City of Winnipeg

BID OPPORTUNITY 636 - 2021

St. Vital Park
Garage and Staff House

190 River Road, Winnipeg

SPECIFICATION

ISSUED FOR CONSTRUCTION
DATE: October 29, 2021

| x | architecture inc.

DIVISIONS	SECTION NO. AND TITLE
BID INFORMATION:	**Bidding Documents:**
DIVISION 00	00 00 01 – Table of Contents
SPECIFICATIONS:	
DIVISION 01 - General Requirements	01 11 00 – Summary of Work 01 31 19 – Project Meetings 01 32 16.19 – Construction Progress Schedule – Bar (GANTT) Chart 01 33 00 - Submittal Procedures 01 45 00 - Quality Control 01 51 00 - Temporary Utilities 01 52 00 - Construction Facilities 01 56 00 - Temporary Barriers and Enclosures 01 61 00 - Common Product Requirements 01 71 00 - Examination and Preparation 01 73 00 - Execution Requirements 01 74 11 - Cleaning 01 77 00 - Closeout Procedures 01 78 00 - Closeout Submittals 01 78 40 - Maintenance Requirements 01 79 00 - Demonstration and Training
DIVISION 02 – Site Work	02 41 13 – Selective Site Demolition
DIVISION 03 - Concrete	03 10 00 – Concrete Forming and Accessories 03 20 00 – Concrete Reinforcing 03 30 00 – Cast-In-Place Concrete 03 35 01 – Concrete Finishing (For Interior Ground Concrete) 03 35 11 – Concrete Floor Sealing 03 41 13 – Hollow Core
DIVISION 04 - Masonry	04 05 12 – Masonry Mortar and Grout 04 05 19 – Masonry Anchorage and Reinforcing 04 22 00 – Concrete Unit Masonry
DIVISION 05 - Metals	05 12 23 - Structural Steel for Buildings 05 31 00 - Steel Decking 05 41 00 - Structural Metal Lightweight Framing 05 50 00 - Metal Fabrications
DIVISION 6 - Woods, Plastics And Composites	06 08 99 - Rough Carpentry for Minor Works 06 10 13 - Wood Blocking and Curbing 06 20 00 - Finish Carpentry 06 40 00 - Architectural Woodwork 06 40 23.13 – Plastic Laminate Finishing 06 61 16 – Solid Surfacing Fabrications

Part 1 General

1.1 RELATED SECTIONS

.1 City of Winnipeg Bid Opportunity Document

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of the construction of a single storey Garage and Staff House building for St. Vital Park as described in the contract documents.

1.3 CONTRACT METHOD

.1 Construct Work under a stipulated price contract. Refer to City of Winnipeg Bid Opportunity Document.

1.4 WORK BY OTHERS

.1 As noted on Drawings.

1.5 CONTRACTOR USE OF PREMISES

.1 Refer to Site Plan for the area of construction.

.2 Coordinate laydown areas and site fencing to allow for minimal interruption to park staff and public users.

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

1.6 CITY OF WINNIPEG FURNISHED ITEMS

.1 City of Winnipeg Responsibilities:

.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.

.2 Deliver supplier's bill of materials to Contractor.

.3 Arrange and pay for delivery to site in accordance with Progress Schedule.

.4 Inspect deliveries jointly with Contractor.

.5 Submit claims for transportation damage.

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

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

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit to Contract Administrator notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Inspect deliveries jointly with City of Winnipeg; record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage, and from exposure to elements.

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

.8 Provide installation inspections required by public authorities.

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

.3 Schedule of City of Winnipeg furnished items:

.1 Pressure Washer

.2 Air Compressor

1.7 EXISTING SERVICES

.1 Notify, Contract Administrator and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.3 Provide alternative routes for pedestrian and vehicular traffic.

.4 Establish location and extent of service lines in area of work before starting Work. Notify Contract Administrator of findings.

.5 Provide adequate bridging over trenches that cross sidewalks or roads to permit normal traffic.

.6 Where unknown services are encountered, immediately advise Contract Administrator and confirm findings in writing.

.7 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

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

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

1.8 DOCUMENTS REQUIRED

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

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 SECTIONS

.1 Section 01 11 00 - Summary of Work

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 77 00 – Closeout Procedures

.4 Section 01 78 00 – Closeout Submittals

1.2 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at regular two (2) week intervals. Coordinate with Contract Administrator.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Contract Administrator.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants.

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

1.3 PRECONSTRUCTION MEETING

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

.2 Contract Administrator, Contractor, major Subcontractors will be in attendance.

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

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

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Presentation of Construction Schedule.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of specified equipment.

.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 City of Winnipeg supplied products or equipment.

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

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

.13 Appointment of inspection and testing agencies or firms.

.14 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule progress meetings on bi-monthly basis.

.2 Contractor, major Subcontractors involved in Work and Contract Administrator are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

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

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

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

.12 Other business.

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 DEFINITIONS

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

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

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

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

1.2 REQUIREMENTS

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

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit Project Schedule to Contract Administrator within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Substantial Completion is required to be completed by September 1, 2022.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Excavation.
- .6 Backfill.
- .7 Building footings.
- .8 Slab on grade.
- .9 Structural Steel.
- .10 Siding and Roofing.
- .11 Interior Architecture (Walls, Floors and Ceiling).
- .12 Plumbing.
- .13 Lighting.
- .14 Electrical.
- .15 Piping.
- .16 Controls.
- .17 Heating, Ventilating, and Air Conditioning.
- .18 Millwork.
- .19 Fire Systems.
- .20 Testing and Commissioning.
- .21 Supplied equipment long delivery items.
- .22 Engineer supplied equipment required dates.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-weekly (every two weeks, aligned with regular project meetings) basis reflecting activity changes and completions, as well as activities in progress.

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

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule

are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

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 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Other sections requesting submittals.

.3 This section describes requirements applicable to all Sections within all Divisions.

1.3 ADMINISTRATIVE

.1 Submit to Contract Administrator 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 Shop Drawings that require approval of any legally constituted authority having jurisdiction shall be provided to such authority by the Contractor for approval.

.4 Present Shop Drawings, product data, samples and mock-ups in SI Metric units.

.5 Where items or information is not manufactured or produced in SI Metric units, converted values within the metric measurement tolerances are acceptable.

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

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

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

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

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

1.4 CO-ORDINATION OF SUBMISSIONS

.1 Review submittals prior to submission to Contract Administrator. 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.

.2 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.3 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.4 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator 's review of submittals.

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

.6 Keep one (1) reviewed copy of each submission on Site.

.7 Verify:

.1 Field measurements and dimension shop drawing accordingly.

.2 Affected adjacent Work are coordinated and note on submission.

.3 Catalogue numbers and similar data.

.8 Coordinate submission of interrelated Shop Drawings with the requirements of the Work and the Contract Documents. Individual shop drawings will not be reviewed until all related shop drawings are available to the Contract Administrator.

1.5 SUBMITTALS, SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

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

.4 Where the Contract Administrator is required to review Shop Drawings, method samples, mock-ups, premature requests for Substantial Performance or Completion reviews, and completed “corrections” more than once and/ or enter into extended discussions or preparation of additional details or calculations to facilitate the Contractor’s work or that of the Contractor’s sub-trades, the additional consulting time shall be paid for by the Contractor. Similarly, if deficient workmanship or construction requires additional or unscheduled Site visits by the Contract Administrator, or other inspectors or reviewers, the additional time and disbursements based on the Contract Administrator’s hourly rates, etc. shall be paid by the Contractor.

.5 The Contractor shall review all Shop Drawings before providing them to the Contract Administrator. The Contractor represents by this review that:

.1 The Contractor has determined and verified all applicable field measurements, field construction conditions, Product requirements, catalogue numbers and similar data, or will do so, and

.2 The Contractor has checked and co-ordinated each Shop Drawing with the requirements of the Work and of the Contract Documents.

.6 Allow ten 10 working days for Contract Administrator's review of each submission.

.7 Adjustments made by Contract Administrator on Shop Drawings and Submittals do not relieve the Contractor from compliance with the requirements of the Contract Documents and are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.8 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of any revisions other than those requested.

.9 Accompany submissions with duplicate transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification, description, and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.10 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 Identify details by reference to sheet and detail numbers shown on the Contract Drawings.

.6 Details of appropriate portions of Work as applicable:

.1 Specification Section number.

.2 Fabrication.

.3 Layout, showing dimensions, including identified field dimensions, and clearances.

.4 Setting or erection details.

.5 Capacities.

.6 Performance characteristics.

.7 Standards.

.8 Operating weight.

.9 Wiring diagrams.

.10 Single line and schematic diagrams.

.11 Relationship to other parts of the Work.

.11 After Contract Administrator's review, distribute copies.

.12 Submit electronic copy of Shop Drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.

.13 Submit electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.

.14 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Contract Administrator

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.15 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Contract Administrator.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.16 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Contract Administrator.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Contract Administrator.

.18 Delete information not applicable to project.

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

.20 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, an electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.6 SAMPLES

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

.2 Deliver samples prepaid to Contract Administrator's business address.

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

.4 Submit samples in an orderly sequence, so as to cause no delay in the work. Failure to submit samples in ample time is not to be considered sufficient reason for an extension of contract time and no claim for extension by reason of such default will be allowed.

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

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

.7 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

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

1.7 MOCK-UP

.1 Erect mock-ups to Section 01 45 00 and as outlined in specific Sections.

1.8 PHOTOGRAPHIC DOCUMENTATION

.1 The Contractor shall photograph and submit monthly colour pictures to the Contract Administrator in digital format demonstrating the progress of the Work and at all concealed areas prior to being covered.

1.9 CERTIFICATES AND TRANSCRIPTS

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

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

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 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Written and electronic reports.

.5 Equipment and system adjust and balance.

.6 This section describes requirements applicable to all Sections within all Divisions.

1.2 REFERENCES

.1 ISO/IEC 17025:2005 - General Requirements for the Competence of Testing and Calibration Laboratories.

.2 SCC (Standards Council of Canada).

1.3 INSPECTION BY AUTHORITY

.1 Allow Authorities Having Jurisdiction 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 whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the 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.

1.4 REVIEW BY CONTRACT ADMINISTRATOR

.1 Allow Contract Administrator access to Work.

.2 Contract administrator may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with Contract Documents.

.3 If, upon review such work is found not in accordance with Contract Documents, correct such Work and pay cost of additional review and correction.

1.5 INDEPENDENT INSPECTION AGENCIES

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

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

.3 Employment of inspection and 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 testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract administrator at no cost to City of Winnipeg. Pay costs for retesting and re-inspection.

1.6 ACCESS TO WORK

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

.2 Cooperate to provide reasonable access and facilities for such access.

1.7 PROCEDURES

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

.2 Submit samples and materials required for testing, as specifically requested in specifications to the designated testing laboratory directly unless requested otherwise. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to:

.1 Provide access to the work to be inspected and tested.

.2 Facilitate inspections and tests.

.3 Make good any work which was disturbed by the inspection and test.

.4 Provide storage on Site for a testing laboratory's exclusive use to store equipment and cure test samples.

.4 Notify the Testing Agency sufficiently in advance of operations to allow for the assignment of laboratory personnel and for the scheduling of tests.

1.8 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 Contract administrator 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 Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, City of Winnipeg may deduct from Contract Price the difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Contract Administrator.

1.9 REPORTS

.1 Submit one (1) electronic copy of signed inspection and test reports to Contract Administrator, Subcontractor of work being inspected or tested, and City of Winnipeg.

1.10 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as required by Specification sections.

1.11 MOCK-UP

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

.2 Construct in all locations acceptable to Contract administrator or as specified in specific Section.

.3 Prepare mock-ups for City of Winnipeg's and Contract administrator'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 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed.

