PDT relay in T7 cabinet as per attached detail drawing "SCHEMATIC - CELL BLOCK RIOT ALARM".

3.7 81 Octagon Outlet Box

.1 Supply and install one recessed 4" octagon outlet box c/w blank cover plate. When ceilings are suspended, the octagon outlet box shall be located no more than 300mm above the suspended ceiling.

.2 Supply and install conduit from the outlet box to a junction box in the area **OR** to the A5 splitter trough (as per floor plans).

.3 Supply, install and label one Provo 5911 co-ax video cable (or equivalent) and **one** 4 conductor **18 AWG** solid copper LVT cable in the conduit from the outlet box to the A5 splitter trough.

.4 Note:

.1 Supply no less than 1200mm of cable slack at the outlet box.

.2 Supply no less than 4500mm of cable slack at the A5 splitter trough.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCES

.1 Government of Canada

.1 NBC-2010, National Building Code of Canada

.2 NFC-2010, National Fire Code of Canada

.3 TB OSH Chapter 3-04, 1994-12-22, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.

.2 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-2006, Installation of Fire Alarm Systems.

.2 ULC-S525-1978, Audible Signal Appliances.

.3 CAN/ULC-S526-1987(R1995), Visual Signal Appliances, Fire Alarm.

.4 CAN/ULC-S527-1987(R1995), Control Units.

.5 CAN/ULC-S528-1991, Manual Pull Stations.

.6 CAN/ULC-S529-1987(R1995), Smoke Detectors.

.7 CAN/ULC-S530-1991, Heat Actuated Fire Detectors.

.8 CAN/ULC-S531-1987(R1995), Smoke Alarms.

.9 CAN/ULC-S536-1997, Inspection and Testing of Fire Alarm Systems.

.10 CAN/ULC-S537-2004, Verification of Fire Alarm Systems.

.3 CAN/CSA-C22.1-2012, Canadian Electrical Code

.4 In the case of any discrepancy between these specifications, the project drawings, and any applicable local codes, the installed Fire Alarm / Life Safety System shall comply with the most stringent requirement.

1.3 DESCRIPTION OF SYSTEM

.1 Fully supervised, addressable, Class A, microprocessor based, fire alarm system, utilizing digital techniques for data control and digital and multiplexing techniques for data transmission.

.2 System to carry out fire alarm and protection functions; including receiving alarm signals; initiating general alarm; supervising components and wiring; actuating annunciators and auxiliary functions; initiating trouble signals and signalling to monitoring agency.

.3 Zoned, non-coded, single stage.

.4 Modular in design to allow for future expansion.

.5 Operation of system shall not require personnel with special computer skills.

.6 System to include:

.1 Central Control Unit in separate enclosure with power supply, stand-by batteries, central processor with microprocessor and logic interface, main system memory, input-output interfaces for alarm receiving, annunciation/display, and program control/signalling.

.2 Trouble signal devices.

.3 Power supply facilities.

.4 Manual alarm stations.

.5 Automatic alarm initiating devices.

.6 Audible signal devices.

.7 End-of-line devices.

.8 Annunciators.

.9 Visual alarm signal devices.

.10 Ancilliary devices. Spare contacts for autodialers, door hold opens, air handling units, etc.

.11 Device loop isolation modules.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

.1 System:

.1 To TB OSH Chapter 3-04.

.2 Subject to Fire Commissioner of Canada (FC) approval.

.3 Subject to FC inspection for final acceptance.

.2 System components: listed by ULC and comply with applicable provisions of National Building Code and Local/Provincial Building Codes, and meet requirements of local authority having jurisdiction.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram, including schematics of modules.

.4 Complete system riser diagram identifying control equipment, initiating zones, loop isolation modules and signaling circuits.

.5 Shop drawings to be stamped by manufacturer to ensure equipment and design are in accordance with ULC standards.

1.6 QUALITY ASSURANCE

.1 Qualifications: Installation to be performed by a qualified licensed Electrical Contractor and licensed journeyman electrician.

.1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.2 Components and control panels to be factory assembled and tested.

.3 Installation to be supervised by manufacturer's representative with three (3) or more years of experience in fire alarm systems. This person shall be responsible for the following:

.1 On-site visits:

.1 Prior to installation to ensure that the Contractor is familiar with all aspects of installation.

.2 During installation to confirm wiring compliance.

.3 After installation is complete to verify that system is fully operational and working in accordance with design.

.2 Start-up, demonstration and training in accordance with 26 05 00 – Common Work Results for Electrical.

.1 Conduct training program for designated building personnel to allow system users to understand and exercise all aspects of system operation.

.2 Troubleshooting basics.

.3 Training duration: 2 hours.

.4 Manufacturer's Field reports: Submit to Engineer or Consultant, a written report, within 3 days of review for each visit, verifying compliance of Work, test results, and product installation in accordance with manufacturer's and supervisors' recommendations.

1.7 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Section 26 05 00 – Common Work Results for Electrical.

.2 Include:

.1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings.

.4 List of recommended spare parts for system.

.5 Certificate of Verification.

.6 Installer to provide fire alarm risers and building plan drawings as described in Section 26 05 00 – Common Work Results for Electrical.

1.8 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Include:

.1 5 spare glass rods for manual pull box stations if applicable.

1.9 MAINTENANCE

.1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Engineer.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

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

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.2 Power supply: to CAN/ULC-S524.

.3 Audible signal devices: to ULC-S525.

.4 Visual signal devices: to CAN/ULC-S526.

.5 Control unit: to CAN/ULC-S527.

.6 Manual pull stations: to CAN/ULC-S528.

.7 Thermal detectors: to CAN/ULC-S530.

.8 Smoke detectors: to CAN/ULC-S529.

.9 Smoke alarms: to CAN/ULC-S531.

.10 Any equipment not bearing a ULC Label shall be removed and replaced with compatible ULC labeled equipment at the contractor’s expense.

2.2 SYSTEM OPERATION: SINGLE STAGE

.1 Actuation of any alarm initiating device to:

.1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.

.2 Indicate address of alarm and zone partition at central control unit and remote annunciator if applicable.

.3 Cause audible signalling devices to sound continuously throughout building and at central control unit.

.4 Transmit signal to fire department via central station.

.5 Cause air conditioning and ventilation fans to shut down or to function to provide required control of smoke movement as required.

.6 Cause fire doors and smoke control doors, if normally held open, to close automatically.

.2 Acknowledging alarm: indicated at central control unit.

.3 Possible to silence signals by "alarm silence" switch at control unit, after 60s period of operation.

.4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.

.5 Actuation of supervisory devices to:

.1 Cause electronic latch to lock-in supervisory state at central control unit and data gathering panel/transponder.

.2 Indicate respective supervisory zone at central control unit and at remote annunciator if applicable.

.3 Cause audible signal at central control unit to sound.

.4 Activate common supervisory sequence.

.6 Resetting alarm, supervisory device not to return system indications/functions back to normal until control unit has been reset.

.7 Trouble on system to:

.1 Indicate circuit in trouble at central control unit.

.2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.

.8 Trouble on system: suppressed during course of alarm.

.9 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 CONTROL PANEL

.1 Central control unit (CCU).

.1 Suitable for DCLA communication style: to CAN/ULC-S524.

.2 Features specified are minimum requirements for microprocessor-based system with digital data control and digital multiplexing techniques for data transmission.

.3 Minimum capacity of 250 addressable monitoring and 250 addressable control/signal points. Points may be divided between 2 communication channels in distributed system, each channel operating independently of other. Faults on one communication channel not to affect operation of other channel.

.4 System to provide for priority reporting levels, with fire alarm points assigned highest priority, supervisory and monitoring lower priority, and third priority for troubles. Possible to assign control priorities to control points in system to guarantee operation or allow emergency override as required.

.5 Integral power supply, battery charger and standby batteries.

.6 Basic life safety software: retained in non volatile Erasable Programmable Read-Only-Memory (EPROM). Extra memory chips: easily field-installed. Random-Access-Memory (RAM) chips in panel to facilitate password-protected

field editing of simple software functions (e.g. zone labels, priorities) and changing of system operation software.

.7 Circuitry to continuously monitor communications and data processing cycles of microprocessor. Upon failure, audible and visual trouble indication to activate.

.8 Communication between CCU and remote addressable devices to be supervised, DCLA. Should communications fail between CCU and remote units, audible and visual trouble to be indicated at CCU. Data communication to be binary DC, baseband, time-division multiplex, half-duplex. Each data channel: capable of communicating up to distance of 3,000 m.

.1 Communication between nodes in networked system to be supervised, DCLA. Should communications fail between any 2 nodes, other nodes on loop to continue to communicate with each other and programmed functions on communicating nodes to continue operating.

.9 Support up to 2 RS-232-C I/O ports. CCU output: parallel ASCII with adjustable baud rates to allow interface of any commercially available printer, terminal or PC.

.10 Equipped with software routines to provide Event-Initiated-Programs (EIP); change is status of one or more monitor points, may be programmed to operate any or all of system's control points.

.11 Software and hardware to maintain time of day, day of week, day of month, month and year.

.12 Software to operate variable sensitivity addressable smoke detectors and annunciate their status and sensitivity settings at control panel.

.2 Enclosure: Sprinkler proof as per 26-008, CSA-C22.1-09 c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys.

.3 Standard of acceptance: General Electric, Notifier or Simplex.

2.4 DATA GATHERING PANELS (DGP'S)/TRANSPONDERS

.1 Fire control modules: distributed throughout building in separately enclosed units (DGP'S) and interconnected to central control unit utilizing multiplex data transmission techniques.

.2 Addressable DGP's.

.1 DGP's: addressable type, provide two-way data communication with addressable devices/interface modules, utilizing digital poll/response protocol communication format. Each addressable device: uniquely identified by own address, set at time of installation.

.2 Addressable DGP's: stand-alone capability.

.3 Interface modules: facilitate connection of non-addressable devices (e.g. flow switch) to addressable DGP; provided in different types for connection to monitoring devices (e.g. flow/tamper switch), signalling devices (e.g. bells, horns), and control functions (e.g. fan shutdown, door release); communicate with addressable DGP over minimum number of wires (specified by manufacturer).

.4 Possible to connect all 3 types of addressable interface modules (monitoring, signal and control) to same addressable communication loop.

.5 Addressable DGP's: self-contained, as specified.

.1 Possible to connect variable-sensitivity addressable smoke detectors together with other addressable devices to same addressable communication loop.

2.5 POWER SUPPLIES

.1 120 V, 60 Hz as primary source of power for system.

.2 Voltage regulated, current limited distributed system power.

.3 Primary power failure or power loss (less than 102 V) will activate common trouble sequence.

.4 Interface with battery charger and battery to provide uninterruptible transfer of power to standby source during primary power failure or loss.

.5 During normal operating conditions fault in battery charging circuit, short or open in battery leads to activate common trouble sequence and standby power trouble indicator.

.6 Standby batteries: sealed, maintenance free with a minimum expected life of 5 years, sized to operate system under supervisory load conditions without recharging for 24 consecutive hours and have sufficient power left to operate sounding devices for 30 minutes. Battery bank and charger to be integrally mounted in main fire alarm control panel.

.7 Continuous supervision of wiring for external initiating and alarm circuits to be maintained during power failure.

2.6 INITIATING/ INPUT CIRCUITS

.1 Receiving circuits for alarm initiating devices such as manual pull stations, smoke detectors, heat detectors and water flow switches, wired in DCLA configuration to central control unit or DGP's/transponders.

.2 Alarm receiving circuits (active and spare): compatible with smoke detectors and open contact devices.

.3 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".

.4 Receiving circuits for supervisory, N/O devices. Devices: wired in DCLA configuration to central control unit or DGP's/transponders.

.5 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

2.7 ALARM OUTPUT CIRCUITS

.1 Alarm output circuit: connected to signals, wired in class B configuration to central control unit.

.1 Signal circuits' operation to follow system programming; capable of sounding bells and driving strobe lights continuously. Each signal circuit: rated at 2 A, 24 VDC; fuse-protected from -overloading/overcurrent.

.2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

2.8 AUXILIARY CIRCUITS

.1 To shut down the Air Handling Unit fans.

.2 To automatically close fire doors and smoke control doors, if normally held open.

.3 Actual status indication (positive feedback) from controlled device.

.4 Alarm and supervisory on system to cause operation of programmed auxiliary output circuits.

.5 Upon resetting system, auxiliary contacts to return to normal or to operate as pre-programmed.

.6 Fans: stagger-started upon system reset; timing circuit to separate starting of each fan or set of fans connected to auxiliary contact on system. Timing circuit: controlled by CCU.

.7 Auxiliary circuits: rated at 2 A, 24 V dc or 120 V ac, fuse-protected.

2.9 WIRING

.1 In accordance with Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

.2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

.3 To signal circuits: 10 AWG minimum, and in accordance with manufacturer's requirements.

.4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

2.10 MANUAL ALARM STATIONS

.1 Addressable manual pull station.

.1 Pull lever, break glass rod, semi-flush wall mounted type, single action, single stage, electronics to communicate station's status to addressable module/transponder over 2 wires and to supply power to station. Station address to be set on station in field.

2.11 AUTOMATIC ALARM INITIATING DEVICES

.1 Addressable heat detectors, fixed temperature , non-restorable rated 57 or 93 C.

.1 Electronics to communicate detector's status to addressable module/transponder.

.2 Detector address to be set on detector base in field.

.2 Addressable smoke detector.

.1 Ionization type.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Detector address to be set on detector base in field.

.3 Addressable duct smoke detector.

.1 Photo-electric air duct type with sampling tubes and protective housing.

.2 Twist-in type with fixed base.

.3 Wire-in base assembly with integral red alarm LED and terminals for remote relay alarm LED.

.4 Electronics to communicate detector's status to addressable module/transponder.

.5 Detector address to be set on detector base in field.

2.12 FIELD DEVICE PROTECTIVE CAGES

.1 To be installed over smoke detectors in cells.

.2 Standard of Acceptance:

.1 Edwards 6255-004: rotate conduit entrance cover 90 degrees to ensure no opening exists when installed. Cover only to be used in air velocities greater than 9 meters per minute as a condition of ULC approval.

.2 Simplex 2098-9829C: rotate guard so that conduit port is blocked by the perforated tab on the mounting plate. Cover only to be used in air velocities greater than 3 meters per minute as a condition of ULC approval.

.3 Notifier Guard Model Smoke G1A-2.

.4 All grills/protective cages must be stamped with manufacturer and model # on face plate.

2.13 AUDIBLE SIGNAL DEVICES

.1 Combination Horn/Strobe:

.1 Red fire alarm horns of the enclosed mounting type with heavy duty mechanisms to provide 87 dB@ 10 feet. Polarize the horns for supervised operations. Use flush box, surface mounting as applicable.

.2 Wedge shaped strobes clearly labeled Fire. Polarize the strobes for supervised operation. Strobes shall provide a high intensity flashing light for visual signaling. Mount the units as with the Horns.

2.14 END-OF-LINE DEVICES

.1 End-of-line devices to control supervisory current in signaling circuits, sized to ensure correct supervisory current for each circuit. Open ,short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.15 REMOTE ANNUNCIATORS

.1 LCD type, with designation cards to indicate zones.

.2 Display:

.1 Alarms and troubles for alarm initiating circuits.

.2 Common supervisory alarm for supervisory initiating circuits.

.3 Common system trouble.

.3 Trouble buzzer.