.6 Mock-ups are required by but not limited to the following Sections:

.1 Section 06 20 00 – Finish Carpentry
.2 Section 06 40 00 – Architectural Woodwork
.3 Section 07 61 00 – Sheet Metal Roofing (for wall and roof panels)
.4 Section 07 42 43 – Composite Wall Panels
.5 Section 07 46 23 - Wood Siding
.6 Section 09 30 13 – Ceramic Tiling

1.12 EQUIPMENT AND SYSTEMS

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

.2 Refer to Mechanical and Electrical Divisions for definitive requirements.

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 SECTIONS

.1 Section 01 52 00 - Construction Facilities.

.2 This section describes requirements applicable to all Sections within all Divisions.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 DEWATERING

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

1.4 WATER SUPPLY

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

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

.3 Contractor will pay for utility charges at prevailing rates.

1.5 TEMPORARY HEATING AND VENTILATION

.1 Pay for costs of temporary heat and ventilation used during construction, including costs of installation, fuel, operation, maintenance and removal of equipment. Use of direct-fired heaters discharging waste products into work areas will not be permitted.

.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, may be used when available on approval by the City of Winnipeg. Be responsible for damage to heating system if use is permitted.

.7 On completion of Work for which permanent heating system is used, replace filters, and clean inside and outside of all ductwork and equipment.

.8 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified Contract Administrator.

.9 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

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

1.6 TEMPORARY POWER AND LIGHT

.1 Contractor will provide a source for, and pay the costs of temporary power during construction for temporary lighting and operating of power tools.

.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 the Contract Administrator 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.

1.7 TEMPORARY COMMUNICATION FACILITIES

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

1.8 FIRE PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 This section describes requirements applicable to all Sections within all Divisions.

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.189-00 , Exterior Alkyd Primer for Wood.

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

.2 CSA Group (CSA)

.1 CSA-A23.1/A23.2-04 , Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121-M1978(R2003) , Douglas Fir Plywood.

.3 CAN/CSA-S269.2-M1987(R2003) , Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321-96(R2001) , Signs and Symbols for the Occupational Environment.

1.3 INSTALLATION AND REMOVAL

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

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

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from Site all such work after use.

1.4 SCAFFOLDING

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

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

1.5 HOISTING

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

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

1.6 SITE STORAGE/LOADING

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

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

1.7 CONSTRUCTION PARKING

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

.2 Provide and maintain adequate access to project Site.

.3 Construction Parking areas to be designated by City of Winnipeg.

1.8 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 OFFICES

.1 Contractor(s) may at their discretion provide a Site trailer for use as their own offices. Location to be approved by Contract Administrator.

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

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

.3 Handle and store products in a manner to prevent damage, deterioration and soiling and in accordance with manufacturer's recommendations when applicable.

.4 Store sensitive products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.5 Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.7 Remove and replace damaged products at own expense and to the satisfaction of the Contract Administrator

1.11 SANITARY FACILITIES

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

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

1.12 CONSTRUCTION SIGNAGE

.1 No signs or advertising shall be allowed or displayed without the approval of the Contract Administrator and City of Winnipeg.

.2 This project will not be used to advertise or promote systems, construction or assembly methods, tools or equipment used and/or incorporated therein without written approval of the Contract Administrator and City of Winnipeg.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

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

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

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

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

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

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

.7 Provide snow removal during period of Work.

1.14 CLEAN-UP

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

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

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from Site all such work after use.

1.2 HOARDING

.1 Erect temporary Site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre. Provide one lockable truck gate. Maintain fence in good repair.

.2 Barriers around trees and plants designated to remain to be provided by City of Winnipeg to protect from damage by equipment and construction procedures.

1.3 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.

1.4 WEATHER ENCLOSURES

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

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat as required.

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

1.5 DUST TIGHT SCREENS

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

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

1.6 ACCESS TO SITE

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

1.7 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent, traffic signals and barricades as required to perform Work and protect public.

1.8 FIRE ROUTES

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

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

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

END OF SECTION

Part 1 General

1.1 QUALITY

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

.2 Defective products, 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 disputes arise as to quality or fitness of products, decision rests strictly with Contract Administrator.

.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.

1.2 AVAILABILITY

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

1.3 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

.7 Store and mix paints in 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 Contract Administrator.

.9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

.10 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

1.4 TRANSPORTATION

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

1.5 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.6 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 Contract Administrator if required Work is such as to make it impractical to produce required results.

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

1.7 CO-ORDINATION

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

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

1.8 CONCEALMENT

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

.2 Before installation inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.9 REMEDIAL WORK

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

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

1.10 LOCATION OF FIXTURES

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

.2 Inform Contract Administrator of conflicting installation. Install as directed.

1.11 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.

1.12 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.

1.13 PROTECTION OF WORK IN PROGRESS

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

1.14 EXISTING UTILITIES

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

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

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 SECTION INCLUDES

.1 Subsurface conditions found.

.2 Survey requirements.

.3 Examination

.4 Preparation

1.2 REFERENCES

.1 Topgraphic Survey by Phillips & Stevens July14, 2021.

1.3 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Contract Administrator.

1.4 SURVEY REFERENCE POINTS

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

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

.3 Make no changes or relocations without prior written notice to Contract Administrator.

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

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

1.5 SURVEY REQUIREMENTS

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

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

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

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 Stake batter boards for foundations.

.7 Establish foundation column locations and floor elevations.

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

1.6 EXISTING SERVICES

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

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Contract Administrator.

1.7 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 Contract Administrator 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 Contract Administrator.

1.8 RECORDS

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

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

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

1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Contract Administrator.

.2 On request of Contract Administrator, submit documentation to verify accuracy of field engineering work.

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

1.10 SUBSURFACE CONDITIONS

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

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

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 SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 61 00 – Common Product Requirements.

.3 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.

.2 Advance notification to other sections of openings required in Work of those sections.

1.2 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of elements of project.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of operational elements.

.4 Visual qualities of sight-exposed elements.

.5 Work of City of Winnipeg or separate contractor.

.3 Include in request:

.1 Identification of project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed Work, and products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on Work of City of Winnipeg or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.3 MATERIALS

.1 Required for original installation.

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

1.4 PREPARATION

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

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

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

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

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

1.5 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 when requested.

.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, and/or fire rated resistant material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.

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

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

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 SECTION INCLUDES

.1 Progressive cleaning.

.2 Cleaning prior to acceptance.

1.2 PROJECT CLEANLINESS

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

.2 Remove waste materials from Site at regularly scheduled times or dispose of as directed by Contract administrator. Do not burn waste materials on Site, unless approved by Contract administrator.

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

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

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

.6 Dispose of waste materials and debris off Site.

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

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

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

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

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

1.3 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.

.5 Remove waste materials from Site at regularly scheduled times or dispose of as directed by Contract administrator. 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, and floors.

.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 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 SECTION INCLUDES

.1 Inspections and declarations.

.2 Closeout submittals

.3 Operation and maintenance manual format.

.4 Contents each volume.

.5 Recording actual Site conditions.

.6 Record documents and samples.

.7 Record documents.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 74 11 - Cleaning

.4 Section 01 79 00 - Demonstration and Training.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

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

.1 Notify Contract Administrator in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Contract Administrator's inspection.

.2 Contract Administrator's Inspection:

.1 Contract Administrator and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted and balanced and fully operational.

.4 Certificates required by Authorities Having Jurisdiction have been submitted.

.5 Operation of systems: demonstrated to City of Winnipeg's personnel.

.6 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Contract Administrator, and Contractor.

.2 When Work incomplete according to City of Winnipeg Contract Administrator, complete outstanding items and request re-inspection.

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

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

.7 Final Payment:

.1 When Contract Administrator considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.2 When Work deemed incomplete by Contract Administrator, complete outstanding items and request re-inspection.

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

1.4 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, four final copies of operating and maintenance manuals in English.

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

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

1.3 FORMAT

.1 Organize data as instructional manual.

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

.3 When multiple binders are used correlate data into related consistent groupings.

- .1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Operation and Maintenance Manuals'; list title of project and identify subject matter of contents.

.5 Arrange content by systems and subdivided by MASTERFORMAT division and Section numbers and sequence of Table of Contents.

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

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

.8 Drawings: provide with reinforced punched binder tab.

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

.9 Provide 1:1 scaled CAD files in dxf and dwg format on USB digital storage device.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

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

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

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

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

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at Site for Contract Administrator one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "RECORD DOCUMENTS" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Contract Administrator.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

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

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

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

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

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

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

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

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

.2 Changes made by Addenda and change orders.

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

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

1.7 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

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

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

.14 Include test and balancing reports as specified in Section 01 45 00- Quality Control.

1.8 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

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

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

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

1.9 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

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

.2 Extra Stock Materials:

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to Site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

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

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to Site location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

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

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

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

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

.5 Remove and replace damaged products at own expense and for review by Contract Administrator.

1.11 WARRANTIES AND BONDS

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

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

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

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

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

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

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

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

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

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

.5 Co-execute submittals when required.

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

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

.8 Conduct joint warranty inspection, measured from time of acceptance, by Contract Administrator.

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

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

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems, lightning protection systems.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at warranty inspection (prior to 12 month warranty expiration), post-construction.

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

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

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

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

1.12 WARRANTY TAGS

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

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

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

.4 Indicate following information on tag:

.1 Type of product/material.
.2 Model number.
.3 Serial number.
.4 Contract number.
.5 Warranty period.
.6 Inspector's signature.
.7 Construction Contractor.

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 SECTION INCLUDES

.1 Equipment and systems.

.2 Materials and finishes.

.3 Spare parts.

.4 Maintenance manuals.

.5 Special tools.

.6 Storage, handling and protection.

1.2 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 01 45 00 - Quality Control.

1.3 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 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.

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

1.4 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 Building Envelope: include copies of drawings of building envelope components, illustrating the interface with similar or dissimilar items to provide an effective air, vapour and thermal barrier between indoor and outdoor environments. Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.5 Additional Requirements: as specified in individual specifications sections.

1.5 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 Site; place and store.

.4 Contractor to Receive and catalogue all items.

1.6 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 Site; place and store.

.4 Contractor to receive and catalogue all items.

1.7 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 Site; place and store.

.4 Contractor to receive and catalogue all items.

1.8 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 Contract Administrator.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to City of Winnipeg's personnel.

.2 Seminars and demonstrations.

1.2 RELATED SECTIONS

.1 Section 01 78 00 – Closeout Submittals.

.2 Section 01 78 40 - Maintenance Requirements.

.3 This section describes requirements applicable to all Sections within all Divisions.

1.3 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment, building envelope, and systems to City of Winnipeg's personnel two (2) weeks prior to date of substantial performance.

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

1.4 COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.

.2 Instruct City of Winnipeg's personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two (2) weeks prior to designated dates, for Contract Administrator's approval.

.2 Submit reports within one (1) 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.

1.6 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with applicable Sections within all Divisions.

.2 Mechanical and Electrical testing, adjusting, and balancing have been performed in accordance with Mechanical and Electrical Divisions, and equipment and systems are fully operational.

.3 Testing, adjusting, and balancing have been performed in accordance with specifications and equipment and systems are fully operational.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 PREPARATION OF AGENDAS AND OUTLINES

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations.
.2 Name of companies and representatives presenting at seminars.
.3 Outline of each seminar's content.
.4 Time and date allocated to each system and item of equipment.
.5 Provide separate agenda for each system

3.3 SEMINAR ORGANIZATION

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.4 Coordinate proposed dates for seminars with City of Winnipeg and select mutually agreeable dates.

3.4 EXPLANATION OF DESIGN STRATEGY

.1 Explain each system. Include following information:

.1 An overview of how system is intended to operate.

.2 Description of design parameters, constraints and operational requirements.

.3 Description of system operation strategies.

.4 Information to help in identifying and troubleshooting system problems.

3.5 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. Video record all sessions and place video on DVD or USB in suitable format for City of Winnipeg's use.

.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.

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

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

.6 In addition to start-up supervision, instruct the City of Winnipeg's personnel in the operation and maintenance of all equipment and systems prior to Substantial Completion inspection.

.7 Following site instruction, review all information with the City of Winnipeg's representative to ensure a thorough understanding of the equipment and its operations.

.8 Confirm in writing to the Contract Administrator, the date and personnel in attendance. Document on Contract Administration Summary.

3.6 TIME ALLOCATED FOR INSTRUCTION

.1 Ensure time required for instruction of each item of equipment or system is adequate for all systems, some of which are noted below:

.1 Plumbing System.

.2 Heating System.

.3 Cooling System.

.4 Ventilation System.

.5 Control System.

.6 Electrical System.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes.

.1 Methods and procedures for demolishing, salvaging, recycling and removing sitework items designated to be removed in whole or in part, and for backfilling resulting trenches and excavations.

.2 Related Sections.

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 City of Winnipeg Standard Specifications.

1.2 REFERENCES

.1 Department of Justice Canada (Jus).

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

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

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

.1 Material Safety Data Sheets (MSDS).

.3 Transport Canada (TC).

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

.4 City of Winnipeg Standard Specifications.

1.3 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Selective Demolition: Sequencing demolition activities to allow separation and sorting of selected site materials.

.3 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.4 SUBMITTALS

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

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.

.3 Shop drawings.

.1 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Manitoba, Canada.

.4 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with all Civic, Provincial and Territorial regulations.

.2 Site Meetings.

.1 Convene pre-installation meeting one week prior to beginning to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection.

.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Contract Administrator at additional cost to contract.

.2 Remove and store materials to be salvaged, in manner to prevent damage. Locate on site where directed by Contract Administrator.

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

.4 Handle salvaged materials as new materials.

.2 Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling.

.2 Divert excess materials from landfill to site authorized by City of Winnipeg.

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

.4 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.5 Label location of salvaged material's storage areas and provide barriers and security devices.

.6 Ensure emptied containers are sealed and stored safely.

.7 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt, and gypsum.

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

1.7 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.2 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.3 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities and Contract Administrator.

.5 Protect trees, plants and foliage on site and adjacent properties where indicated.

.2 Existing Conditions.

.1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction and as directed by Contract Administrator from site, prior to start of demolition Work, and dispose of at City of Winnipeg designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.

1.8 SCHEDULING

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Contract Administrator in writing when unforeseen delays occur.

Part 2 Products

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 EXAMINATION

.1 Survey existing conditions and correlate with requirements indicated to determine extent of selective site demolition required.

.2 Contract Administrator does not guaranty that existing conditions are the same as those indicated in Project Record Documents.

.3 Inventory and record the condition of items being removed and salvaged.

.4 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to the Contract Administrator .

3.2 PREPARATION

.1 Inspect site with Contract Administrator and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Protection of in-place conditions:

.1 Prevent movement, settlement or damage to adjacent structures, services, walks , paving , trees to remain, landscaping, .

.1 Provide bracing, shoring as required.

.2 Repair damage caused by demolition as directed by Contract Administrator.

.2 Support affected site elements and, if safety of site element being demolished or services appear to be endangered, take preventative measures, stop Work and immediately notify Contract Administrator.

.3 Prevent debris from blocking surface drainage system which must remain in operation.

.3 Surface Preparation:

.1 Disconnect and re-route electrical and service lines within the site to be demolished.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties, buildings or infrastructure during period of selective site demolition.

.4 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.5 Notify and obtain approval of utility companies before starting demolition.

3.3 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Removal of Pavements, Curbs and Gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Contract Administrator.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.5 Excavate at least 300mm below pipe invert, when removing pipes under existing or future pavement area.

.6 Remove designated trees during demolition.

.1 Obtain written approval of Contract Administrator prior to removal of trees not designated.

.7 Stockpile topsoil for final grading and landscaping.

.1 Provide erosion control and seeding if not immediately used.

.8 Disposal of Material.

.1 Dispose of materials not designated for salvage or reuse on site as instructed by Contract Administrator.

.9 Excavation and Backfill.

.1 In accordance with City of Winnipeg Standard Specifications.

3.4 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by Contract Administrator when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

3.6 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work, unless otherwise indicated on Drawings.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 CLEANING

.1 Remove debris, trim surfaces and leave work site clean, upon completion of Work.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-A23.1-09 Concrete Materials and Methods of Concrete Construction
- .2 CAN/CSA-O86.1, Engineering Design in Wood (Limit States Design).
- .3 CSA O121, Douglas Fir Plywood.
- .4 CSA O151, Canadian Softwood Plywood.
- .5 CSA O437 Series 93, Standards for OSB and Waferboard.
- .6 CSA S269.1, Falsework for Construction Purposes.
- .7 CAN/CSA-S269.3, Concrete Formwork.
- .8 CAN/CSA-O325-07, Construction Sheathing

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

.1 Formwork materials:

- .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series and CSA-O153.
- .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.

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

- .1 Spiral pattern not to show in hardened concrete.

.3 Form ties:

- .1 For concrete not designated “architectural”, use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .2 For architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

- .1 Plywood: Douglas Fir to CSA O121, 19 mm thick.

.5 Form release agent: non-toxic, biodegradable, maximum VOC content: 350 g/L (less water)

.6 Concrete Sealant: to Section 07 92 00 – Joint Sealants.

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

Part 3 Execution

3.1 FABRICATION AND ERECTION

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

.2 Refer to drawings for concrete members requiring architectural exposed finishes.

.3 Do not place shores and mud sills on frozen ground.

.4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.6 Align form joints and make watertight. Keep form joints to minimum.

.7 Use 1-inch chamfer strips on external corners and 1-inch fillets at interior corners, joints, unless specified otherwise.

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

.9 Construct forms for architectural concrete, and place ties as indicated.

.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

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

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

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place until concrete has reached sufficient strength to carry dead loads and all possible construction loads liable to be imposed upon it.

.2 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.3 Space reshoring in each principal direction at not more than 2400mm apart.

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 CSA International

.1 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA-A23.3, Design of Concrete Structures.

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

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

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.2 MEASUREMENT PROCEDURES

.1 No measurement will be made under this Section.

.1 Include reinforcement costs in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.3 SUBMITTALS

.1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00- Submittal Procedures.

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

.3 Shop Drawings:

.1 Submit drawings.

.1 Indicate placing of reinforcement and:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

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

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

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by The Contract Administrator.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18 M grade 400R deformed bars except column ties and beam stirrups which shall be grade 400W..

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

.4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M. All tie wires to be non-corroding or epoxy coated.

.5 Welded steel wire fabric: to ASTM A185/A185M. Provide in flat sheets only.

.6 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.7 Mechanical splices: subject to approval of Contract Administrator.

.8 Plain round bars: to CAN/CSA- G40.20/G40.21.

2.2 FABRICATION

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

.2 Obtain Contract Administrator’s approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of the Contract Administrator, weld reinforcement in accordance with CSA W186.

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

2.3 SOURCE QUALITY CONTROL

.1 Upon request, inform the Contract Administrator of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Contract Administrator.

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

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

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

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

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

.4 When paint is dry, apply thick even film of mineral lubricating grease.

.5 Prior to placing concrete, obtain Contract Administrator 's approval of reinforcing material and placement.

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

3.3 DOWELING PROCEDURES

.1 For bars that are indicated as being dowelled, drill in and grout bars into slab as indicated on drawings. Use only approved adhesive to manufacturer’s instructions. Acceptable product:

.1 Hilti HIT HY-200 by Hilti Canada.

.2 Sikadur AnchorFix 4CA by Sika Canada Inc.

.2 Clean hole thoroughly prior to application of adhesive. Use injection or caulking gun to ensure that the adhesive fills the bottom of the hole prior to embedment of bar.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)

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

.2 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)

.3 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.2 American Concrete Institute (ACI)

.1 ACI 309R-96, Guide for the Consolidation of Concrete.

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

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

.2 ASTM C309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-10a Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C928/C928M-09, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

1.2 MEASUREMENT PROCEDURES

.1 Include all costs for concrete required.

1.3 CERTIFICATES

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

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

1.4 QUALITY ASSURANCE

.1 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Contract Administrator on following items:

.1 Falsework erection.
.2 Hot weather concrete.
.3 Cold weather concrete.
.4 Curing.
.5 Finishes.
.6 Formwork removal.
.7 Joints.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Use trigger operated spray nozzles for water hoses.

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

.3 Carefully coordinate the specified concrete work with weather conditions.

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

.5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, provincial and national regulations.

.6 Choose least harmful, appropriate cleaning method which will perform adequately.

1.6 ABBREVIATIONS

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.
.2 Type CI - with CaO content ranging from 8 to 20%.

.2 SCM – Supplemental cementing materials.

.3 SSD - Saturated surface dry.

.4 WRA – Water reducing agent.

1.7 DELIVERY, STORAGE AND HANDLING

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

.1 Modifications to maximum time limit must be agreed to Contract Administrator and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Contract Administrator.

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

Part 2 Products

2.1 MATERIALS

.1 The concrete constituents shall comply with the following standards:

.1 Cement: to CAN/CSA-A3001.

.2 Blended Hydraulic cement: to CAN/CSA-A3001.

.3 Supplementary cementing materials: to CAN/CSA-A3001.

.4 Water: To CSA-A23.1.

.5 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density.

.6 Air entraining admixture: ASTM C260.

.7 Chemical admixtures: ASTM C494/C494M. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather.

2.2 MIXES

.1 Concrete to be mixed, delivered and placed in accordance with CSA A23.1.

.2 Concrete to be batched and mixed at a ready mix plant and delivered to site in ready to place form.

.3 Control of slump on the job site to be in accordance with CSA-A23.1 except as otherwise specified below:

.1 The addition of water to increase slump is strictly prohibited unless prior written permission from concrete supplier is obtained.

.2 The use of WRA may be required to aid in placement of the concrete and obtain adequate consolidation in heavily reinforced sections.

.3 WRA addition shall occur at the batch plant or on site. For site addition, concrete supplier to provide written notice minimum 2 weeks prior to commencement of concrete work, indicating recommended dosages based on slump at point of discharge.

.4 Site addition WRA will be the responsibility of the concrete supplier.

.5 Slump and air must be measured both before and after addition of WRA.

2.3 BONDING SLURRY

.1 The bonding slurry shall consist of a cement/sand grout mixed in a 1:1 ratio by weight to a maximum water/cement ratio of 0.40 in accordance with CSA-A23.1 and as follows:

.1 1.0 kg Type GU to CSA A3001.

.2 1.0 kg SSD concrete sand to CSA A23.1.

.3 0.40 kg Water to CSA A23.1.

.4 High range water reducing agent to ASTM C494/C494M as required and approved by Contract Administrator.

.5 Volume batching will be permitted provided the volumes are calibrated by weight prior to batching. The measuring containers shall be clearly labelled, indicating material type, calibrated weight of material, and calibrated volume. The Contract Administrator reserves the right to randomly check batch weights.

.6 Shovel batching is strictly prohibited.

.2 Alternative Method: Plastic concrete from same mix utilized for overlying concrete. Scrub plastic concrete. Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8" over entire area. Collect and remove all coarse aggregate prior to placement of the overlay.

2.4 ACCESSORIES

.1 Evaporation retardant: Acceptable Product:

.1 MasterKure ER 50, formerly (Confilm) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.2 Cure and sealing compound: to ASTM C309, Type 1. Acceptable product(s):

.1 Florseal WB by Sika Canada Inc. at a minimum application rate of 4.9 m²/L.

.2 MasterKure CC, formerly (Kure-N-Seal) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.3 Vapour Barrier: 10 mil polyethylene film to CAN/CGSB-51.34.

2.5 GRANULAR BASE

.1 Comply with Civil Drawings

Part 3 Execution

3.1 PREPARATION

.1 Obtain Contract Administrator 's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

.2 Ensure reinforcement and inserts are not disturbed during concrete placement.

.3 Prior to placing of concrete obtain Contract Administrator's approval of proposed method for protection of concrete during placing and curing in adverse weather. Protection and curing must comply with the hot weather and cold weather requirements of CSA-A23.1.