.1 Acknowledging trouble at main panel to silence trouble buzzers in system.

.4 Supervised, with LED test button and alarm trouble acknowledge button.

.5 Minimum wiring configuration with main panel.

2.16 AS-BUILT RISER DIAGRAM

.1 Fire alarm system riser diagram: in accordance with 26 05 00 – Common Work Results for Electrical.

.2 Locate in main electrical room, and provide a paper copy in the Operation and Maintenance Manual.

2.17 ANCILLARY DEVICES

.1 Remote relay unit to initiate fan shutdowns.

.2 Remote relay unit to initiate automatic door closers, and release maglocks if applicable.

2.18 ISOLATOR MODULES

.1 Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on a Class A branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the loop segment or branch. Isolators are to be located as specified herein and where shown on the drawings.

.2 If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the signaling line circuit. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

.3 The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.

.4 Isolator modules to be installed as per ULC-S524-01 and are to be located between the fire alarm zones as indicated in the zoning schedule on the drawings.

2.19 SPRINKLER SYSTEM

.1 Connect all sprinkler flow switches to the respective box circuits wired to sound alarm in the event of the sprinkler's operation.

.2 Connect all sprinkler gate valve(s) to sound trouble if the valve is closed. Gate valves to be wired to a supervisory circuit such that signaling trouble will not prevent an initiating device from sending an alarm signal to the fire alarm panel.

.3 Sprinkler supervised valve switches, and flow switches to be provided by Mechanical Contract.

.4 Refer to mechanical shop drawings for locations prior to rough-in.

.5 Provide multiplexing modules at each sprinkler device location to allow individual addressing of device on to fire alarm system supervisory loop.

2.20 SIGNALS TO FIRE DEPARTMENT

.1 Notification of fire department shall be provided in accordance with CAN/ULC-S536.

.2 Provide autodialer/communicator for reporting alarm and trouble conditions to a remote monitoring station conforming to the requirement.

Part 3 Execution

3.1 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524, Canadian Electrical Code Section 32, and TB OSH Chapter 3-04.

.2 Install main control panel and connect to ac power supply, dc standby power.

.3 Locate and install manual alarm stations and connect to alarm circuit wiring.

.4 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.5 All fire alarm wiring shall be in conduit. The contractor shall be responsible for the supply and installation of the conduit, wire, wire pulling, junction boxes, electrical boxes, and terminal cabinets in accordance with the manufacturers recommendations.

.6 The manufacturer shall allow for the necessary amount of on site assistance for the contractor during the construction period.

.7 Connect alarm circuits to main control panel.

.8 Locate and install horns, bells, and visual signal devices and connect to signaling circuits. Mount horn/strobe units as per Section 26 05 00 or as per interior elevations

.9 Install end-of-line devices at end of alarm and signaling circuits.

.10 Install remote annunciator panels and connect to annunciator circuit wiring.

.11 Locate and install door releasing devices.

.12 Locate and install remote relay units to control fan shut down.

.13 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

3.2 SYSTEM VERIFICATION

.1 Fire alarm equipment supplier to make a thorough inspection of the complete installed fire alarm system including all components such as manual stations, thermal detections, products-of-combustion detectors, and controls to ensure the following:

- .1 System is complete and functional in accordance with engineer's specifications.
- .2 System is installed according to Underwriters Lab of Canada S524 requirements.
- .3 System is installed in accordance with manufacturer's recommendations.
- .4 Regulations covering supervision of components are adhered to.
- .5 Subsequent changes necessary to conform to Items 1, 2, 3 and/or 4 to be done by Division 26 with technical assistance supplied by the manufacturer.
- .6 During the period of this inspection by the manufacturer, Division 26 to supply to the manufacturer one journeyman electrician.
- .7 To assist Division 26 in preparing his bid, manufacturer to specify number of hours required to perform this inspection.
- .8 Manufacturer to submit to engineer on completion of inspection a point-by-point check list indicating date and time of each item inspected and also issue a Certificate for his records confirming that inspection has been completed and system is installed and functioning in accordance with the specifications. Included with this Certificate to be satisfactory proof of liability insurance valid for not less than one (1) year from date of final inspection.
- .9 Certificate to be free from defining and qualified statements which would make it unacceptable by the Owner.
- .10 Provide a copy of the inspecting technician's report. Identify each device by location and certify the test results.
- .11 Verification shall take place no later than 1 week prior to the substantial completion date. Notify Consultant of verification date and time at least one week in advance.
- .12 Verification may be performed only after:
  - .1 Air balancing is complete.
  - .2 Sprinkler system is 100% complete, charged and ready for use.
  - .3 Building is at a state of completion that will ensure a reasonably dust free environment and the absence of contaminating fumes from verification date to final completion.
- .13 Manufacturer to provide sufficient backup parts on site during verification to accommodate any component failures. Backup parts not used during verification can be removed from site by the manufacturer.
- .14 Provide all testing equipment required for testing smoke detectors and heat detectors during verification.
- .15 Issue a Certificate of Verification confirming the completion of the verification.
- .16 Remuneration shall be paid to the design Consultant to be onsite for the Verification of Fire Alarm. Include all costs of this Verification inspection in the total tender price.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

.1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors sprinkler system transmit alarm to control panel and actuate first stage alarm general alarm ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of trouble signals.

.4 Addressable circuits system style DCLA:

.1 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals on each side of single open-circuit fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.2 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.5 Provide final control panel programming for system Engineer incorporating program changes made during construction.

.6 Simulate and test all auxiliary functions.

.3 Test to be performed by the system manufacturer or qualified testing company, certified to test fire alarm system within the Province of Saskatchewan.

END OF SECTION

ROYAL CANADIAN MOUNTED POLICE
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.

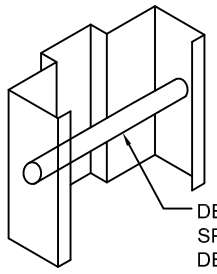
9) GENERAL CONTRACTOR IS RESPONSIBLE TO ENSURE THAT FRAMES AND DOORS ARE SET PLUMB, SQUARE, LEVEL AND THAT WALLS AND FRAME ARE FULLY GROUTED. THE MANUFACTURER OF HOLLOW METAL DOORS AND/OR PRESSED STEEL FRAMES CAN NOT CONTROL THE QUALITY OF EITHER THE HARDWARE, THE FIELD INSTALLATION OF HARDWARE, OR THE PROPER ERECTION OF FRAMES IN THE WALL.

10) ALL BURRS AND SHARP EDGES MUST BE REMOVED AFTER INSTALLATION.

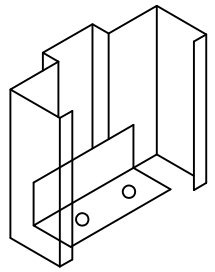
11) THE FOLLOWING SHOP DRAWINGS REFLECT A STANDARD 195 mm BLOCK WALL CONSTRUCTION, SITE CONDITIONS MAY VARY.

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

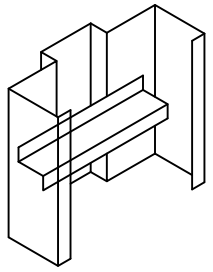
A-3 ANCHOR TYPES



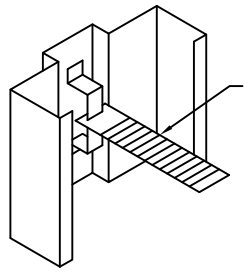
WELDED ROD ANCHOR



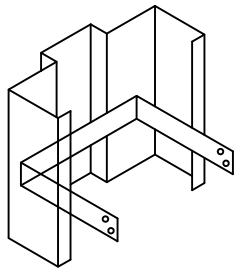
STANDARD FIXED BASE ANCHOR



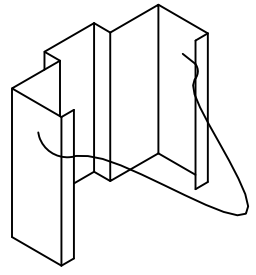
STEEL STUD ANCHOR



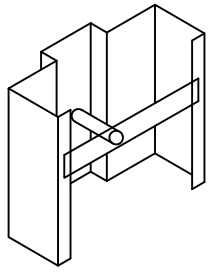
CORRUGATED TAIL ANCHOR



WOOD STUD ANCHOR



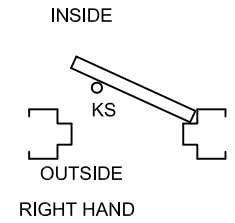
CONCRETE BLOCK WALL WIRE ANCHOR



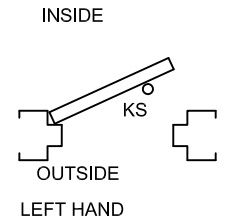
EXISTING WALL ANCHOR

B-3 DOOR AND FRAME HANDING CHART

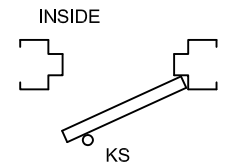
TO DETERMINE HAND(SWING) OF DOOR AND FRAME STAND OUTSIDE - FACING DOOR



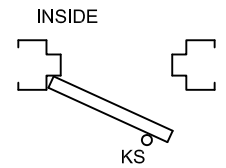
RIGHT HAND



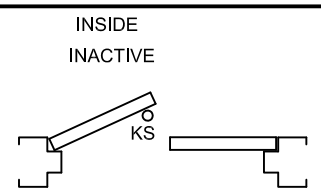
LEFT HAND



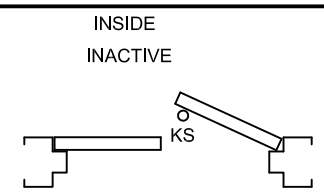
OUTSIDE
RIGHT HAND REVERSE



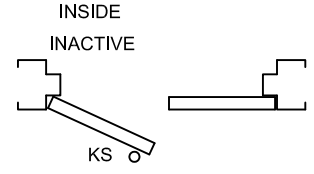
OUTSIDE
LEFT HAND REVERSE



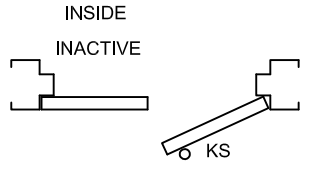
OUTSIDE
PAIR OF DOORS
LH ACTIVE



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

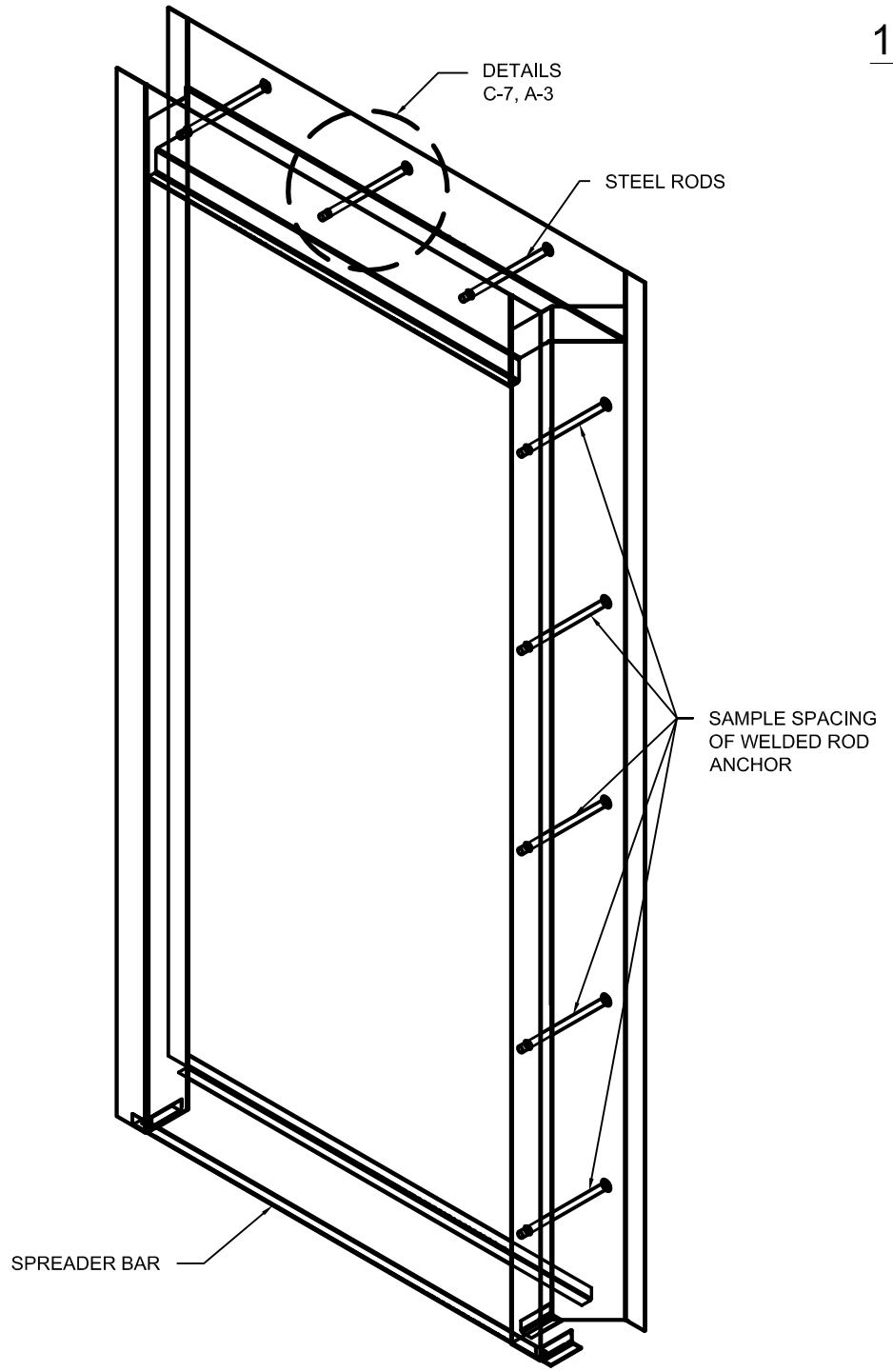
DATE: 9/26/2007

W.O.#:

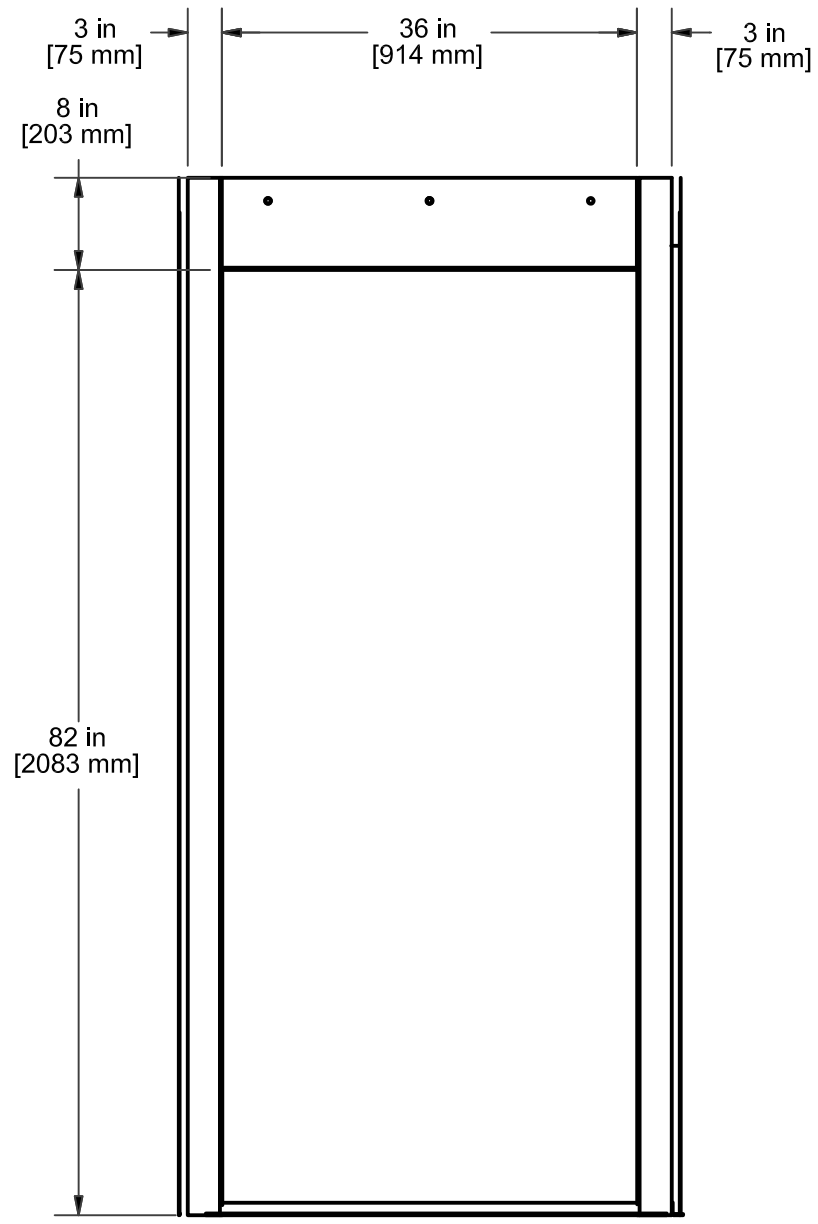
FILE NUMBER:

PG.#: 3

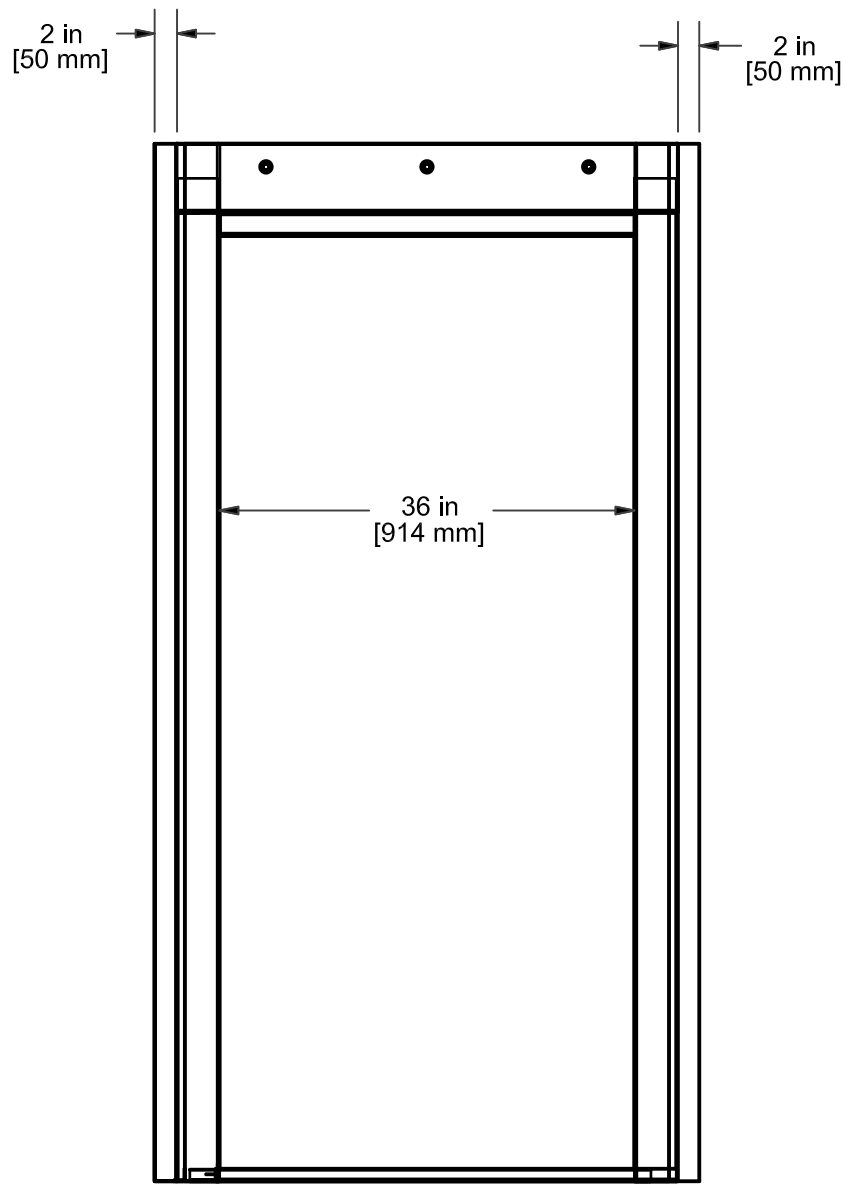
12GA. FRAME FOR SLIDING DOOR



A-4 ISOMETRIC VIEW



B-4 CORRIDOR SIDE

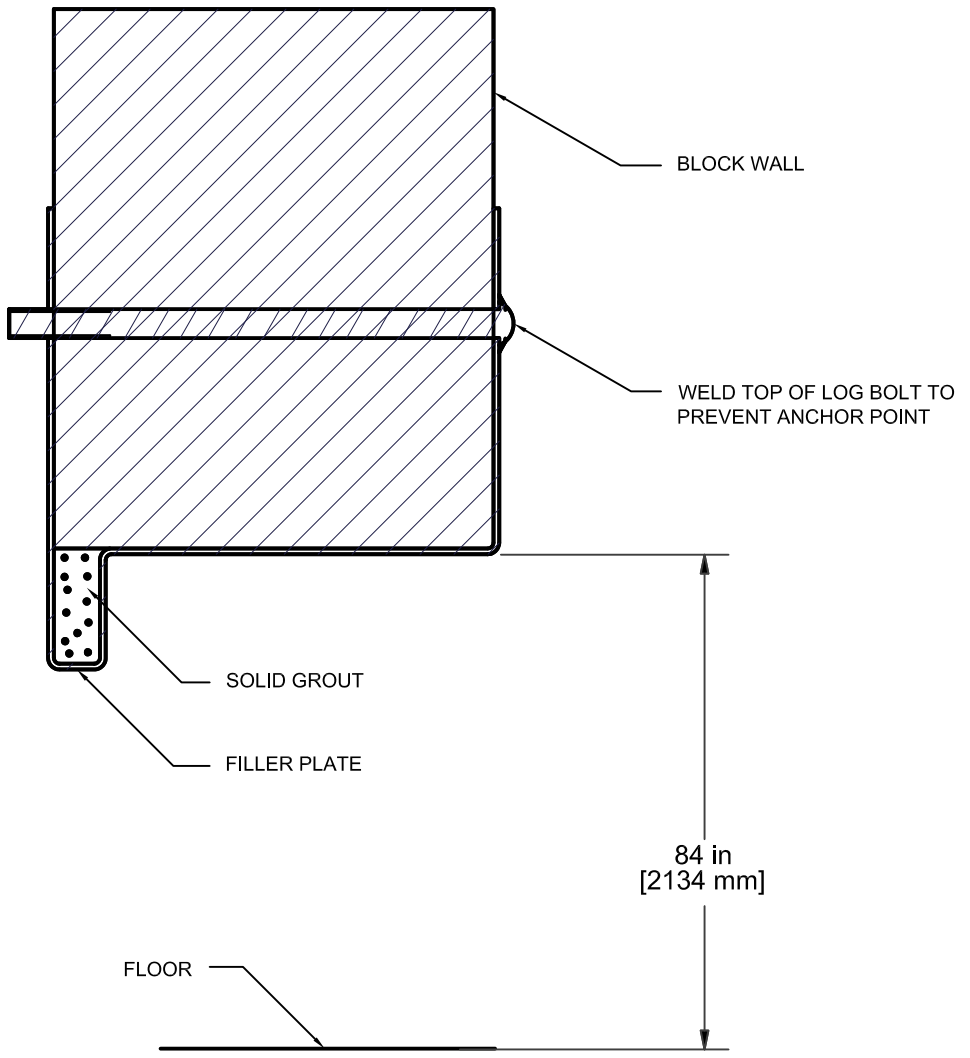


C-4 DETAINEE SIDE

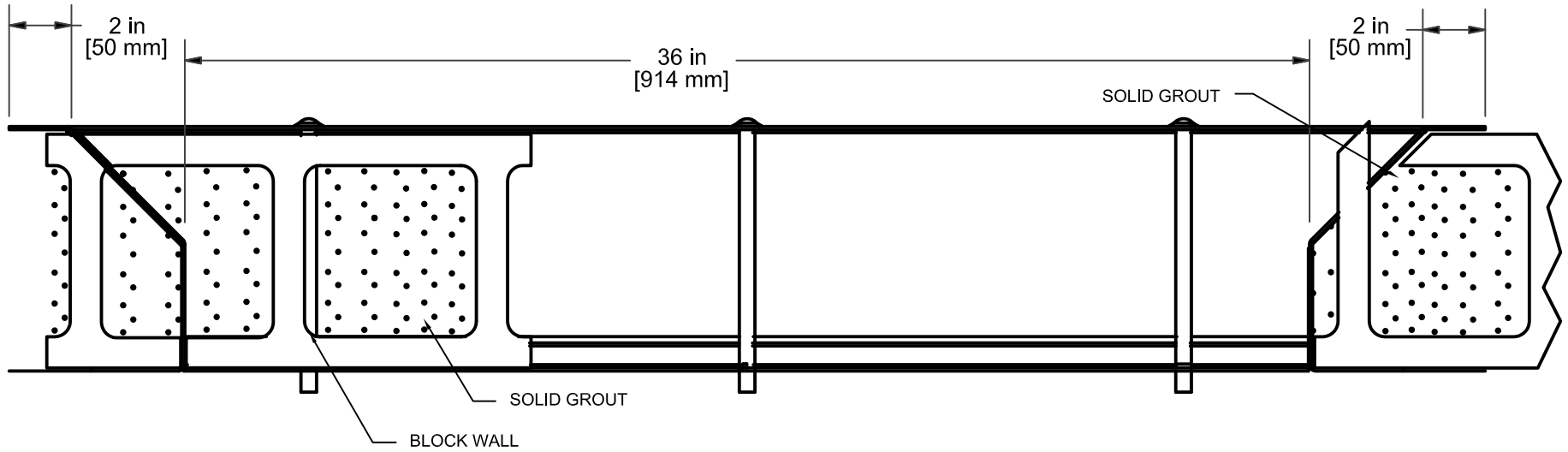
REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	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

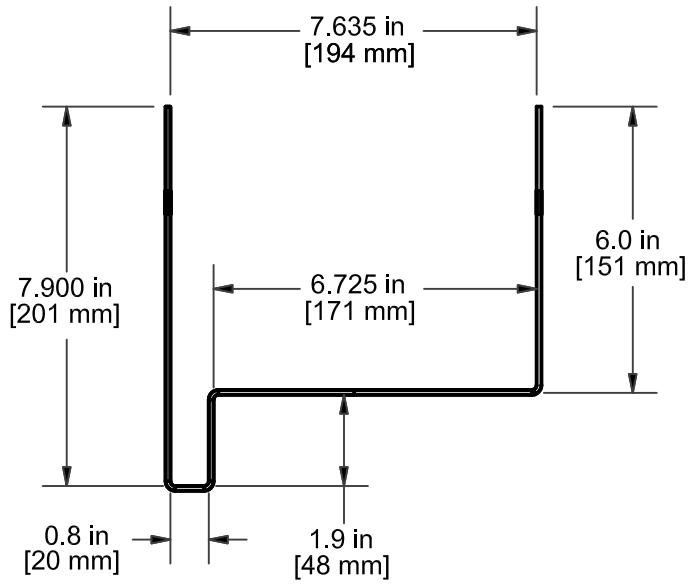
NOTE: OPTIONAL 2" LENGTH X 3/16" [51 x 5 mm] FILLER PLATE CONTINUALLY WELDED TO HEADER AND SIDES OF FRAME.