.4 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.5 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and epoxy grout to anchor and hold dowels in positions as indicated. Refer to Section 03 20 00.

.6 Do not place load upon new concrete until authorized by Contract Administrator.

.7 Provide formwork and falsework to Section 03 10 00 - Concrete Forms and Accessories.

.8 Place reinforcing steel and install dowels to Section 03 20 00 - Concrete Reinforcement. Provide dowels at locations shown on the drawings.

.9 Provide temporary bridging as required to permit access to all areas during placement, finishing and curing.

.10 Do not place concrete until screed rails for hand operated strike-off devices are in place and firmly secured.

.1 Rails to be of type, and so installed, that no springing or deflection will occur due to weight of finishing equipment.

.2 Set rails or headers to elevations to produce deck true to required grade and cross section.

.3 Use polyethylene film or plastic coated tape if necessary to prevent concrete from bonding to rails.

.4 Do not treat rails with release agents or parting compounds.

.5 Subject to approval of the Contract Administrator, screed rail anchors which remain in the concrete may be used provided they are non-corroding and sit a minimum of 30 mm below the finished surface of the concrete.

3.2 INSTALLATION/APPLICATION

.1 Place concrete work in accordance with CSA-A23.1.

.2 Concrete shall be transported to placement location by pump or trolley. Note that regard to load limitations on the deck must be maintained to avoid overstressing the structural members.

.3 When concrete is placed by pump, the initial slurry used to prime the pump shall not be incorporated into the topping. The slurry shall be trapped and disposed off-site.

.4 Ensure high points and slopes to drains as shown on drawings are maintained.

.5 Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur. Install a construction dam or bulkhead in case of a delay longer than 60 minutes. During delays between 5 and 60 minutes, protect the end of the placement with damp burlap.

.6 Protect freshly placed concrete from exposure to dust, debris and precipitation.

.7 Sleeves and inserts.

.1 No sleeves, ducts, pipes or other openings shall pass through concrete members except where indicated or approved by Contract Administrator.

.2 Electrical conduits, junction and fixture boxes shall not be embedded within concrete members.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Contract Administrator.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Contract Administrator before placing of concrete.

.5 Check locations and sizes of sleeves and openings shown on drawings.

.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.8 Anchor bolts.

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

.2 With approval of Contract Administrator, grout anchor bolts in preformed holes or holes drilled after concrete has set. Formed holes to be minimum 100 mm diameter. Drilled holes to be to manufacturers' recommendations.

.3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.

.4 Set bolts and fill holes with epoxy grout.

.5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.

.9 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.10 Joint fillers.

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by The Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.2 Locate and form isolation expansion joints as indicated. Install joint filler.

.11 Cold Weather Concrete

.1 The following are minimum requirements for protecting concrete during and after placement in freezing weather. Except as noted below, concrete curing and protection to be in accordance with CAN/CSA-A23.1.

.2 Before any concrete is placed, all ice, snow and frost shall be completely removed from all formwork, reinforcing and other surfaces shall be raised above 10°C for 24 hours minimum prior to concreting. Where concrete work is to come in contact with the earth, the surfaces of the earth shall be completely free of frost when the concrete is placed thereon.

.3 Concrete aggregates and water shall be heated to not over 80°C.

.4 Concrete shall not be less than nor more than 30°C in temperature when deposited.

.5 Concrete when placed during freezing weather (or if freezing is anticipated during curing period) shall be fully enclosed and the temperature of same maintained at 18°C for the first three days and 10°C for the next three days.

.6 Provide adequate heating to attain specified concrete strengths required prior to stripping, or provide concrete mix which will meet specified stripping strengths under reduced curing temperatures.

.7 Keep protecting covering clear of concrete and form surfaces to permit full circulation of air, and maintain intact for at least 24 hours after artificial heat is discontinued.

.8 Heating enclosures: strong and windproof, but well ventilated. Heating units located as to prevent local overheating, drying of concrete, and damage from combustion gases. Only Herman Nelson heat exchange, fuel oil type heaters will

be acceptable for slabs and flat areas. Units must be vented outside the building. No direct fired units will be acceptable.

.12 Hot Weather Concrete

.1 All concreting operations during hot weather in accordance with CAN/CSA-23.1.

.2 Exercise particular care to prevent surface crazing of floor slabs due to combined high temperature and drying winds.

.3 Use of water reducing-retarding chemical admixture in the concrete mix may be required at the The Contract Administrator's discretion.

.13 Abrasive Nosings: Install abrasive nosings with anchors fully embedded in concrete. Centre nosings on tread width at exterior concrete stairs. Install before initial set of concrete fill unless noted otherwise.

3.3 FINISHING HORIZONTAL SURFACES

.1 Finish concrete in accordance with CAN/CSA-A23.1/A23.2.

.2 Use procedures acceptable to Contract Administrator or those noted in CAN/CSA-A23.1 to remove excess bleed water. Ensure surface is not damaged.

.3 It is imperative that finishing be completed before surface of concrete dries, otherwise extensive cracking will result. Follow CPCA and CSA-A23.1 procedures and recommendations.

.4 Ensure uniform, level surface is obtained.

.5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.4 JOINTS

.1 Install control joints at locations shown on the drawings. Joints shall correspond to location of slip dowels.

.2 Location of control and construction joints:

.1 Concrete pavements: As shown on Drawings.

.2 Other flatwork not shown on drawings: not more than 4500mm on-centre and matching joints in adjacent work.

.3 Control joints in upstand walls and curbs to be formed matching joints in adjacent work (no more that 4500mm on-centre) and using a 13mm x 13mm form strip on each face. Tool in joints along top surface corresponding to form strips.

.3 Control joints and construction joints shall be formed or tooled at locations shown. Refer to Drawings for paving patterns and joint locations.

.1 All joints to be sawcut via specialized dry-process cutting.

.1 Sawcut to a minimum of one 38mm or one-quarter of the depth of the slab, whichever is greater, following initial set of concrete.

.2 Timing of the saw cutting will vary with weather conditions however are typically completed within 1 to 4 hours after final finishing. Timing of the saw cutting will be the responsibility of the Contractor. Sawcutting 24 hours following placement will not be permitted.

.4 Where paving abuts curbs, walls and other vertical surfaces use 12 mm asphalt impregnated fibre board.

.5 Unless otherwise indicated, all control and construction joints to be filled with a flexible joint sealant in accordance with Section 07 92 00 Joint Sealants.

3.5 CURING

.1 Cure and protect concrete in accordance with requirements CSA A23.1.

.2 Concrete surfaces to be cured at a minimum temperature of 10°C for the entire curing period.

.3 Curing methods shall be in accordance with CSA A23.1 unless otherwise indicated.

.1 Basic curing methods shall consist of one of the following:

.1 polyethylene sheet;

.2 forms in contact with concrete surface; or

.3 curing compounds to ASTM C309 at manufacturer's specified applications rates, when approved by Contract Administrator.

.2 Requirements for wet-curing:

.1 Immediately after final finishing, protect exposed surface against plastic shrinkage by means of a fog spray and/or evaporation reducer, until the concrete has enough strength to support the placement of the wetted burlap. When an evaporation reducer is used, intermittent reapplication may be required if the film evaporates before initiation of the wet cure.

.2 Burlap to be thoroughly presoaked by immersing it in water for a period of at least 24 hours immediately prior to placement.

.3 Commence wet curing with burlap and water as soon as the surface will support the weight of the wetted burlap without deformation. Burlap to be applied in one layer with strips overlapping at least 75 mm and be securely held in place without marring the concrete surface.

.4 Wet curing with burlap and water must be maintained for the periods indicated. Periodic rewetting by means of a soaker hoses, sprinklers, or other suitable methods approved by the Contract Administrator may be necessary.

.4 Unless noted otherwise the curing regime shall be consistent with the Class of Exposure. Refer to related sections for curing of concrete repair materials.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CSA-A23.1 and Section 01 45 00 - Quality Control and as described herein.

.1 Testing laboratory to be certified in accordance with CSA A283.

.2 The Contractor will pay for costs of tests.

.3 Frequency and Number of Tests:

.1 Not less than one strength test per 50 m^3 of concrete placed and not less than one test for each class of concrete placed on any one day.

.2 Slump and air measurements will be completed on each of the initial 3 loads of concrete per day of casting to ensure satisfactory control of the air content is established. If adequate control of air content is not established within the first 3 loads of concrete or if a test falls outside the specified limits, the testing frequency shall revert to one test per load until satisfactory control is re-established. Costs for additional testing will be the responsibility of the concrete supplier.

.4 Contract Administrator may take additional test cylinders during cold weather concreting or when concrete quality is suspect. Cure cylinders on job site under same conditions as concrete which they represent.

.5 Non-destructive Methods for Testing Concrete shall be in accordance with CSA-A23.2.

.6 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve contractual responsibility.

3.7 DEFECTIVE CONCRETE

.1 Defective concrete: cracking, spalling, scaling and concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Contract Administrator, based on the specifications and the above guidelines.

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

.4 Modify or replace concrete not conforming to lines, detail and elevations indicated on drawings.

.5 Repair or replace concrete not properly placed, resulting in excessive honeycombing and other defects in critical areas of stress.

.6 Notify Contract Administrator of proposed methods of repairing or replacing defective concrete. Methods of repairing or replacing defective concrete shall be acceptable to the Contract Administrator.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

.2 Section 03 30 00 – Cast In Place Concrete

.3 Section 03 35 43 – Polished Concrete Finishing

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C309-03, Liquid Membrane-Forming Compounds for Curing Concrete.

.2 C418 – Standard Test Method for Abrasion Resistance of Concrete by Sandblasting

.3 C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

.4 C1353 – Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser.

.5 D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.

.6 D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

.7 E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.

.8 G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-25.20-95 , Surface Sealer for Floors.

.3 CSA Group (CSA)

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

.4 American National Standard Institute / National Floor Safety Institute:

.5 ANSI B101.1-Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.

.6 ANSI B101.3-Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Include application instructions for concrete floor treatments.

.3 Certificates by manufacturer stating that installer is listed applicator of special concrete finishes, and has completed the necessary training programs.

.4 Floor Protection Plan.

.5 Closeout Submittals: Submit the following:

.1 Maintenance instructions: Operation and maintenance instructions for installed concrete flooring products in accordance with Division 1 Closeout Submittals Section. Include methods for maintaining final finish gloss and cleanliness of concrete slab surface.

1.4 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00- Quality Control.

.2 Installer Qualifications:

.1 Applicator to be familiar with the specified requirements and the methods needed for proper performance of work of this section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 5 projects of similar scope and complexity.

.3 Minimum 4 weeks prior to starting concrete finishing work, provide proposed quality control procedures for review by Contract Administrator on following items:

.1 Hardening.

.2 Sealing.

.3 Curing.

.4 Finishes.

.4 Mock-up: On site, prior to the first application of the densifier.

.1 Require attendance of parties directly affecting work of this Section, including the Contractor, Architect, applicator, and City of Winnipeg’s Representative.

.2 Notify the above parties one week in advance of date and time when mock-up will be completed.

.3 Demonstrate the materials, equipment and application methods to be used for work specified herein in pre-approved location approximately 50 sq. ft. in area or as directed by Contract Administrator.

.4 Retain approved mock-up during construction as a standard for judging the completed Work. Areas may remain as part of the completed work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

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

.3 Store concrete hardener/densifier in environment recommended on published manufacturer's product data sheets.

.1 Store containers upright in a cool, dry, well-ventilated place, out of the sun with temperature between 40 and 100 degrees F (4 and 38 degrees C).

.2 Protect from freezing.

.3 Store away from other chemicals and potential sources of contamination.

.4 Keep lights, fire, sparks and heat away from containers.

.5 Do not drop containers or slide across sharp objects.

.6 Do not stack pallets more than three high.

.7 Keep containers tightly closed when not in use.

1.6 SITE CONDITIONS

.1 Environmental limitations:

.1 Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.

.2 Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.