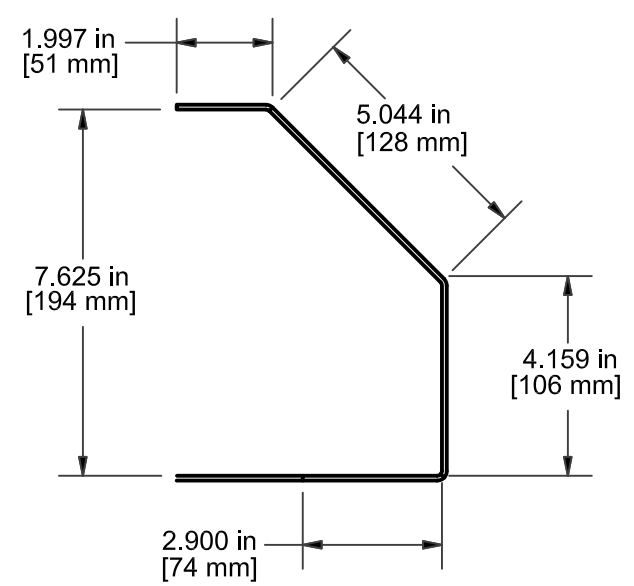


A-5 SECTION THROUGH FRAME



B-5 CROSS SECTION THROUGH JAMBS & HEADER



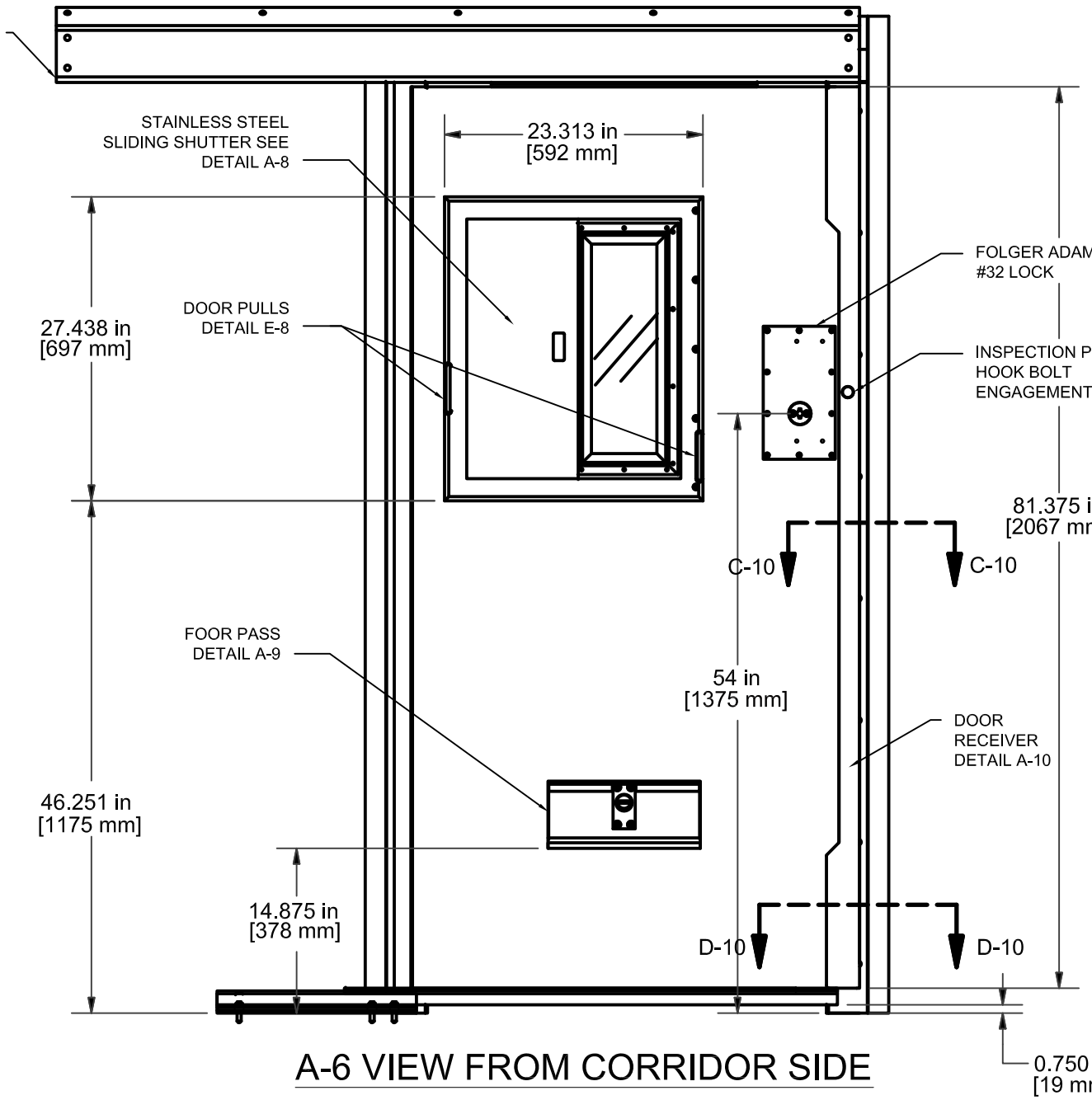


C-5 JAMB PROFILES FOR BENDING

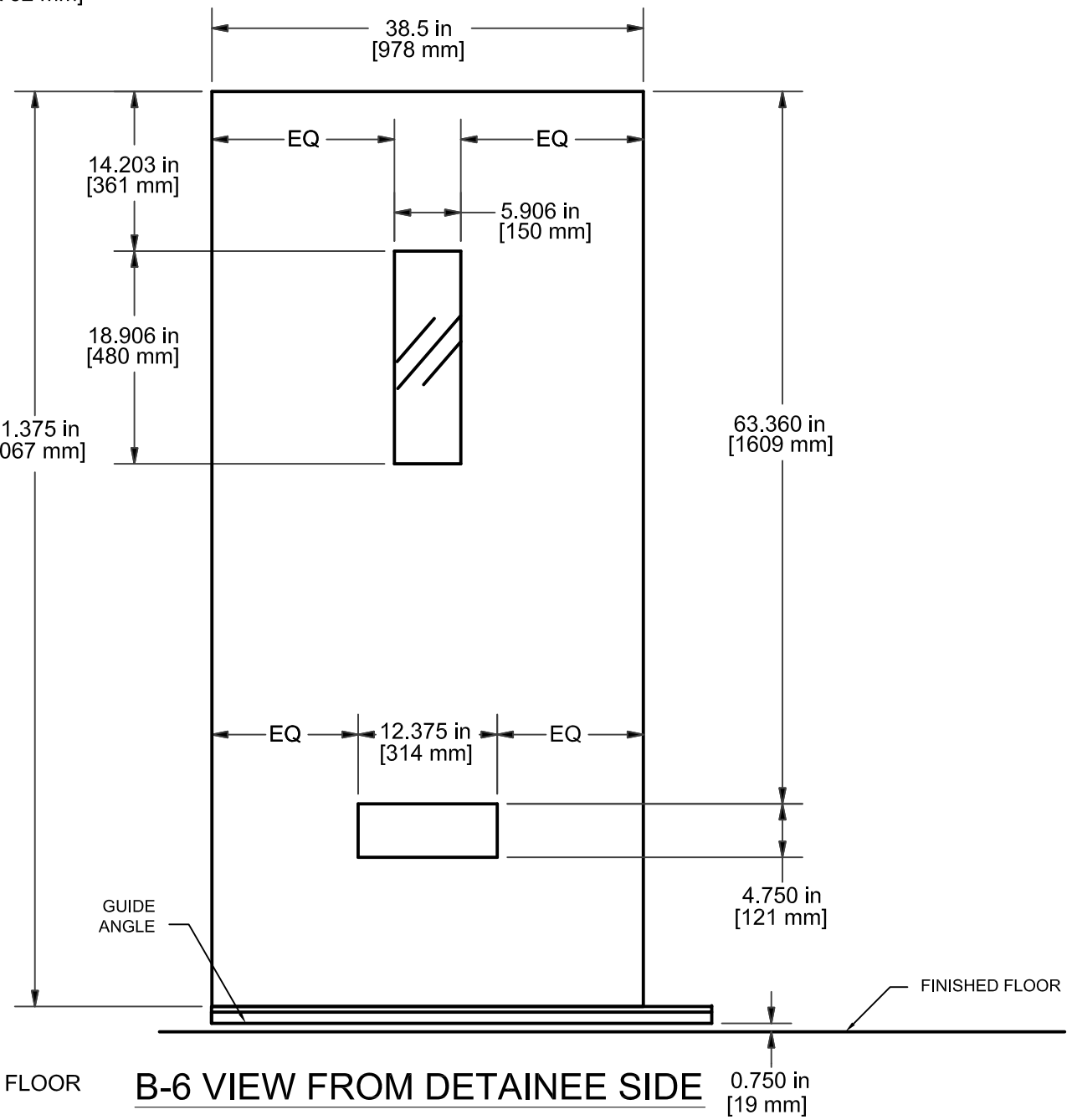
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	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]

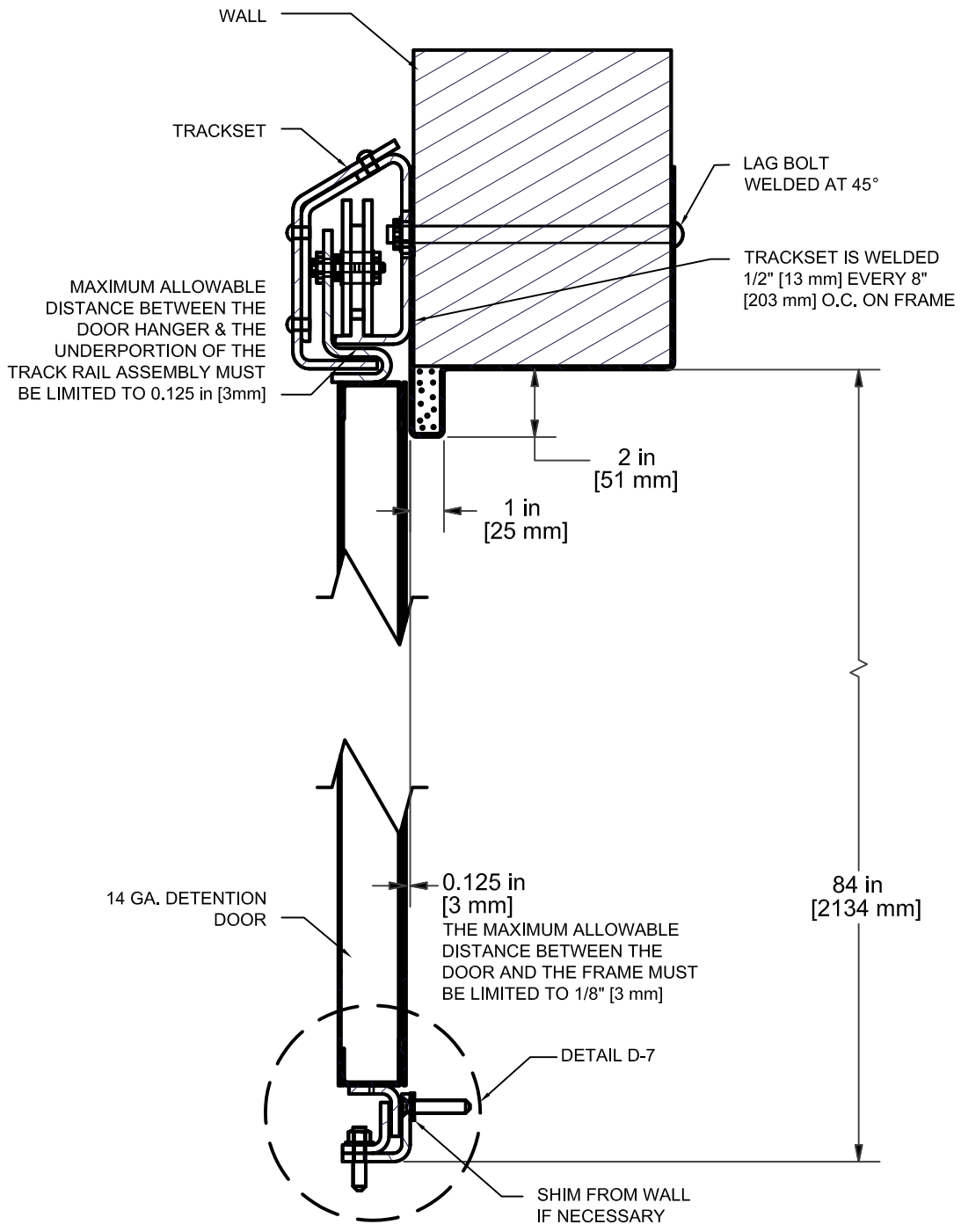


A-6 VIEW FROM CORRIDOR SIDE



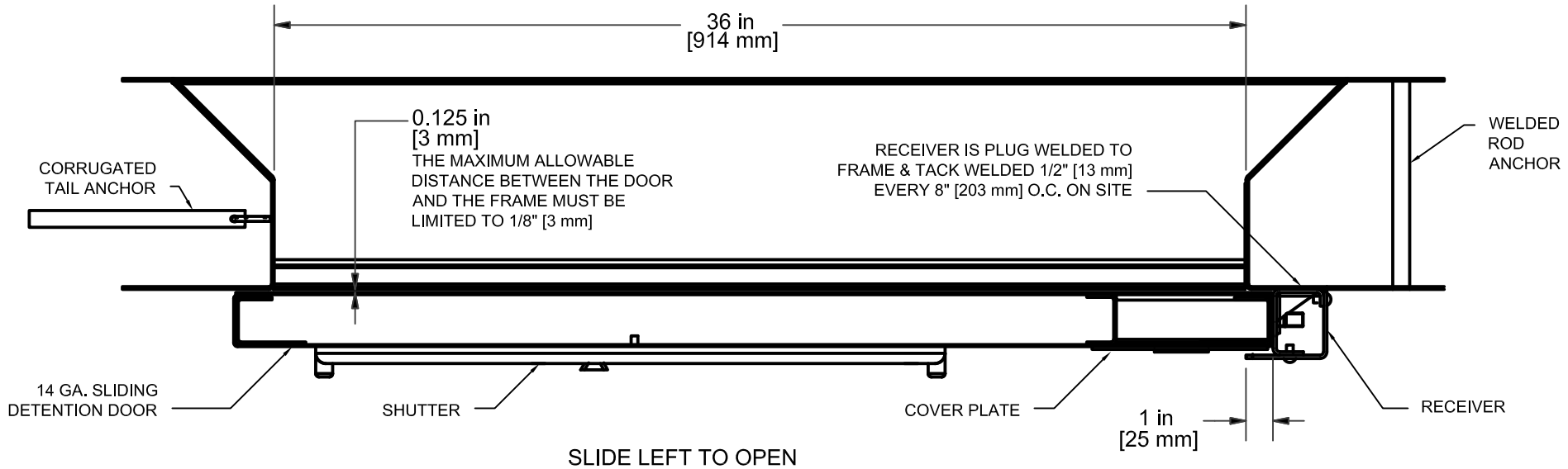
B-6 VIEW FROM DETAINEE SIDE

REVISIONS:	NOTES:		JOB:		
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 6