.3 Protect the completed slab to prevent damage by the other trades during floor completion.

.4 Temperature Limitations:

.1 Apply when surface and air temperature are between 40 degrees F (4 degrees C) and above 100 degrees F (38 degrees C) unless otherwise indicated by manufacturer's written instructions.

.2 Apply when surface and air temperatures are expected to remain above 40 degrees F (4 degrees C) for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

.5 Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.

.6 Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.

.7 Apply a minimum of 24 hours after rain event. Suspend application when rain is anticipated for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

.8 Temporary Lighting: Minimum 200 W light source, placed 8 feet (2.5 meters) above horizontal concrete surface for each 425 square feet (40 square meters) of concrete being finished.

.9 Temporary Heat: Ambient temperature of 50 degrees F (10 degrees C) minimum.

.10 Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

Part 2 Products

2.1 STANDARD OF ACCEPTANCE

.1 Medium grind floor with “Salt and Pepper” finish

2.2 MATERIALS

.1 Pre-Densifier Concrete Cleaner: Cleaner to remove dirt, oil, grease, and other stains from existing slab surface.

.1 Product: Consolideck Cleaner/Degreaser manufactured by PROSOCO, Inc., www.prosoco.com.

.2 Penetrating Concrete Hardener/Densifier: Blended silicate hardener/densifier.

.1 Product: Consolideck Blended Densifier, manufactured by PROSOCO, Inc., www.prosoco.com.

.2 Subject to compliance with the following minimum performance requirements:

.1 Comply with national, state and district AIM VOC regulations and contain 50 g/L or less.

.2 Microabrasion Resistance: Greater than 30 percent improvement over the untreated samples when tested in accordance with ASTM C418.

.3 Abrasion Resistance: Greater than 40 percent improvement over untreated samples when tested in accordance with ASTM C1353.

.4 Achieve ‘High Traction Range’ readings when tested in accordance with ANSI B101.1 and ANSI B101.3.

.5 Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.

.6 Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.

.7 Water Vapor Transmission: 99 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).

.3 Protective Coating: to provide stain resistance

.1 Product: Consolideck Polish Guard, manufactured by Prosoco, Inc., www.prosoco.com.

.2 Technical Data:

.1 Form: White Milky Liquid

.2 Specific Gravity: 1.01

.3 pH: 8.4

.4 Wt/Gal: 8.5 lbs

.5 Active Content: 15%

.6 Total Solids: 15%

.7 VOC Content: 100 g/L maximum

.8 Flash Point: >93 degrees celcius

.9 Freeze Point: 0 degrees celcius

2.3 EQUIPMENT

.1 Auto Scrubber Machine: For cleaning operations.

.2 Burnishing Machine and Diamond Impregnated Burnishing Pads to produce specified results.

.1 Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by diamond impregnated burnishing system manufacturer. Dust skirt must be installed at time of work.

.2 Diamond Impregnated Burnishing Pads:

.1 Resin Diamond Pad Grit Sizes: 800, 1500 or 3000 grit.

2.4 CONCRETE MAINTENANCE SUPPLIES

.1 Concrete Maintenance Cleaner: Lithium silicate concentrated maintenance cleaner to keep maintain concrete surface sheen and remove dirt and soils.

.1 Consolideck LSKlean ULTRA 15 or 30 (confirm with City of Winnipeg), pre-measured 4 oz packs, manufactured by PROSOCO, Inc., www.prosoco.com

.2 Floor Maintenance Pads:

.1 White floor maintenance pads.

.3 Spill Clean-up Kit: Provide critical cleaning items to remove spills from concrete floors. Spill Clean-up Kit should include the following:

.1 One quart of Consolideck Cleaner Degreaser, one quart of Consolideck Oil and Grease Remover, two pound Spill Guard Neutralizer Absorbent, one package of multi absorbent shop towels, one small plastic scraper and one box of general purpose vinyl gloves.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrate with installer present for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Notify the Contract Administrator of conditions detrimental to the proper and timely completion of the work.

.2 Do not begin installation until unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.2 PREPARATION

.1 Clean dirt, dust, oil, grease and other contaminants that interfere with penetration or performance of specified product from surfaces.

.2 Remove remnants of curing compound, bond breaker, and construction laitance prior to application of densifier. Remove by cleaning and scrubbing in accordance with manufacturer's instructions.

.3 Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Contract Administrator. Allow repair materials to cure completely before application of product.

.4 Scrub floor with pre-densifier floor cleaner to remove latent salts.

.5 Do not proceed until unsatisfactory conditions have been corrected.

3.3 APPLICATION OF CONCRETE HARDENER/DENSIFIER

.1 Cured Steel Troweled Concrete: Apply concrete hardener/densifier to cured steel troweled concrete. Apply according to manufacturer's written instructions and as follows:

.1 Remove remnants of bond breakers, curing agents, surface grease and oil and construction debris. Contact manufacturer for recommended cleaner and cleaning method.

.2 Apply hardener/densifier per manufacturer's recommended application rate to designated finished floor area, with a low pressure sprayer fitted with a 0.5 gpm spray tip.

.3 Apply sufficient material to wet the surface without producing puddles. Use a clean microfiber pad to spread the hardener/densifier evenly to achieve uniform wetting. Avoid spreading once drying begins. Surface should remain wet for 10 to 15 minutes. Avoid over-application. (Scrubbing is not necessary) Allow treated surface to dry.

.4 Apply second coat of concrete hardener/densifier, as necessary to product desired finishing results.

.5 Once thoroughly dry, concrete may be auto-scrubbed or burnished with slab surface refinement system

3.4 INTERIOR CONCRETE SLAB SURFACE REFINEMENT SYSTEM

.1 Sequential progression of surface refinement shall be required and limited to no more than double the grit value of the previous diamond grit used after application of the concrete hardener/densifier.

.2 Overlap adjacent burnishing passes by 25 percent

.3 Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.

.4 Progressively refine surface utilizing approved diamond impregnated burnishing system, to produce Finishing Requirements.

3.5 FINISHING REQUIREMENTS

.1 Appearance:

.1 Interior exposed finished slab areas must consist of the following:

.1 Slab surface must meet the desired sheen, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.

.2 Slab surface must have a consistent look and exhibit a finish that has no evidence of streaking or burnish marks.

.3 White residue or hazy appearance is not acceptable.

.4 Exposure of aggregate beyond CPAA Class B-Fine Aggregate is not acceptable.

.2 Interior exposed finished slab areas must consist of the following CPAA Gloss Level:

.1 Finished Gloss Level 2 – Satin Gloss Appearance.

3.6 SLAB PROTECTION

.1 Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.

.2 Do not drag or drop equipment or material across the slab which will scratch or chip it.

.3 Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.

.4 Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.

.5 Develop a concrete protection procedure which addresses the following procedures:

.1 Communication of protection plan to subcontractors and vendors.

.2 Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.

.6 Provide a clean slab surface using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's published recommendations

3.7 CLOSEOUT ACTIVITIES

.1 Provide and post the laminated methods for maintaining final finish gloss and cleanliness of concrete slab surface within Room 107 Laundry.

.2 Contact PROSOCO, Inc. at 800.255.4255 to obtain colored poster.

.3 Provide Store Manager the following concrete floor maintenance supplies:

.4 One Spill Clean-Up Kit.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Concrete hardener and sealing compounds.

1.2 RELATED SECTIONS

.1 Structural Specifications

1.3 REFERENCES

.1 A23.1-09/A23.2-09 - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal procedures.

.2 Product Data: Provide data on materials and application requirements.

.3 Submit Material Safety Data Sheet (MSDS) for products provided.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00 Submittal procedures.

.2 Manufacturer's Application Data: Indicate special procedures, conditions requiring special attention, and other details.

.3 Test Reports: Submit substantiating data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data prior to application of Work.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00 Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

.2 Applicator Qualifications: Company specializing in performing the work of this section with minimum two (2) years documented experience and approved by the manufacturer.

.3 Materials:

.1 As per Part 2 of this specification section

.2 Not to affect bonding capability of other materials applied to substrate.

.4 Provide materials of this section from single manufacturer.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00 Common Product Requirements.

.2 Store containers to manufacturer's written instructions.

.3 Protect materials from freezing, at temperature recommended by manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient temperatures to manufacturer’s written instructions.

1.10 ENVIRONMENTAL CONTROL

.1 Refer to Material Safety Data Sheet for information related to product contact with skin and eyes.

Part 2 Products

2.1 MANUFACTURERS

.1 Hardener: Sika Coloplete Surface Hardener.

.2 Sealer: Sika FlorSeal WB 18.

.3 Substitutions: Approved Equal approved by Contract Administrator in writing.

2.2 MATERIALS

.1 Water: Potable.

.2 Hardener: Sika Colorplete, mineral surface hardener, pigmented to Contract Administrator’s written instructions.

Part 3 Execution

3.1 EXAMINATION

.1 Ensure surfaces are clean, dry and free of contaminants.

.2 Ensure new concrete has cured to details specified in manufacturer’s written instructions.

.3 Ensure ambient temperature meets manufacturer’s written requirements.

.4 Apply sealer only after the disappearance of all surface moisture.

.5 Do not apply material if rain is predicted within six (6) hours after application to exterior/exposed surfaces.

3.2 PREPARATION

.1 Surfaces must be clean, dry and free of all loose dirt, oil, wax, sealer, curing and parting compounds, and other foreign matter. Clean substrate surfaces to manufacturer's written instructions.

.2 Perform application on minimum 0.85 sq m (9 sq ft) test section; obtain approval of test section from Contract Administrator before proceeding with application.

.3 Stir sealer well prior to use, ensuring thorough agitation and distribution of any settled material throughout the liquid; prepare in accordance with manufacturer’s written instructions.

.4 Do not dilute or alter the product in any way.

3.3 INSTALLATION

.1 Install membrane and tape seal to manufacturer's written instructions.

.2 Protect adjacent work from spillage and overspray. Remove overspray on adjacent surfaces immediately before dry.

.3 Apply materials where indicated and allow to cure according to manufacturer's written instructions.

.4 Do not dilute or mix materials with other products.

.5 Apply products in even coats in accordance with manufacturer’s written instructions.

.6 Do not apply to surfaces that are restricted by product manufacturer.

.7 Clean substrate and equipment with potable water.

.8 Hardener:

.1 Apply in accordance with manufacturer's recommendations and technical instructions. It is critical that the hardener be provided at the appropriate time.

.2 Apply in 2 or 3 broadcasts, float each broadcast promptly using power equipment.

.3 If a coarse non-slip finish is specified by Contract Administrator, do not proceed with further floating or troweling operations after second floating, but allow the surface to cure.

.4 Avoid excessive floating.

.5 Ensure the broadcast application is completely wetted and incorporated into the base slab.

.9 Sealer:

.1 Apply Sealer as soon as final trowelling is completed and applicator and equipment cannot damage the surface, apply as per manufacturer’s written instructions.

.2 Wait a minimum of 72 hours after concrete placement to apply sealer.

.3 Apply uniformly to form a continuous film.

.4 Protect the finished surface from damage by traffic or trades until sufficiently hardened.

3.4 SCHEDULE

.1 Supply and install hardener and sealer to concrete slab in all areas with a final floor finish of exposed concrete, unless noted otherwise on Room Finish Schedule.

.2 Refer to Room Finish Schedule

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Floor and roof planks.

.2 Connection plates, brackets, and hangers.

.3 Grouting plank joint keys.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM A 775/A 775M Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .2 ASTM C 260, Standard Specification for Air-entraining Admixtures for Concrete.
- .3 ASTM C 494/C 494M-99ae1, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM D 412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
- .5 ASTM D 2240, Standard Test Method for Rubber Property - Durometer Hardness.
- .6 ASTM A 416, Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
- .7 ASTM A 185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .8 ASTM A 82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.40, Anticorrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181, Ready Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA)
- .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A5, A8, A23.5, A362, A363, A456.1, A456.2, A456.3).
- .2 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .3 CAN3-A23.3, Design of Concrete Structures for Buildings.
- .4 CAN3-A23.4/A251, Precast Concrete - Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products.
- .5 CAN/CSA-A23.5, Supplementary Cementing Materials.
- .6 CSA-A3000, Cementitious Materials Compendium.
- .7 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
- .8 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .9 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.10 CSA-W47.1, Certification of Companies for Fusion Welding for Steel Structures.
.11 CSA-W48.01, Filler Metals and Allied Materials for Metal Arc Welding
.12 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
.13 CSA-W59, Welded Steel Construction (Metal Arc Welding).
.14 CSA-W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 American Concrete Institute (ACI)
.1 ACI 303R, Guide to Cast-in-Place Architectural Concrete Practice.

.5 Canadian Precast/Prestressed Concrete Institute (CPCI)

.1 Design Manual (4th edition) – Precast and Prestressed Concrete

.6 UL - Underwriters' Laboratories Inc., Fire Resistance Directory.

1.4 DESIGN REQUIREMENTS

.1 Size components to withstand design loads as indicated on the structural drawings.

.2 Maximum Allowable Deflection of Roof Planks: 1/360 span, cambered to achieve slope to drain.

.3 Maximum Allowable Deflection of Floor Planks: 1/360 span, cambered to achieve flat surface under dead load.

.4 Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

.5 Grouted Keys: Capable of transmitting a factored horizontal shear force of 30kN/m minimum or as required by design.

.6 Calculate structural properties of framing members in accordance with CSA A23.3.

.7 Utilize the CPCI Design Manual.

1.5 TOLERANCES

.1 Tolerance of precast elements to CAN3-A23.4, Section 10.

.2 Length of precast elements not to vary from design length by more than plus or minus 25 mm.

.3 Maximum variation from design camber shall be L/1000 but at no point greater than 20mm. Differential camber between adjacent slabs shall be a maximum of L/600 but at no point greater than 25 mm.

1.6 SUBMITTALS

.1 Shop Drawings:

.1 Indicate plank locations, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, camber, finishing schedules, methods of handling and erection, sleeves, inserts, and relationship to adjacent materials.

.2 Ensure each drawing submitted bears stamp and signature of qualified professional engineer licensed in province of Manitoba, Canada.

.3 Indicate design loads, deflections, and cambers.

.2 Mock-up: Contract Administrator to be notified when first plank is cast to review surface finish.

.3 Fabricator's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.7 QUALITY ASSURANCE

.1 Maintain plant records and quality control program during production of precast planks. Make records available upon request.

1.8 QUALIFICATIONS

.1 Precast concrete elements to be fabricated and erected by manufacturing plant certified by Canadian Standards Association in appropriate categories according to CSA-A251.

.2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting tender and to specifically verify as part of tender that plant is currently certified in appropriate categories: Structural Prestressed.

.3 Only precast elements fabricated in such certified plants to be acceptable to City of Winnipeg, and plant certification to be maintained for duration of fabrication, erection, and until warranty expires.

.4 Welding companies certified to CSA-W47.1.

.5 Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Province of Manitoba.

1.9 REGULATORY REQUIREMENTS

.1 Conform to CSA 23.3 and the National building Code of Canada 2005 amended by the Manitoba Building Code and any other applicable Codes and documents.

1.10 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, protect and handle products to site.

.2 Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

1.11 COORDINATION

.1 Coordinate the Work of framing components not post tensioned but directly associated with the Work of this section.

.2 Coordinate field cut openings with affected section.

.3 Coordinate location of hanger tabs and devices for mechanical and electrical work.

1.12 WARRANTY

.1 Contractor hereby warrants that precast element will not spall or show visible evidence of corrosion of embedded steel and cracking, except for normal hairline shrinkage cracks, in accordance with General Conditions, but for 10 years.

Part 2 Products

2.1 MATERIALS

.1 Cement, aggregates, water, admixtures, colouring admixture: to CAN/CSA- A23.1 and CAN3-A23.4.

.2 Cementitious materials: to CAN/CSA-A3000.

.3 Use same brands and source of cement and aggregate for entire project to ensure uniformity of colouration and other mix characteristics.

.4 Reinforcing steel: to CAN/CSA-G30.18, ASTM A775/A775M.

.5 Prestressing steel: ASTM A416/A416M, uncoated, seven-wire, low-relaxation, Grade 270 stranded steel cable; ultimate tensile stress of 270 ksi (1860 MPa).

.6 Welded wire fabric: to ASTM-A185.

.7 Hardware and miscellaneous materials: to CAN/CSA-A23.1.

.8 Forms: to CAN/CSA-A23.4/ A251.

.9 Anchors and supports: to CAN/CSA G40.21, Type 350 W.

.10 Welding materials: to CSA-W47.1.

.11 Welding electrodes: to CSA-W48.1 and certified by Canadian Welding Bureau.

.12 Galvanizing: hot dipped galvanizing with minimum zinc coating of 610 g/m^2 to CAN/CSA-G164.

.13 Steel primer: to CAN/CGSB-1.40.

.14 Zinc-rich primer: to CAN/CGSB-1.181.

.15 Bearing pads: smooth, ultra-high molecular weight polyethylene plastic.

.16 Air entrainment admixtures: to ASTM C260. The use of chloride containing admixtures is strictly forbidden.

.17 Chemical admixtures: to ASTM C494/C494M.

.18 Shims: smooth, ultra-high molecular weight polyethylene plastic.

.19 Weephole tubes: purpose made plastic.

2.2 MIXES

.1 Concrete.

.1 Proportion normal density concrete in accordance with CSA-A23.1-04, Alternative 1 to give properties as required by design.

.2 Grout.

.1 Cement grout: 1 parts type 10 Portland cement, 2 parts sand, sufficient water for placement and hydration.

.2 Minimum compressive strength: 25 MPa.
.3 Shrinkage compensating grout: to Section 03 30 00 - Cast-in-Place Concrete.

2.3 MANUFACTURED UNITS

.1 Manufacture units in accordance with CAN3-A23.4, and CSA-A251.

.2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit that will not be exposed.

.3 Provide hardware suitable for handling elements.

2.4 FABRICATION

.1 Embed anchors, inserts, plates, angles, and other items at locations indicated.

.2 Provide openings required by other sections, at locations indicated.

2.5 COMPONENTS

.1 Size as noted on structural drawings.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that site conditions are ready to receive work.

.2 Verify supporting structure is ready to receive work.

3.2 PREPARATION

.1 Prepare support devices for the erection procedure and temporary bracing.

3.3 ERECTION

.1 Do precast concrete work in accordance with CAN3-A23.4 AND CAN3-A23.3.

.2 Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.

.3 Align and maintain uniform horizontal and end joints, as erection progresses.

.4 Maintain temporary bracing in place until final connection is made. Protect members from staining.

.5 Install bearing pads.

.6 Adjust differential camber between precast members to tolerance before final attachment and grouting.

.7 Adjust differential elevation between precast members to tolerance before final attachment.

.8 Grout plank joints, trowel smooth.

.9 Prevent grout leakage.

.10 Secure units in place. Perform welding in accordance with CSA W59.

3.4 ERECTION TOLERANCES

.1 Erect members level and plumb within allowable tolerances.

3.5 PROTECTION OF FINISHED WORK

.1 Protect finished Work.

.2 Protect members from damage caused by field welding or erection operations.

.3 Provide non-combustible shields during welding operations.

3.6 CLEANING

.1 Clean weld marks, dirt, or blemishes from surface of exposed members.

END OF SECTION

General

1.1 RELATED REQUIREMENTS

.1 04 05 19 – Masonry Anchorage and Reinforcing

.2 04 22 20 – Concrete Unit Masonry

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.

.3 CAN/CSA A371-04, Masonry Construction for Buildings.

.4 CAN/CSA-A3000-03, Cementitious Materials Compendium; CAN/CSA-A3002, Masonry and Mortar Cement.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets.

.3 Samples: Provide duplicate samples of specified coloured grout.

.4 Informational Submittals:

.1 Submit two copies of WHMIS MSDS – Material Safety Data Sheets. Indicate VOC’s mortar, grout and admixtures.

.2 Submit manufacturer’s installation instructions.

.3 Product certificates.

.4 Test reports.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Submit laboratory test reports.

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

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handles masonry mortar and grout materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:

.1 Deliver pre-packaged, dry-blended mortar mix to project site in labelled plastic-lined bags each bearing name and address of manufacturer, production codes or batch numbers, and colour or formula numbers.

.2 Maintain mortar, grout and packaged materials clean, dry, and protected against dampness, freezing, traffic and contamination by foreign materials.

Part 2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:

.1 Portland Cement: to CAN/CSA-A3000.

.2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA A179.

.3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA A179.

.4 Packaged Dry Combined Materials for mortar: to CAN/CSA A179.

.3 Aggregate: supplied by one supplier. To CAN/CSA A179.

.4 Water: clean and potable.

.5 Lime: To CAN/CSA A179.

.6 Mortar:

.1 To CSA A179.

.2 Use aggregate passing 1.18mm sieve where 6mm thick joints are indicated.

.3 White mortar: use white Portland cement, and white masonry cement to produce mortar type specified.

.4 Colour: ground coloured natural aggregates or metallic oxide pigments, use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.

.5 Non-staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

.6 Mortar type:

.1 Exterior, parapet, and Loadbearing Walls: type S mortar having a minimum strength of 12 MPa at 28 days.

.2 Non-Loadbearing Walls: type N mortar having a compressive strength of 5 MPa at 28 days. proportion specifications.

.7 Colour mortars:

.1 Incorporate colour and admixtures into mixes in accordance with manufacturer’s instructions.

.2 Use clean mixer for coloured mortar.

.8 Pointing Mortar:

.1 Prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into a ball. Allow to stand for not less than

1 hour nor more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.7 Grout:

.1 To CSA A179.

.2 Mix grout to semi-fluid consistency.

.3 Do not use calcium chloride or chloride based admixtures.

2.2 SOURCE QUALITY CONTROL

.1 Use same brands of materials and source of aggregates for entire project.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA A179 except where specified otherwise.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 04 05 12 – Masonry Mortar and Grout

.2 04 22 20 – Concrete Unit Masonry

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA A179-[04], Mortar and Grout for Unit Masonry.

.3 CAN/CSA A370-[04], Connectors for Masonry.

.4 CAN/CSA A371-[04], Masonry Construction for Buildings.

.5 CAN/CSA G30.18-[M92(R2007)], Billet-Steel Bars for Concrete Reinforcement.

.6 CSA-S304.1-[04], Design of Masonry Structures.

.7 CSA W186-[M1990(R2007)], Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets illustrating products to be incorporated into project for specified products.

.2 Provide two copies of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS).

.3 Shop Drawings:

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

.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.2 Provide shop drawings detailing bar bending details, anchorage details, lists and placing drawings

.3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Manufacturer's Instructions:

.1 Provide manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.5 FIELD MEASUREMENTS

.1 Make field measurements necessary to ensure proper fit of members.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle masonry anchorage and reinforcing materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:

.1 Deliver reinforcement and connectors, identified in shop and placement drawings.

Part 2 Products

2.1 MATERIALS

.1 Bar reinforcement: CAN/CSA A371 and CAN/CSA G30.18, Grade 400.

.2 Connectors: to CAN/CSA A370 and CSA-S304.1.

.1 Corrosion protection:

.1 To CSA-S304.1.

.2 Single Wythe Joint Reinforcement: ladder type:

.1 Cold drawn steel wire conforming to ASTM A82.

.2 Standard Joint Reinforcement consisting of 3.66mm (9ga) longitudinal wires and 3.66mm cross or diagonal wires.

.3 Yield Strength is 480MPa.

.3 Anchors: to CAN/CSA A370.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Fabricate connectors in accordance with CAN/CSA A370.

.3 Obtain Contract Administrator 's approval for locations of reinforcement splices other than shown on placing drawings.

.4 Upon approval of Contract Administrator weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Contract Administrator with certified copy of mill test report of reinforcement steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcement work.