A-7 SECTION THROUGH TRACKSET AND DOOR

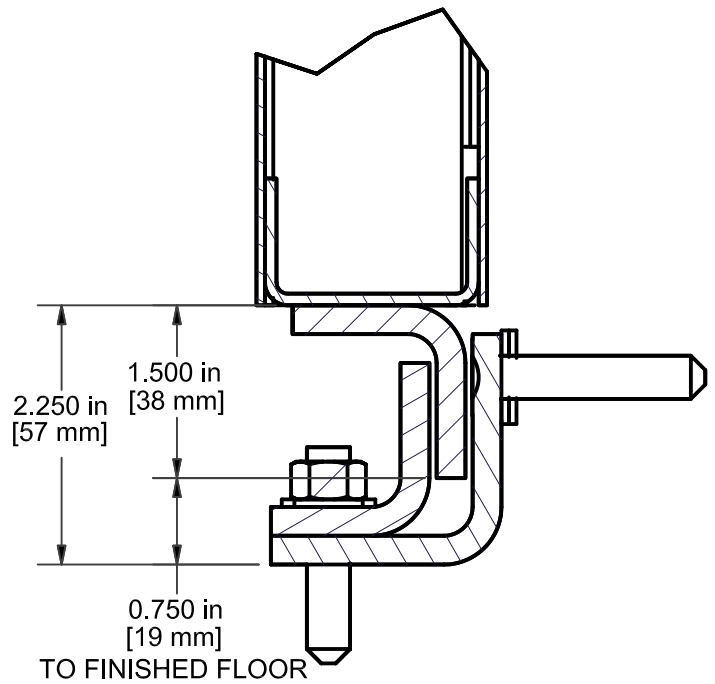
CROSS SECTION THROUGH DOOR AND RECEIVING ENCLOSURE



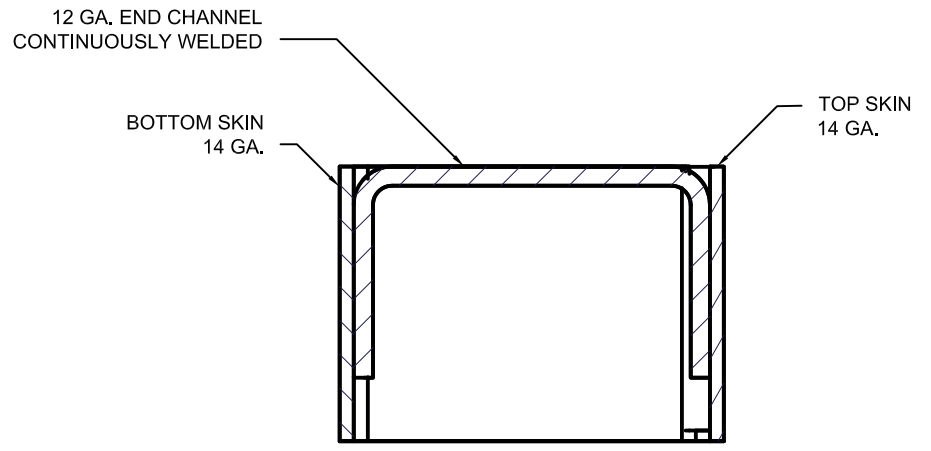
SLIDE LEFT TO OPEN

B-7 CT ANCHOR

C-7 WR ANCHOR

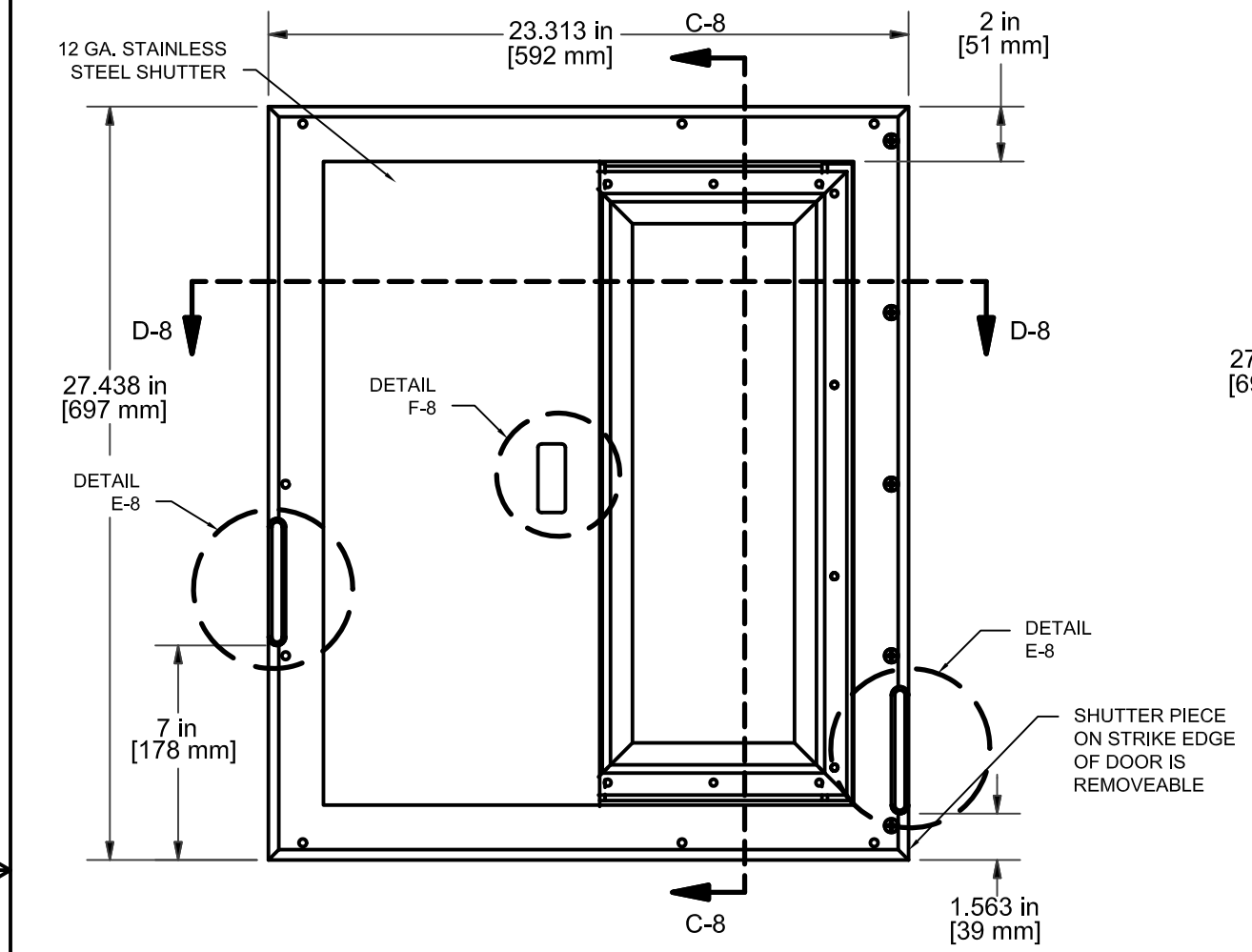


D-7 DETAIL

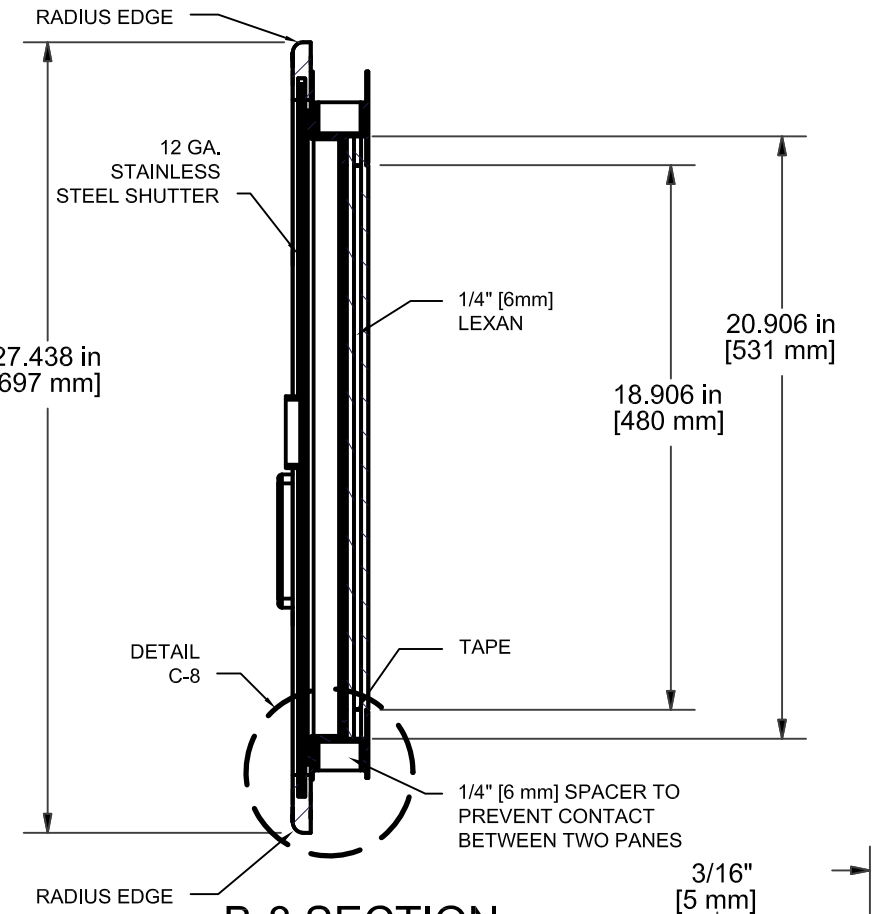


E-7 DETAIL TOP & BOTTOM END CHANNEL

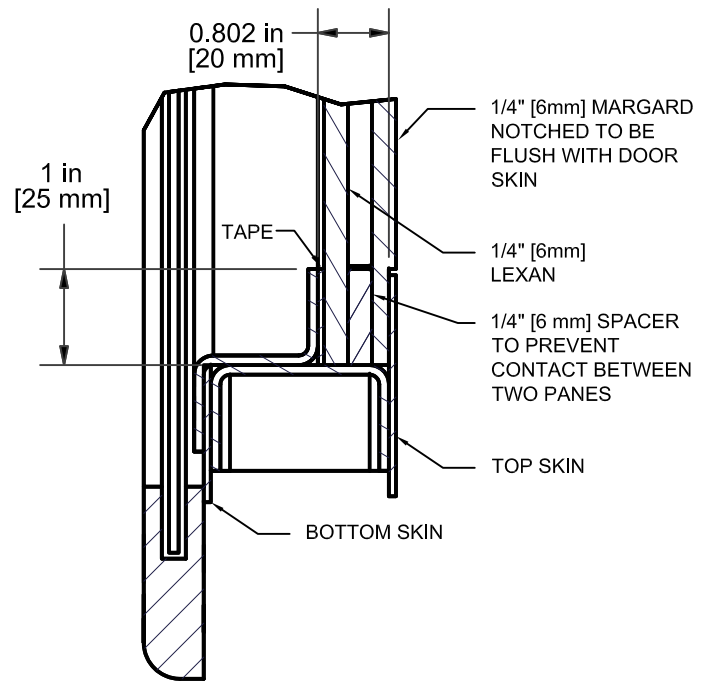
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	SEE A-3 FOR ADDITIONAL ANCHOR OPTIONS	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 7