.2 Upon request inform Contract Administrator of proposed source of material to be supplied.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Supply and install masonry reinforcement in accordance with CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 Prior to placing concrete, obtain Contract Administrator’s approval of placement of reinforcement.

3.3 LADDER REINFORCING

.1 Install in accordance with CAN/CSA A370 and CAN/CSA A371.

.2 Install horizontal joint reinforcement every second course. Every course for stack bond.

.3 Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 400 mm each side of opening.

.4 Place joint reinforcement continuous in first joint below top of walls.

.5 Lap joint reinforcement ends minimum 150 mm.

.6 Connect stack bonded unit joint corners and intersections with strap anchors 200 mm on centre.

3.4 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA-S304.1, CAN/CSA A371, and CAN/CSA A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA A371.

3.5 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CAN/CSA A371 and CAN/CSA A179 and as indicated.

3.6 ANCHORS

.1 Supply and install metal anchors in accordance with CAN/CSA A370 and CAN/CSA A371 unless noted otherwise.

3.7 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.8 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.9 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Engineer.

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

.3 Replace bars and connectors which develop cracks or splits.

3.10 FIELD QUALITY CONTROL

.1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.

.2 Obtain Engineer's approval of placement of reinforcement and connectors, prior to placing mortar.

3.11 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.12 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 12 – Masonry Mortar and Grout

.2 Section 04 05 19 – Masonry Anchorage and Reinforcing

.3 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-A165 Series-2004, CSA Standards on Concrete Masonry Units.

.2 CAN/CSA A371-04, Masonry Construction for Buildings.

.3 CSA S304.1-04, Design of Masonry Structures.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Product Data: provide product data, including manufacturer's printed data sheets and catalogue pages illustrating products to be incorporated into project for specified products.

1.4 QUALITY ASSURANCE SUBMITTALS

.1 Test Reports

.1 Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Submit laboratory test reports certifying compliance of masonry units and mortar with specification requirements.

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

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.4 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control supplemented as follows:

.1 Construct mock-up panel of unit masonry construction 1200 x 1800 mm.

.2 Approved mock-up may remain as part of the Work

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Protection:

.1 Keep materials dry until use except where wetting of bricks is specified.

.2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

.3 Packaging Waste Management:

.1 Separate and recycle waste materials in accordance with Section 01 74 11 – Cleaning.

Part 2 Products

2.1 MATERIALS

.1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1) .

.1 Classification: Standard Block H/15/A/M. High Strength Block (where noted on structural drawings) H/30/A/M.

.2 Size: Modular –metric.

.3 Special shapes: provide square units for exposed corners. Provide purpose-made shapes for lintels, beams and bond beams. Provide additional special shapes as indicated.

2.2 AIR / VAPOUR BARRIER

.1 Self adhesive air/vapour barrier supplied by Section 07 26 00, but installed by this Section.

2.3 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA A165.1, supplemented as follows:

.1 Maximum variation between units within specific job lot not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA A165.1, supplemented as follows:

.1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

Part 3 Execution

3.1 EXAMINATION

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

.2 Verify items provided by other sections of work are properly sized and located.

.3 Verify that built-in items are in proper location, and ready for roughing into masonry work.

.4 Examine work of other Sections upon which work of this Section is dependent. Should discrepancies be found which affect the proper performance of the work of this section, do not commence work until such discrepancies have been resolved.

.5 Commencing installation means acceptance of existing substrates.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

.2 Direct and coordinate placement of metal anchors supplied to other sections.

.3 Provide temporary bracing during installation of masonry work to CSA-A371. Maintain in place until building structure provides permanent bracing.

.4 Establish lines, levels, and coursing; protect from disturbance.

.5 Verify that items built-in under other sections are properly located and sized.

3.3 INSTALLATION

.1 Concrete block units:

- .1 Bond: running unless noted otherwise.
- .2 Coursing height:
  - .1 Standard Masonry Block: 200 mm for one block and one joint.
- .3 Jointing:
  - .1 Interior Masonry Block: Concave where exposed
  - .2 Flush joints: where concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating, and to height to suit resilient base where resilient base is applied to painted walls.

.2 Special Shapes:

- .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.
- .2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
- .3 End bearing: not less than 200 mm
- .4 Install special Site cut shaped units.

3.4 REINFORCEMENT

.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.5 CONNECTORS

.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.6 MORTAR AND GROUT PLACEMENT

.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.

3.7 CONSTRUCTION

.1 Cull out masonry units, in accordance with CAN/CSA A165 and approved range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.

.2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.

.3 Construct masonry walls using running bond unless otherwise noted.

.4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.

.6 Install movement joints and keep free of mortar where indicated.

.7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.8 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.

.9 Ensure compacted head joints. Use full or face-shell joint as indicated.

.10 Tamp units firmly into place.

.11 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.

.12 Tool exposed joints concave; strike concealed joints flush.

.13 After mortar has achieved initial set up, tool joints.

.14 Do not interrupt bond below or above openings.

3.8 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.9 FIELD QUALITY CONTROL

.1 Site Tests, Inspection:

.1 Perform field inspection and testing in accordance with Section 01 45 00 - Quality Control.

.2 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

3.10 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.11 CLEANING

.1 Standard Block: Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

3.12 PROTECTION

.1 Brace and protect concrete unit masonry in accordance with Industry standards.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International Inc.

- .1 ASTM A325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .2 ASTM A325M, Specification for High-Strength Bolts for Structural Steel Joints Metric.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)

- .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.
- .2 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.4 Canadian Standards Association (CSA International)

- .1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.
- .4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
- .6 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
- .7 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

- .1 SSPC SP-2, SP-7.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.7 Shop Drawings:

- .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

.8 Erection drawings:

.1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:

.1 Description of methods.

.2 Sequence of erection.

.3 Type of equipment used in erection.

.4 Temporary bracings.

.9 Fabrication drawings:

.1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Province of Manitoba, Canada.

.10 Samples:

.1 Upon request, prepare sample of typical exposed structural connections in accordance with AISC Specifications of Architecturally exposed structural steel for approval of Contract Administrator. Samples to be judged upon alignment of surfaces, uniform contact between surfaces, smoothness and uniformity of finished welds. When approved, sample units will serve as a standard for workmanship, appearance and material acceptable for entire project.

.11 Source Quality Control Submittals:

.1 Submit 2 copies of mill test reports 4 weeks prior to fabrication of structural steel.

.2 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.

.12 Provide mill test reports certified by metallurgists qualified to practice in Province of Manitoba, Canada.

.13 Fabricator Reports:

.1 Upon request, provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.3 QUALITY ASSURANCE

.1 If requested, submit certified copies of mill reports showing chemical and physical properties of steel used in this Work.

.2 Work of this Section shall be done by a structural steel fabricator/erector who is fully accredited and a current member in good standing of Canada Institute of Steel Construction, or who has submitted a list of experience reference acceptable to the Contract Administrator at least one week prior to tender closing. Failure to meet this requirement may result in disqualification of fabricator/erector.

.3 Welding shall be done by a fabricator fully certified to the conditions of CSA Qualification Code W55.3 or W47.1 respectively. Conform to CAN/CSA-S16 where requirements are at variance.

.4 Advise The Contract Administrator of proposed fabrication schedule, at least ten working days prior to starting, to permit the Testing Agency to arrange for inspection of Work in

the shop.

1.4 DELIVERY, STORAGE AND HANDLING

.14 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:

.1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.

.2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 Upon request, submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Manitoba, Canada for non standard connections.

2.2 MATERIALS

.1 Structural steel: All rolled or steel structural sections shall be G40.21-350W. All Hollow structural sections to be G40.21-350W class C. All angles, channels and plates shall be G40.21-300W.

.2 Anchor bolts: to CSA-G40.20/G40.21, Grade 300W.

.3 Bolts, nuts and washers: to ASTM A307, ASTM A325M, and ASTM A490/A490M as required.

.4 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.5 Shop paint primer:

.1 Steel not receiving finish painting: one coat of CISC/CPMA 1-73A quick drying shop primer

.2 Steel receiving finish painting: one coat of CISC/CPMA 2-75 quick drying shop primer.

.6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m^2.

.7 Shear studs: to CSA W59, Appendix H.

2.3 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136, and in accordance with reviewed shop drawings.

.2 Install shear studs in accordance with CSA W59.

.3 Continuously seal members by continuous welds where indicated. Grind smooth.

2.4 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel as follows:

.1 Steel not receiving finish painting: One coat of CISC / CPMA 1-73a quick drying shop primer. Steel to be cleaned in conformance with SSPC-SP2.

.2 Steel receiving finish painting: One coat of CISC / CPMA 2-75 quick drying shop primer. Steel to be cleaned in conformance with SSPC-SP7.

.3 Exterior structural steel: All exterior structural steel shall be hot-dipped galvanized unless noted.

.2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter.

.3 Apply one coat of primer in shop to steel surfaces, except:

.1 Surfaces to be encased in concrete.

.2 Surfaces to receive field installed stud shear connections.

.3 Surfaces and edges to be field welded.

.4 Faying surfaces of slip-critical connections.

.5 Below grade surfaces in contact with soil.

.4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 GENERAL

.1 Erect structural steel as indicated in accordance with CAN/CSA-S16, CAN-S136, and in accordance with reviewed shop drawings.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 MARKING

.1 Mark materials in accordance with CAN/CSA G40.20/G40.21. Do not use die stamping.

If steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to The Contract Administrator.

3.4 ERECTION

.1 Erect structural steel as indicated in accordance with CAN/CSA-S16, CAN-S136, and in accordance with reviewed shop drawings.

.2 Provide necessary erection equipment, bracing, shoring and temporary flooring as required for erection and for all safety regulations. Brace and support structure during erection to ensure that it is maintained in alignment under construction and other loading and until all other construction elements contributing to stability are in place.

.3 Check anchor bolt and insert layout before erection. Arrange for correction of discrepancies.

.4 Set base plates on cleaned bearing surfaces. Solidly pack open spaces between shims with bedding mortar consisting of non-shrink grout as specified in Section 03 30 00.

.5 Obtain permission of The Contract Administrator prior to field cutting or altering of structural members not shown on Drawings.

.6 Clean field welds, bolted connections and abraded areas. Apply touch up shop primer (or zinc rich paint for galvanized steel) to bolts, welds and burned or scratched surfaces at completion of erection.

.7 Continuously seal members by continuous welds where indicated. Grind smooth.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by The Contract Administrator.

.2 The Inspection and Testing Company will carry out vertical and horizontal alignment checks, torque testing and inspection of bolted and welded connections for a minimum 10% representative sample of connections. Welding inspections to be visual, except where non-destructive testing is deemed necessary by the Testing Agency or The Contract Administrator.

.3 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by The Contract Administrator.

.4 Submit test reports to Contract Administrator within 2 weeks of completion of inspection.

.5 Contractor will pay costs of tests.

.6 Test shear studs in accordance with CSA W59.

3.6 DEFECTIVE WORK

.1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract Administrator.

.2 Contractor shall be responsible for the cost of additional testing and re-inspection made necessary by the occurrence of deficient Work.

.3 Submit in writing details of proposed method of remedial work, for approval by the Contract Administrator. Details to be signed and sealed by a licensed Professional Engineer retained by the Contractor.

.4 Correction of misaligned holes or other field modifications by flame-cutting is not permissible.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

- .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 A792/A792M-01a, Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

- .1 CSA C22.2 No.79-1978(R1999), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
- .2 CAN/CSA-S16.1-94(R2000), Limit States Design of Steel Structures.
- .3 CSA-S136-94(R2001), Cold Formed Steel Structural Members.
- .4 CSA W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Sheet Steel Building Institute (CSSBI)

- .1 CSSBI 10M-96, Standard for Steel Roof Deck.

1.2 SHOP DRAWINGS AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings erection and shoring drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit drawings stamped and signed by qualified Professional Engineer registered and licensed in the Province of Manitoba.

.3 Submit design calculations if requested by The Contract Administrator.