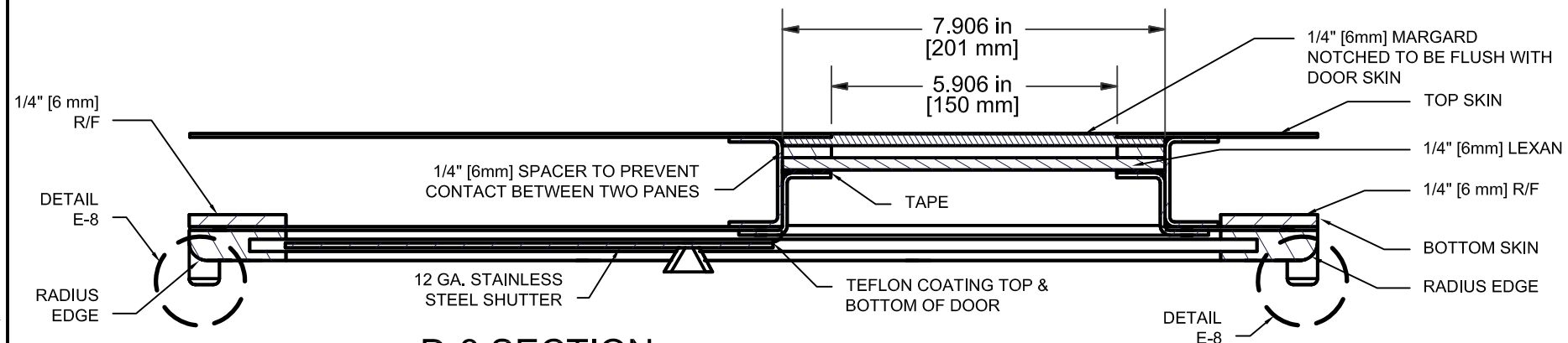
A-8 SLIDING SHUTTER



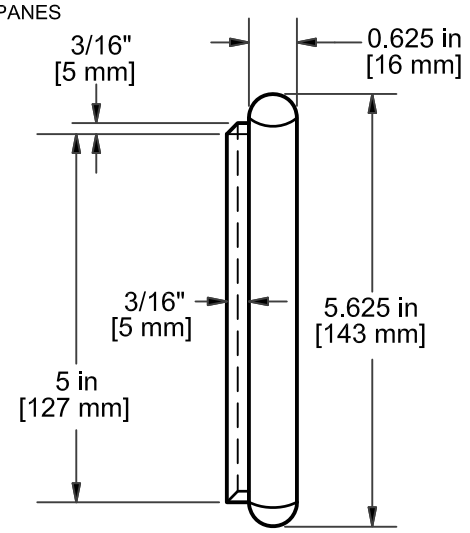
B-8 SECTION



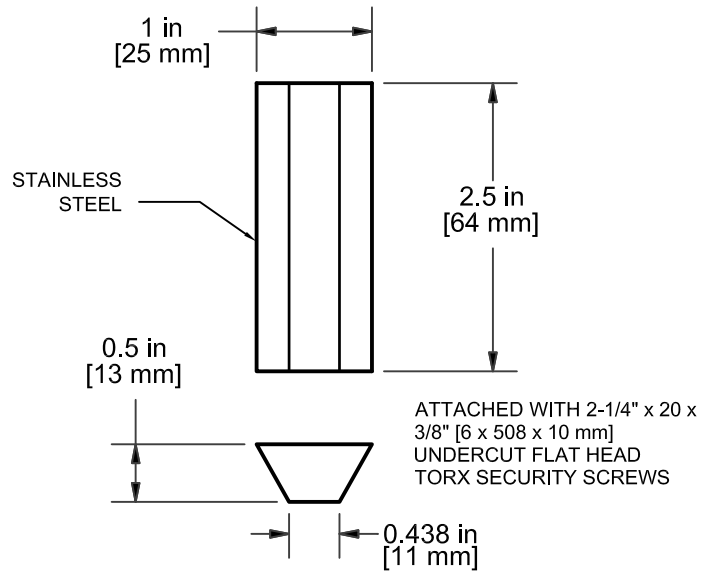
C-8 GLAZING DETAIL



D-8 SECTION

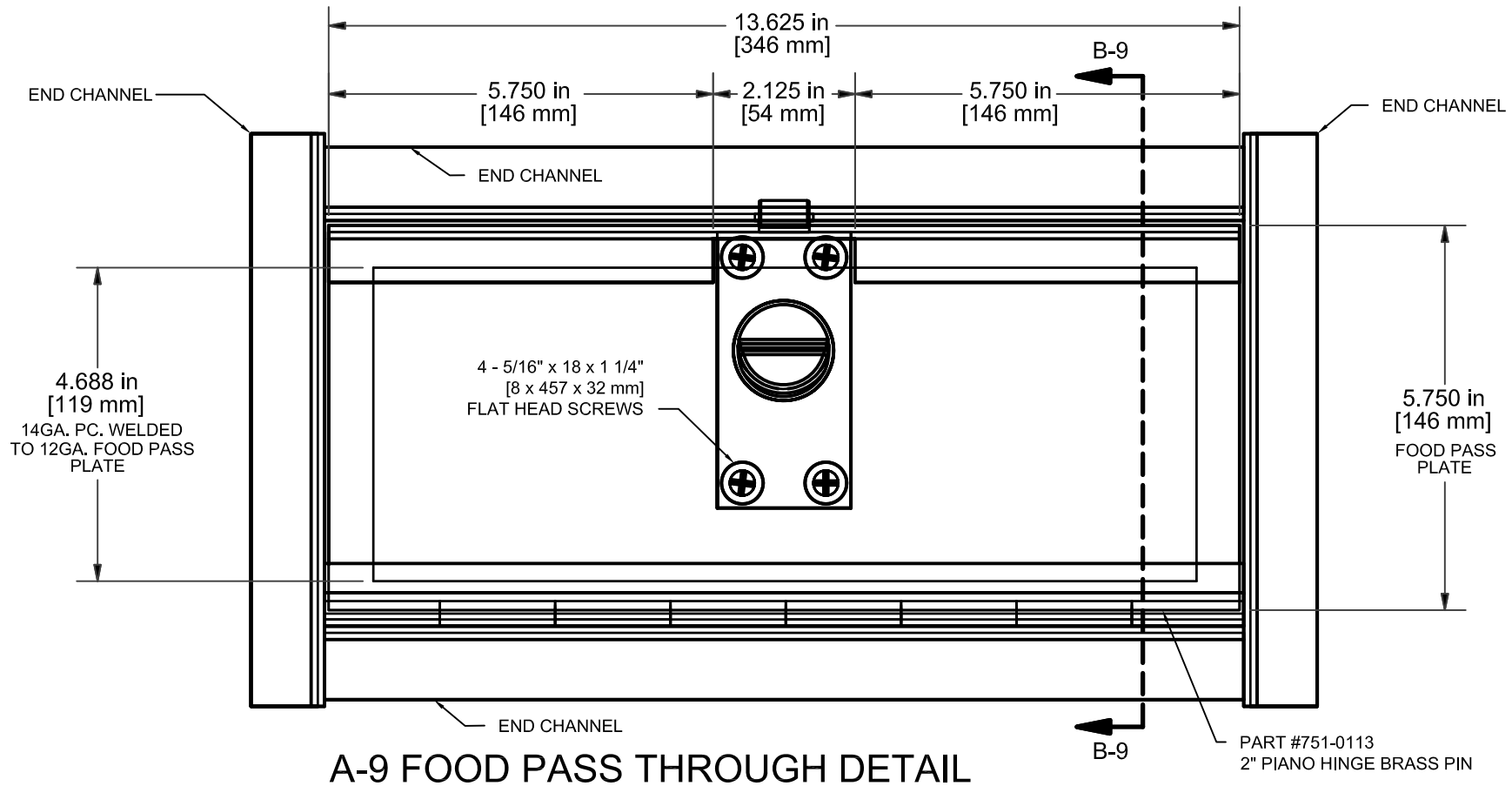


E-8 SLIDING DOOR HANDLE DETAIL

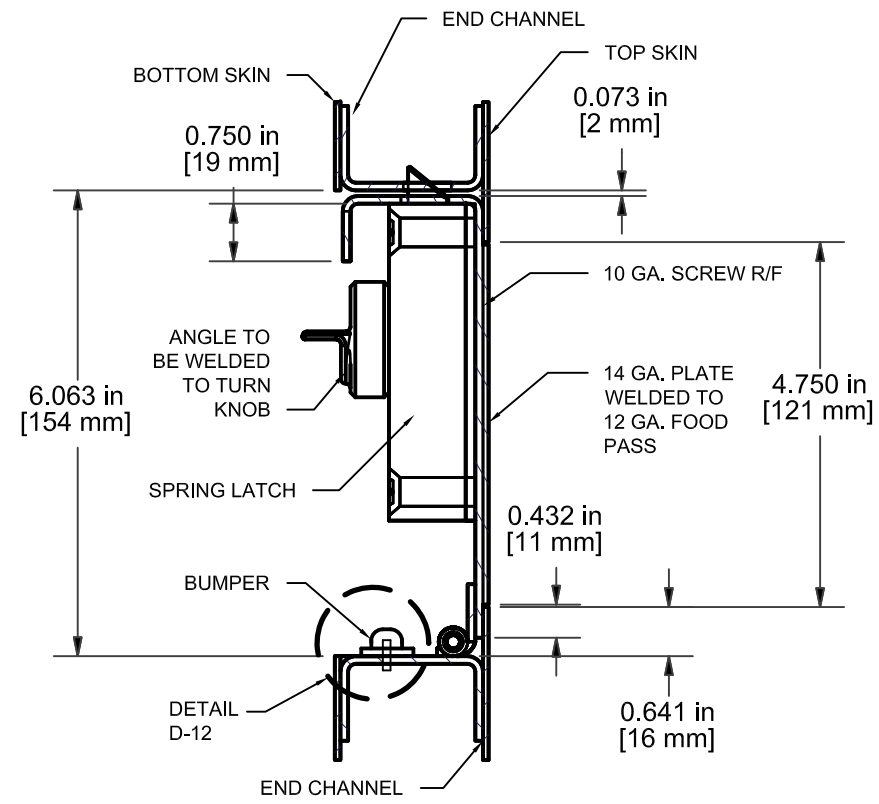


F-8 SHUTTER HANDLE DETAIL

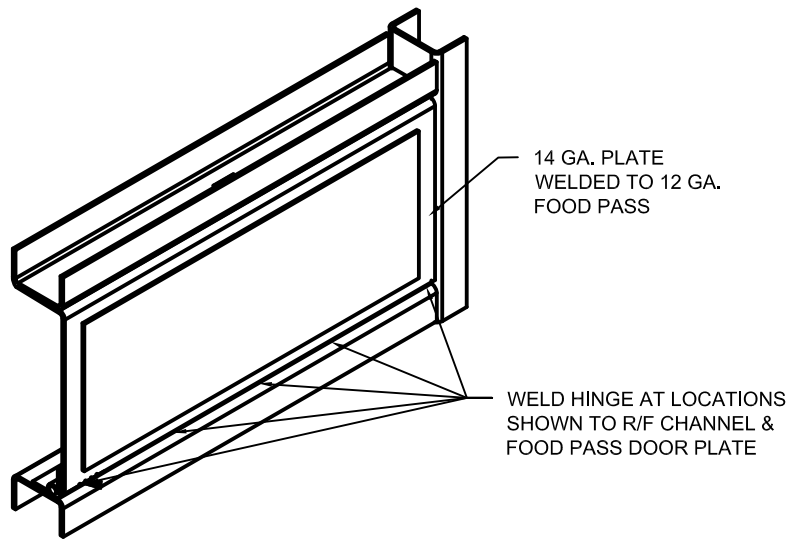
REVISIONS:	NOTES:		JOB:
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:
			DRAWN BY: CL JOHNSON / DATE: 9/26/2007
			W.O.#: / FILE NUMBER: / PG.#: 8



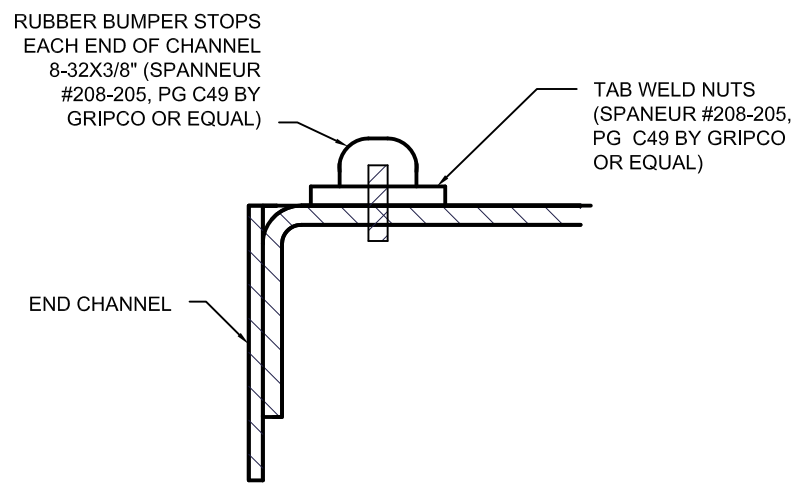
A-9 FOOD PASS THROUGH DETAIL



B-9 SECTION

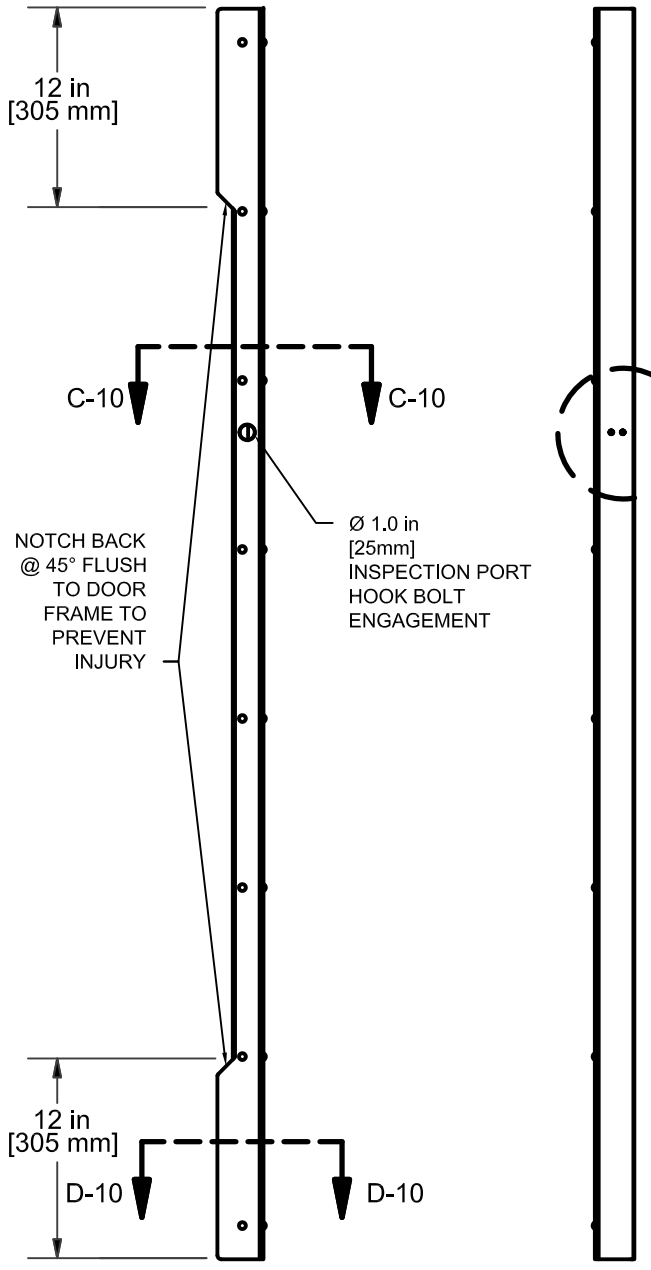


C-9 FOOD PASS THROUGH DETAIL

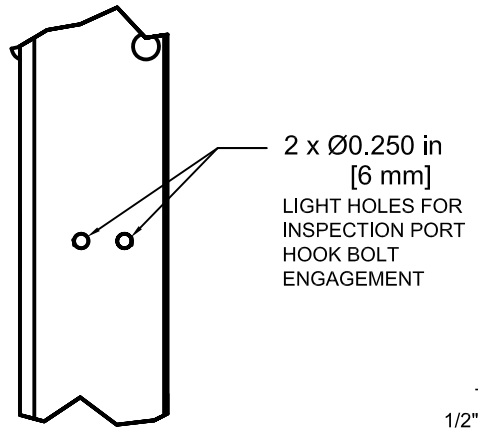


D-12 BUMPER DETAIL

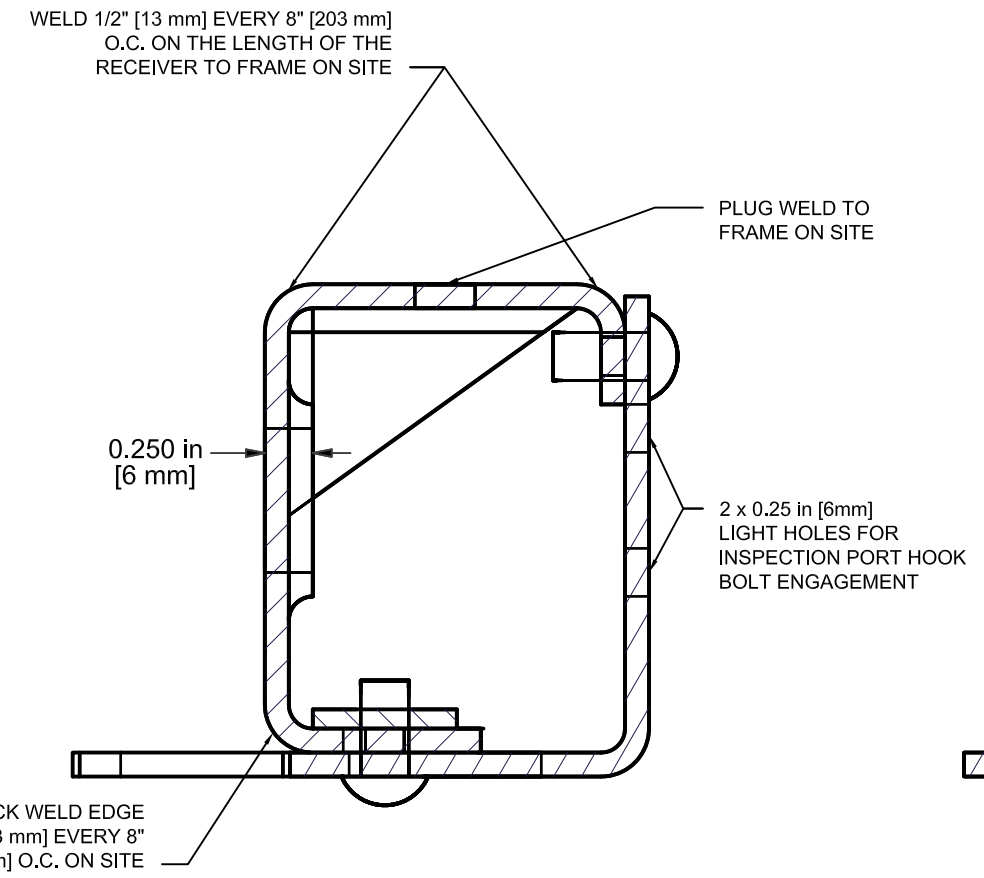
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 9



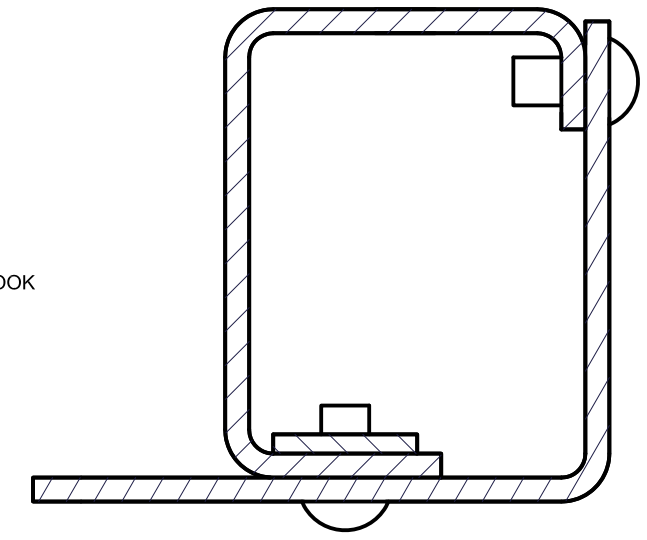
A-10 DOOR RECEIVER



B-10 DETAIL



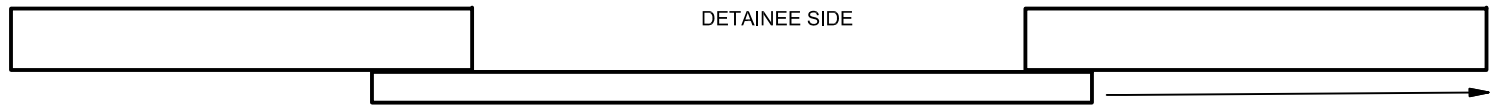
C-10 SECTION THROUGH DOOR RECEIVER



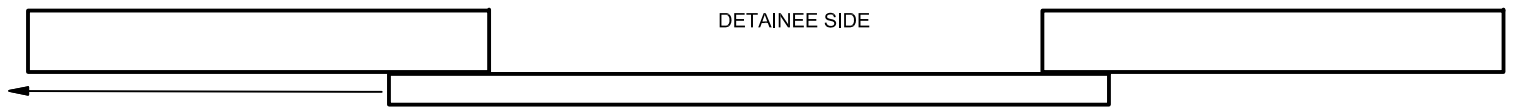
D-10 SECTION THROUGH DOOR RECEIVER

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)

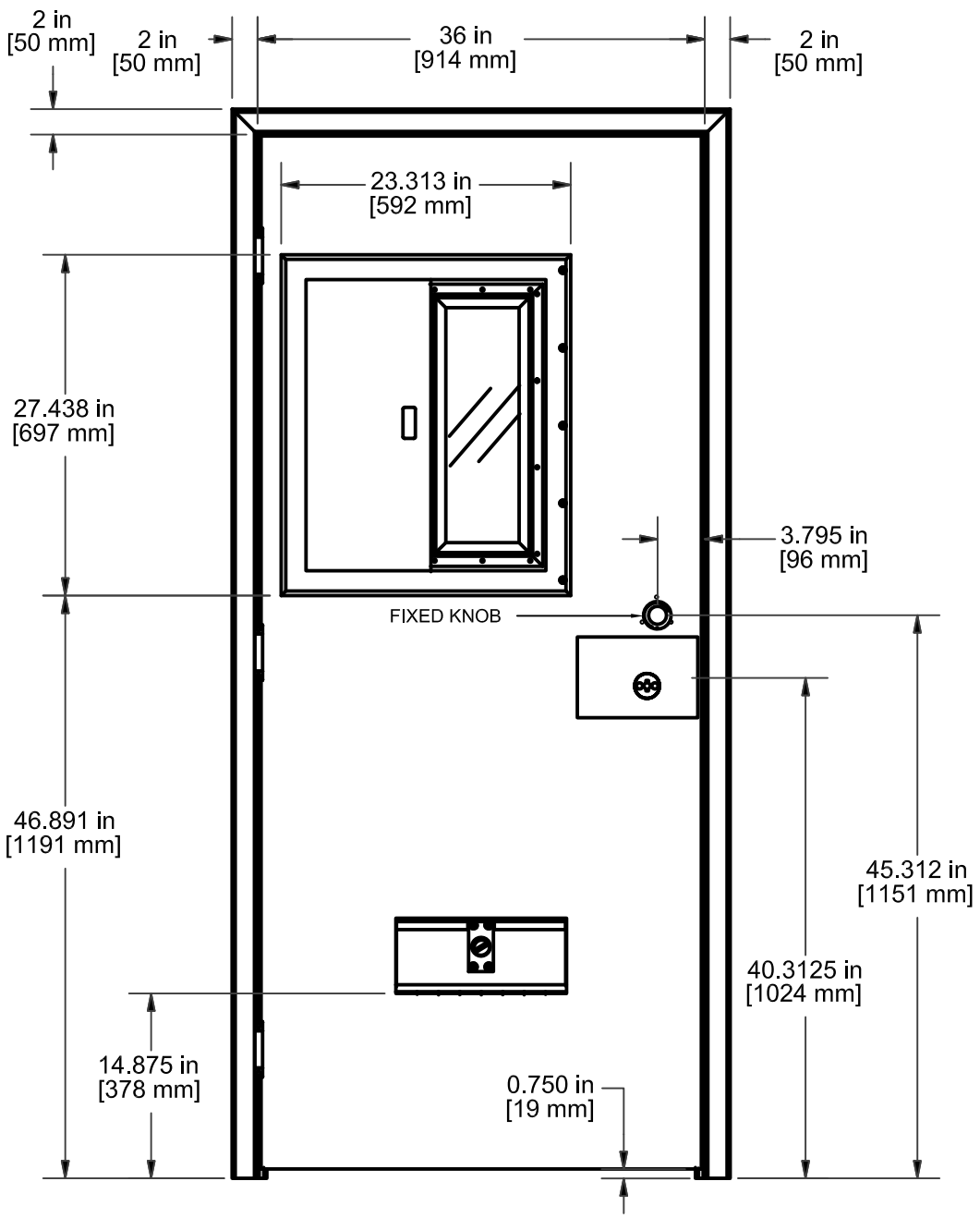


SLL OPENS TO THE LEFT
(BENT AS A RH)

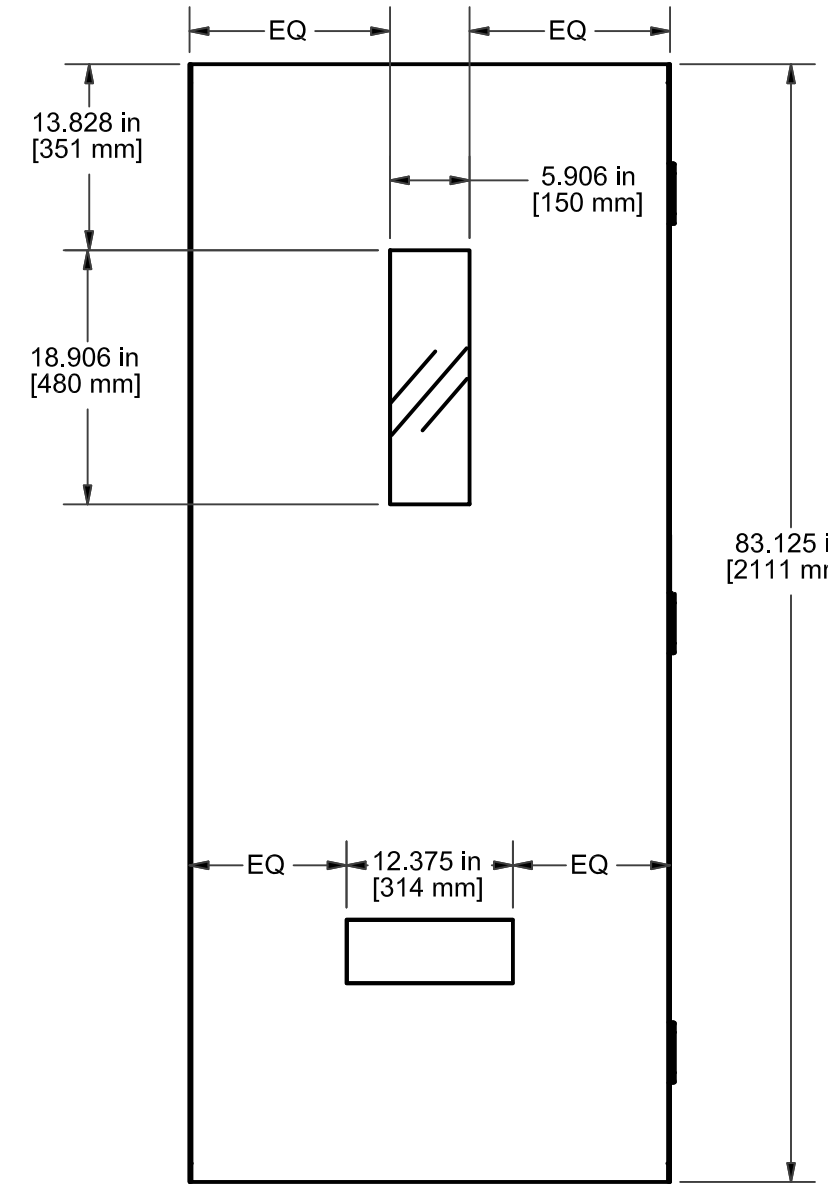
REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	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]

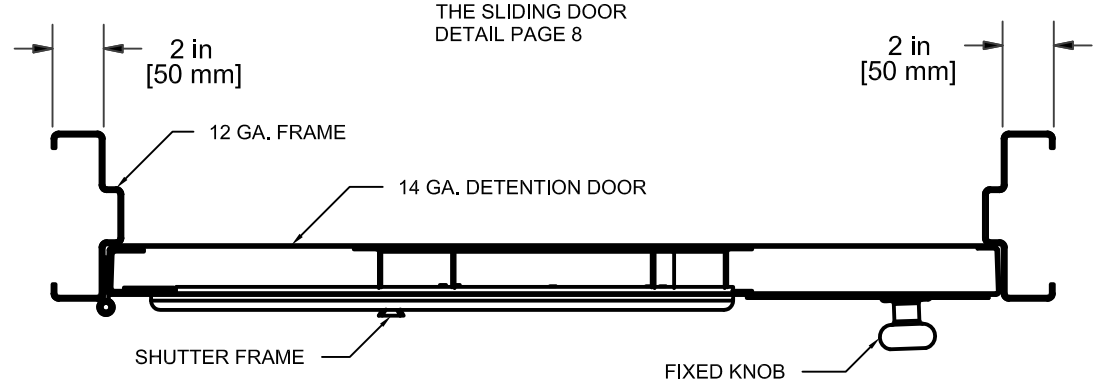


A-12 VIEW FROM CORRIDOR SIDE

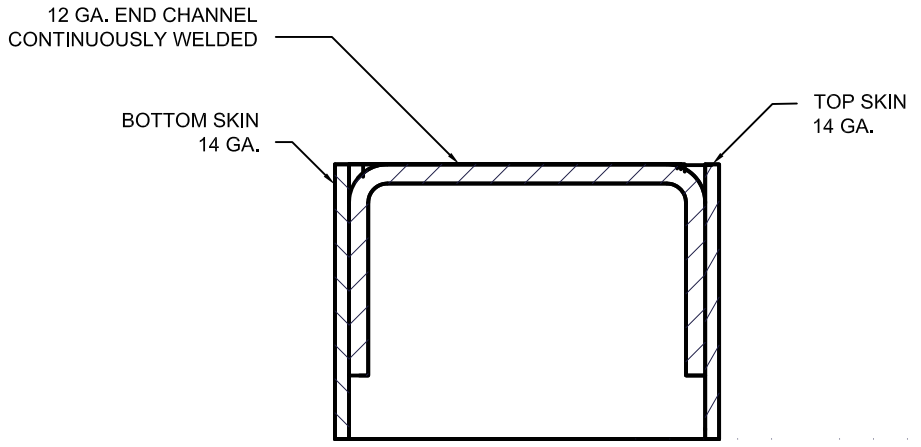


B-12 VIEW FROM DETAINEE SIDE

NOTE: LITE KIT IS THE SAME AS
THE SLIDING DOOR
DETAIL PAGE 8

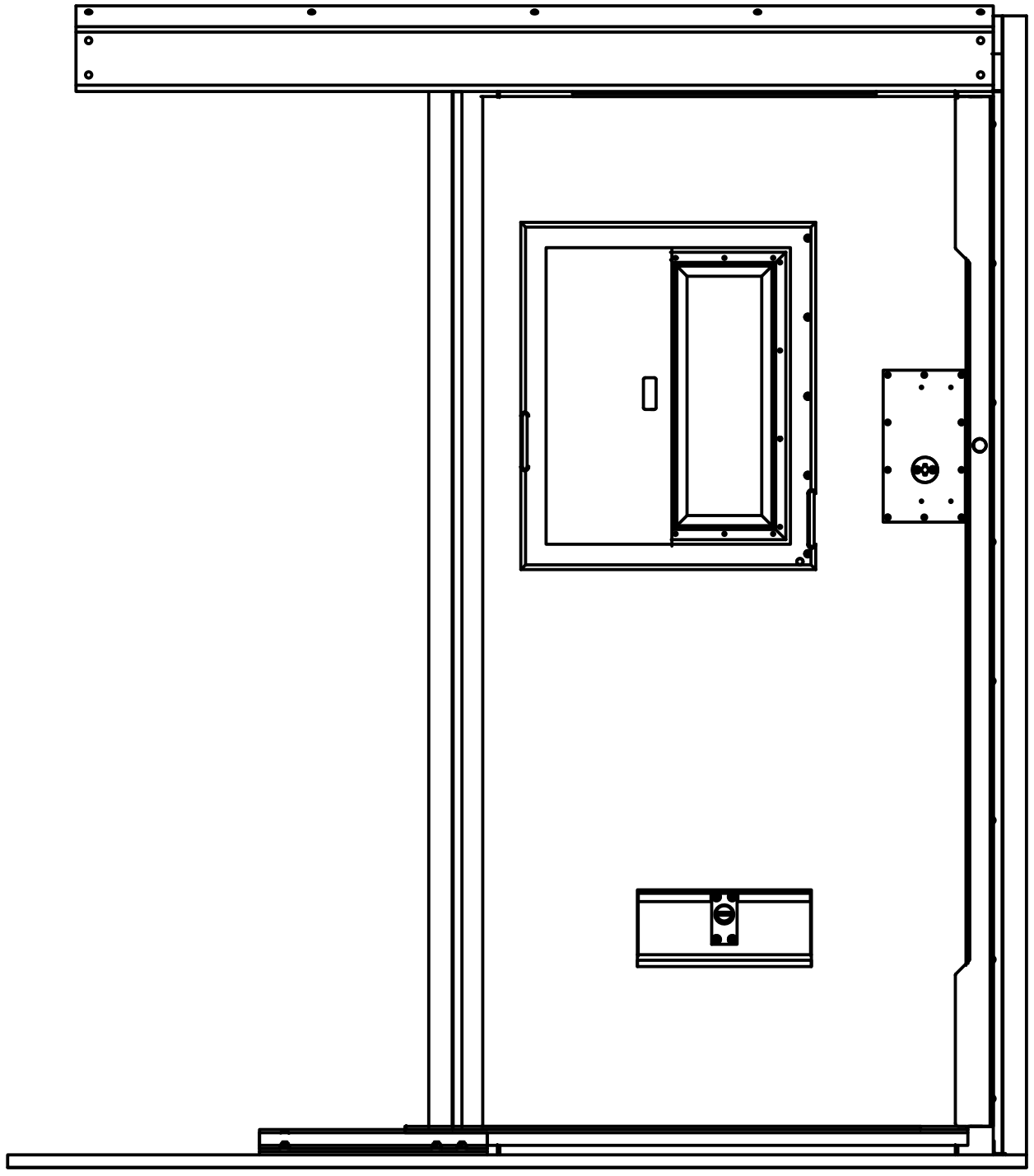


C-12 CROSS SECTION THROUGH
DOOR & FRAME

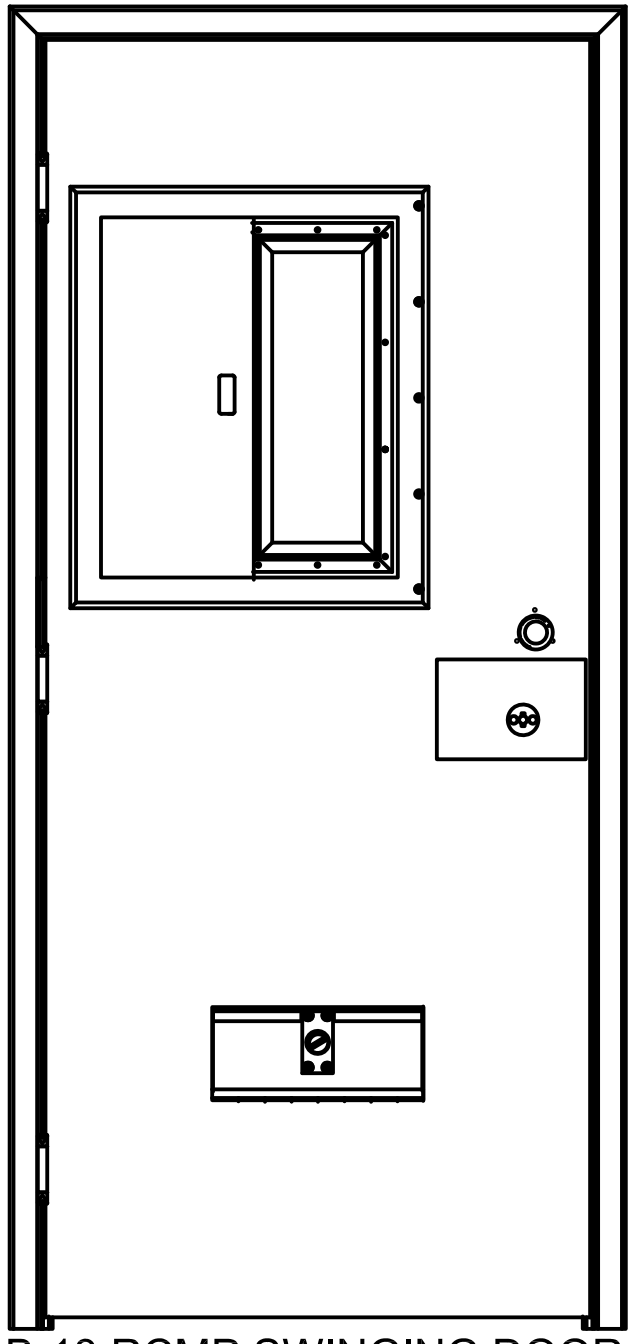


D-12 DETAIL TOP &
BOTTOM END CHANNEL

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 12



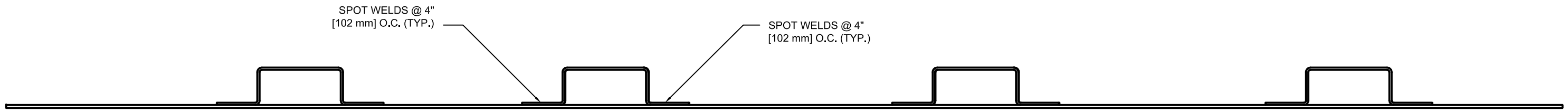
A-13 RCMP SLIDING DOOR



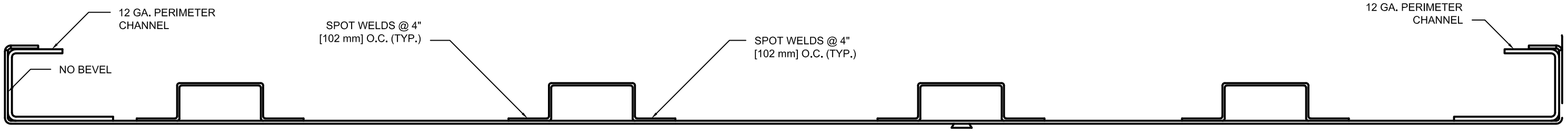
B-13 RCMP SWINGING DOOR

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: PG.#: 13

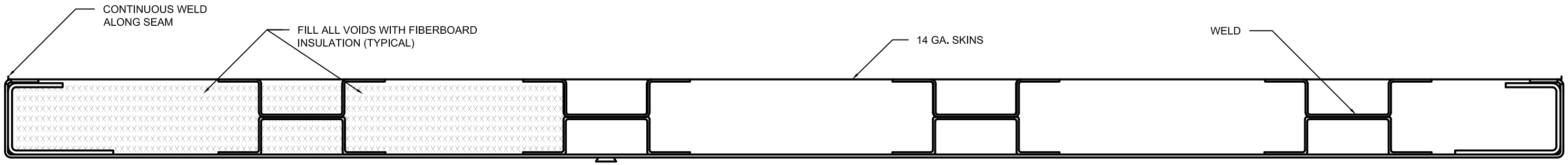
TYPE A CELL DO0R (SLIDING)



A-14 TOP SKIN PROFILE



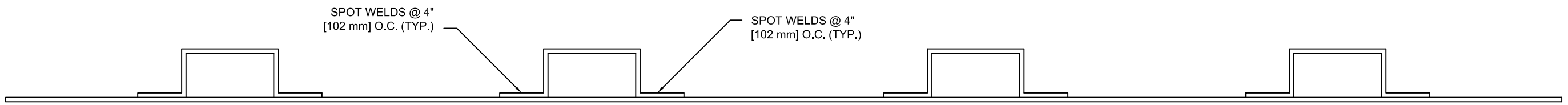
B-14 BOTTOM SKIN PROFILE



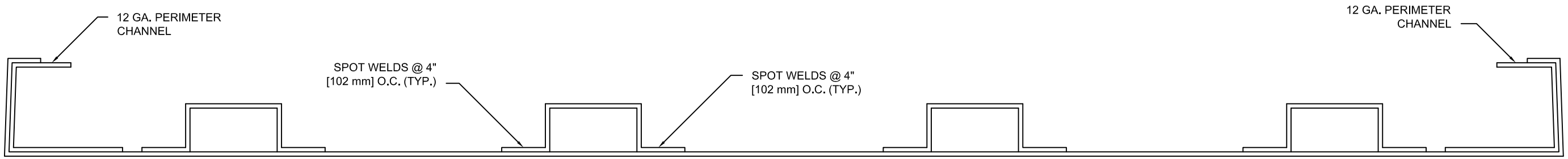
C-14 TOP & BOTTOM SKIN ASSEMBLY PROFILE

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

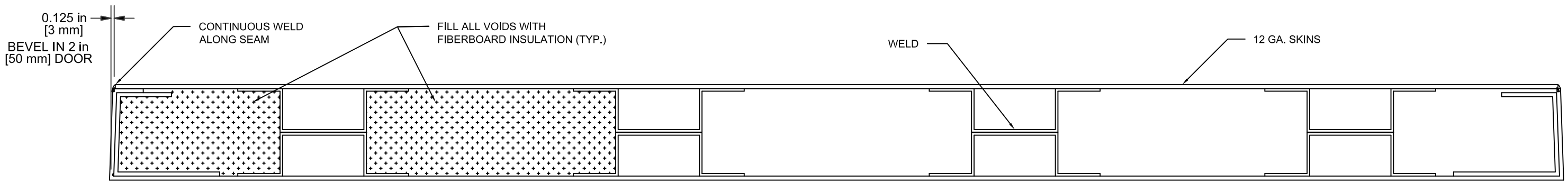
TYPE B CELL DOOR (SWINGING)



A-15 TOP SKIN PROFILE



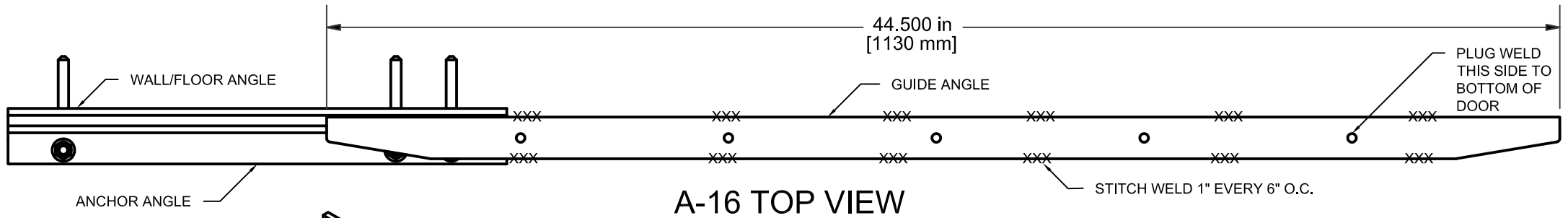
B-15 BOTTOM SKIN PROFILE



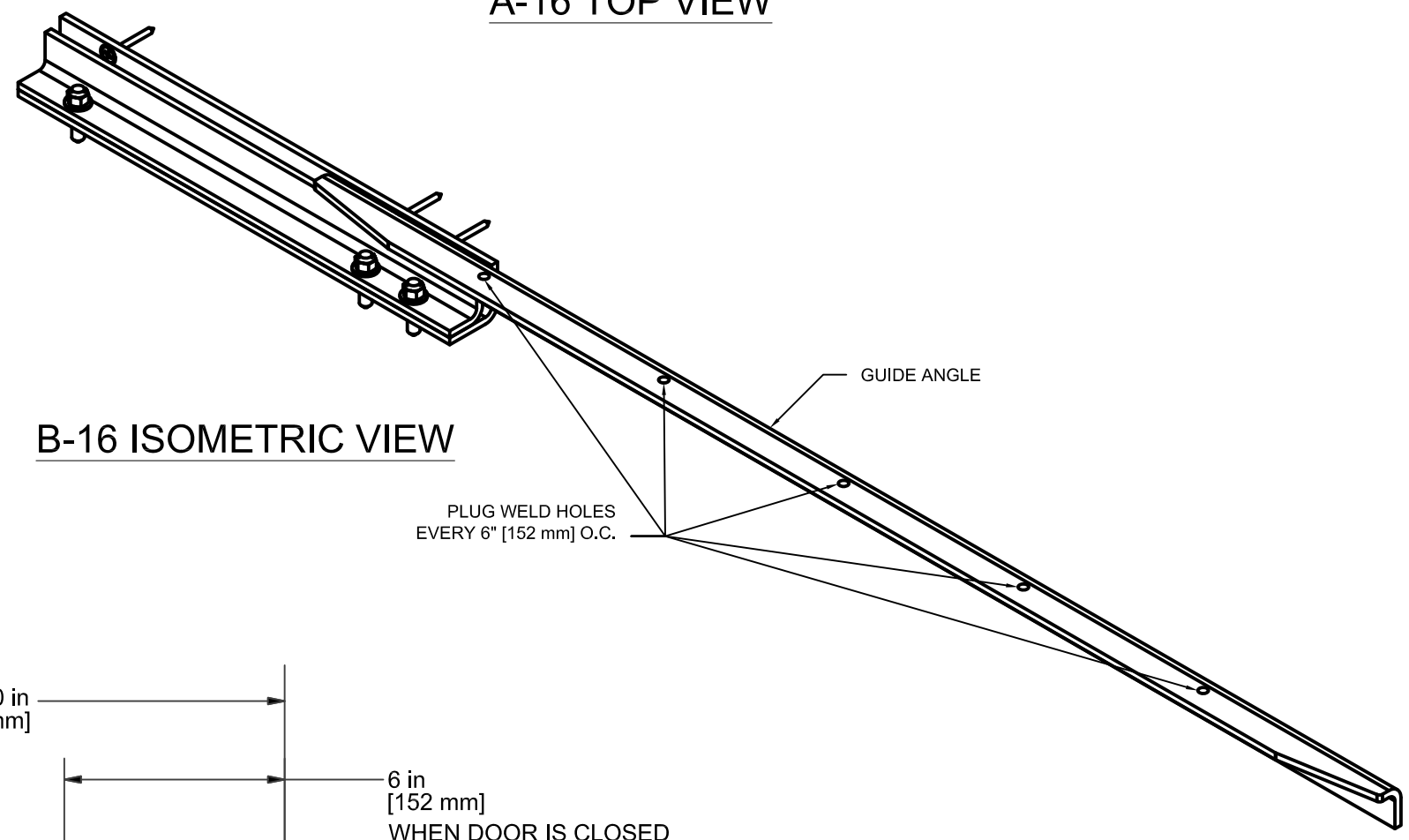
C-15 TOP & BOTTOM SKIN ASSEMBLY PROFILE

REVISIONS:	NOTES:		JOB:	
REVISION AS PER THE MEETING ON JULY 20, 2006	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:	
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007
			W.O.#:	FILE NUMBER: / PG.#: 15

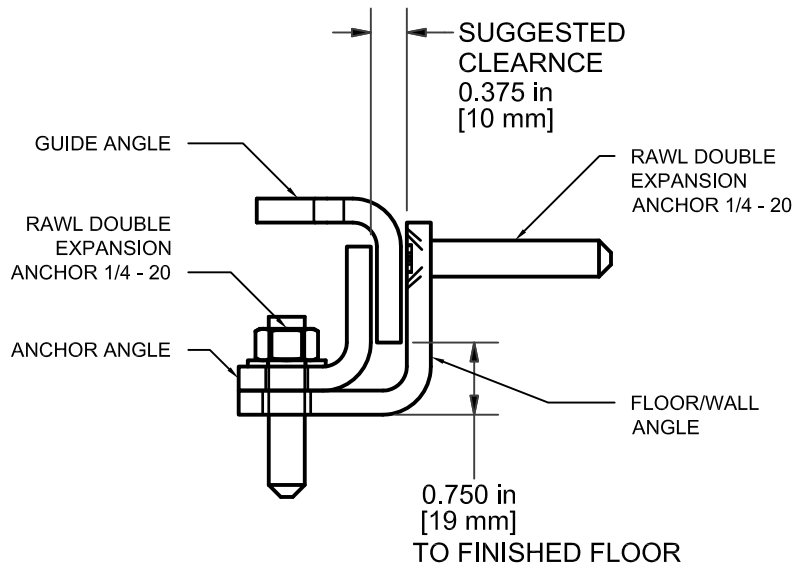
INSTALLATION OF WALL/FLOOR & ANCHOR ANGLE & GUIDE ANGLE



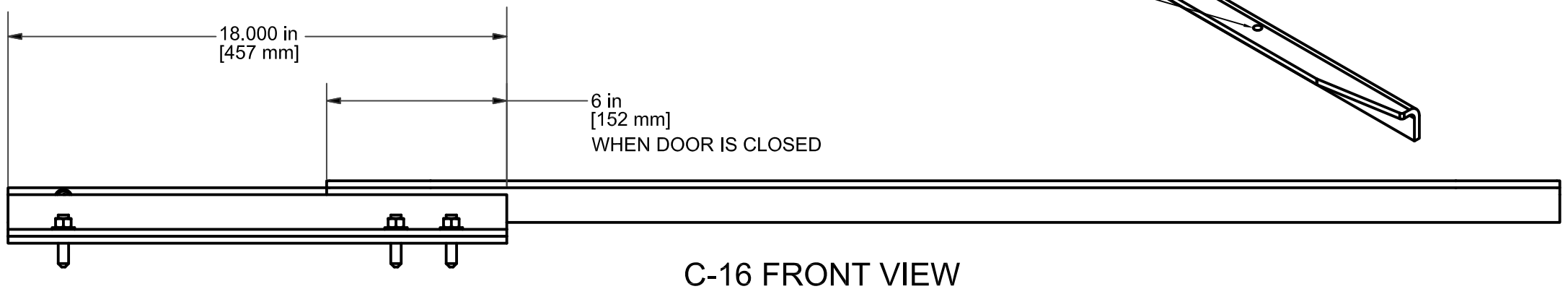
A-16 TOP VIEW



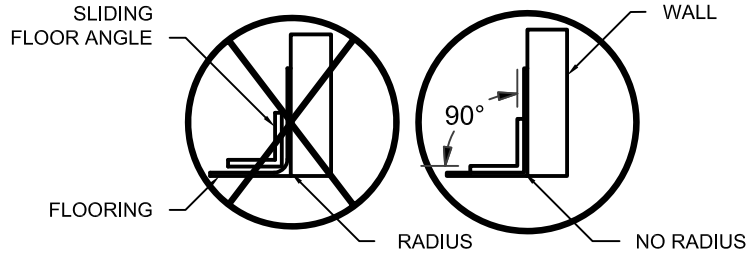
B-16 ISOMETRIC VIEW



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	THIS DRAWING IS THE EXCLUSIVE PROPERTY OF THE RCMP. NO USE WHATSOEVER OF THE INFORMATION CONTAINED HEREON, NOR REPRODUCTION IN WHOLE OR IN PART MAY BE MADE WITHOUT EXPRESSED WRITTEN PERMISSION. THIS DRAWING REMAINS THE PROPERTY OF THE RCMP AND MUST BE RETURNED ON DEMAND.	FINAL	CONTRACTOR:		
			DRAWN BY: CL JOHNSON	DATE: 9/26/2007	
			W.O.#:	FILE NUMBER:	PG.#: 16