.4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories. Show welding and connection details for diaphragm action.

.5 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials for disposal to recycling facilities.

1.4 QUALITY ASSURANCE

.1 Steel deck manufacturers: members in good standing of the Canadian Sheet Steel Building Institute.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design steel deck using limit states design in accordance with CSA S136.

.2 Steel decking and all connectors/fasteners shall be designed to safely carry dead, live and diaphragm loads as indicated, including any variable or concentrated loads, wind uplift and construction loads.

.3 Deflection under live loads (including construction loads) shall not exceed:

.1 Roof Deck: 1/240th of span, except when plaster or gypsum board ceilings are suspended directly from deck, live load deflection not to exceed 1/360th of span.

2.2 MATERIALS

.1 Zinc-iron Alloy (ZF) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75 coating, for interior surfaces not exposed to weather, unpainted finish, thickness as indicated on structural drawings.

.2 Decks to be painted: zinc-iron alloy coated decks suitable for finish painting.

.3 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75, coating, for exterior surfaces exposed to weather, thickness as indicated on structural drawings.

.4 Acoustic insulation: fibrous glass 17.5 kg/m3 density profiled to suit deck flutes.

.5 Closures: as indicated in accordance with manufacturer's recommendations.

.6 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm. Metallic coating same as deck material.

.7 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

.8 Shear studs: to CSA W59.

2.3 TYPES OF DECKING

.1 Steel roof deck: steel thickness and deck depth as indicated on the drawings, non-cellular, interlocking side laps.

Part 3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S136.

.2 Welding: in accordance with CSA W59, except where specified otherwise.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.2 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA S136, and in accordance with reviewed erection drawings.

.2 Butt ends: to 1.5 to 3 mm gap. Install steel cover plates over gaps wider than 3 mm.

.3 Lap ends: to 50 mm minimum.

.4 Weld and test stud shear connectors through steel deck to steel joists/beams below in accordance with CSA W59.

.5 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.

.6 SPEC NOTE: Use the following paragraphs only if concrete fill is used.

.7 Temporary shoring, if required, to be designed to support construction loads and other construction equipment.

.8 Place and support reinforcing steel as indicated.

3.3 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.

.2 Frame deck openings with any one dimension between 150 to 300 mm as with minimum L64x64x6.4 each side of opening perpendicular to flutes. Angle shall be welded to at least two flutes on each side of opening.

.3 Deck supplier shall reinforce openings over 300mm to 450mm across the flutes with suitable reinforcement based on a structural analysis of the loads involved.

.4 For deck openings with any one dimension greater than 450 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.4 CONNECTIONS

.1 Provide connections in accordance with CSSBI recommendations as indicated.

3.5 DEFECTIVE WORK

.1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract.

.2 Submit in writing, details of proposed method of remedial work, for approval by the Contract Administrator. Details to be signed and sealed by a licensed Professional Engineer retained by the Contractor.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 09 21 16 – Gypsum Board Assemblies

1.2 REFERENCES

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

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

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

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM C754-11, Standard for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Canadian Standards Association (CSA).

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

.2 CSA S16-14, Design of Steel Structures.

.3 CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.

.4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.

.5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.

.6 CSA W55.3-08(2013), Resistance Welding Qualification Code for Fabricators of Structural members Used in Buildings.

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

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.4 Canadian Sheet Steel Building Institute (CSSBI).

.1 CSSBI S5-2008, Guide Specification for Wind Bearing Steel Studs.

1.3 SUBMITTALS

.1 Shop Drawings.

.1 Submit shop drawings including fabrication and erection drawings, and materials list in accordance with Section 01 33 00 – Submittal Procedures.

.2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.

.3 Indicate welds by welding symbols as defined in CSA W59.

.4 Indicate locations, dimensions, openings and requirements of related work.

.5 Ensure qualified professional Engineer licensed in jurisdiction of Place of Work signs and stamps all designed assemblies, components and connections, and drawings.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver all material to site in manufacturer's original unopened packaging with labels clearly identifying product name and manufacturer.

.2 Store materials in a dry, enclosed area protected from exposure to moisture, and in strict accordance with manufacturer's recommendations.

.3 Handle all products with appropriate precautions and care as stated manufacturer's instructions.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Products.

.1 Clark Dietrich

2.2 MATERIALS

.1 Steel: to CSA S136, fabricated from ASTM A653/A653M Grade A for 0.048" material and thinner, Grade D for 0.060" and thicker.

.2 Zinc Coated Steel Sheet: commercial quality to ASTM A653/A653M, with Z275 designated zinc coating.

.3 Welding Materials: to CSA W59 and certified by Canadian Welding Bureau.

.4 Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected to minimum requirements of CSSBI S5, length as required. For structural connections, fasteners of styles, sizes, and lengths shown on reviewed shop drawings.

.5 Anchors: concrete expansion anchors or other suitable drilled type fasteners as indicated. Fasteners into wood structure to be designed to accommodate all applicable loads.

.6 Bolts, Nuts, Washers: hot dipped galvanized to ASTM A123/A123M.

.7 Touch-up Primer: zinc rich to CAN/CGSB 1.181.

2.3 COMPONENTS

.1 Steel Studs: to CSA S136 fabricated from zinc coated steel, depth as indicated. Minimum steel thickness as required by steel stud supplier's Engineer's design. Colour code to CSSBI S5. Gauge of steel must not be less than 20ga.

.2 Slotted Top Track: to be of same material and gauge as studs and sized to suit. Leg length of top track to be 75 mm long, and slotted to suit vertical deflection of structure.

.1 Dietrich Metal Framing Canada MaxTrak® or approved alternate.

.3 Bottom Track: to be of same material and gauge as studs and sized to suit stud.

.4 Steel Stud Girts, Clip Angles for Girts and Furring Channels: Minimum steel thickness as required by steel stud supplier's Engineer's design.

.5 Bridging: fabricated from same material and finish as studs, 38 x 12 x minimum steel thickness as required by steel stud supplier's Engineer's design.

.6 Tension Straps and Accessories: as recommended by manufacturer.

.7 Bent Metal Plate: zinc coated steel sheet: 22 ga., commercial quality to ASTM A653/653M, with Z275 designation zinc coating.

.8 Sill gasket: Polyethylene foam gasket for use under exterior steel stud tracks at main floor only. Refer to Section 09 80 00 for acoustic treatment under steel stud tracks above main floor.

.1 Standard of Acceptance: ProPink ComfortSeal Sill Gasket from Owens Corning.

Part 3 Execution

3.1 INSTALLERS

.1 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding and/or CSA W55.3 for resistance welding.

3.2 INSTALLATION

.1 Do welding in accordance with CSA W59.

.2 Erect components to requirements of reviewed shop drawings and in accordance with CSSBI S5.

.3 Anchor tracks securely to structure at 800 mm o.c. maximum, or as required by steel stud supplier's Engineer's design, whichever is stricter.

.4 Erect studs plumb, aligned and securely attached as per steel stud supplier's shop drawings, or welded in accordance with manufacturer's recommendations and steel stud supplier's Engineer's design.

.5 Seat studs into bottom tracks and two piece telescoping top track.

.6 Install steel studs to accommodate vertical deflection of structure to avoid transmission of structural loads onto framing by use of slotted top tracks. Steel stud framing to allow for 50% of slot length clear to underside of roof/floor structure and free to move.

.7 Install studs at not more than 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.8 Brace steel studs with horizontal internal bridging at 1220 mm maximum. Fasten bridging to steel clips fastened to steel studs with screws or by welding.

.9 Frame openings in stud walls to adequately carry loads by use of additional full height studs and other framing members and bracing as detailed on shop drawings.

.10 Touch up welds with coat of zinc rich primer.

.11 Install bent metal plate as detailed to secure gypsum board sheathing to steel roof deck at roof/wall connection.

3.3 CONSTRUCTION

.1 Site Tolerances.

.1 Plumb: not to exceed 1/500th of member length.

.2 Camber: not to exceed 1/1000th of member length.

.3 Spacing: not more than 3 mm from design spacing.

.4 Gap between end of stud and track web: not more than 3 mm.

.2 Maximum size of cutouts for services as follows:

Member Depth Centre-to-centre	Across Member Depth	Along Member Depth	Spacing
64 mm	not allowed	not allowed	n/a
92 mm	40 mm max.	105 mm max.	600 mm min.
102 mm	40 mm max.	105 mm max.	600 mm min.
152 mm	65 mm max.	115 mm max.	600 mm min.

.3 Limit distance from centre line of last un-reinforced cutout to end of member to less than 300 mm.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

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

.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Section 04 05 00 - Common Work Results for Masonry.

.4 Section 05 12 23 - Structural Steel.

.5 Section 05 31 00 - Steel Deck.

.6 Section 09 91 13 Exterior Painting

.7 Section 09 91 23 Interior Painting

1.2 REFERENCES

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

.1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.

.4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

1.3 SUBMITTALS

.1 Shop Drawings

.1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada in accordance with Section 01 33 00 - Submittal Procedures.

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

1.4 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

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

.3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 61 00 - Common Product Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Replace defective or damaged materials with new.

.4 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.5 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaing and Waste Processing.

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

.3 Collect and separate for disposal all appropriate materials for recycling in accordance with Waste Management Plan.

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

Part 2 Products

2.1 MATERIALS

.1 Steel sections: to G40.21, Grade 350W.

.2 Angles, Channels and Plates: to G40.21, Grade 300W.

.3 Steel Tubing: to G40.21-350W CLASS C or ASTM A500, Grade C.

.4 Welding materials: to CSA W59.

.5 Bolts and anchor bolts: to ASTM A307. Galvanized to ASTM A153 for galvanized components.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

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

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

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

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

.5 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

.6 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

.1 Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

.2 Galvanizing: hot dipped galvanizing with zinc coating 600g/m^2 to CAN/CSA-G164.

.3 Shop coat primer: to CAN/CGSB-1.40.

.4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 SHOP PAINTING

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

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

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

Part 3 Execution

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

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

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

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

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

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

3.3 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal fabrications installation.

3.4 SCHEDULES

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

.2 Concrete Filled Steel Bollards:

.1 Supply concrete filled galvanized steel bollards as detailed on Drawings.

.3 Overhead Door Metal Jamb & Head Plates:

.1 Supply galvanized ptd. steel plates, anchored to concrete block walls as detailed on Drawings.

.4 Exterior Metal Fins

.1 Provide 3mm shop painted steel on three sides of steel stud frame. Refer to drawings.

.5 Bar Counter support

.1 Provide shop painted metal bar counter support in staff room at curtain wall as detailed on drawings.

.6 Washroom Vanity Support Structure

.1 Provide vanity support structure as detailed on drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 20 00 Finish Carpentry

.2 Section 06 41 11 Architectural Woodwork

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA B111-1974(R2003) , Wire Nails, Spikes and Staples.

.2 CSA O121-08 , Douglas Fir Plywood.

.3 CSA O141-05(R2009) , Softwood Lumber.

.4 CSA O151-09 , Canadian Softwood Plywood.

.5 CAN/CSA-O325.0-0 , Construction Sheathing.

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

.2 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.3 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2010 .

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate

1.5 QUALITY ASSURANCE

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

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect wood from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

.1 CAN/CSA-O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 CAN/CSA-Z809 or FSC or SFI certified.

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

.1 S2S is acceptable for

.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.

.3 Panel Materials:

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

.1 Urea-formaldehyde free.

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

.1 Urea-formaldehyde free.

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

.1 Urea-formaldehyde free.

.4 Wood Preservative:

.1 Surface-applied wood preservative: clear

.5 Coatings: in accordance with manufacturer's recommendations for surface conditions:

.1 Coating: VOC limit 350 g/L maximum.

2.2 ACCESSORIES

.1 Fasteners: to CAN/CSA-G164, for exterior work, pressure- preservative and fire-retardant or treated lumber.

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

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

.4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Contract Administrator .

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

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

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and 1 minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.3 INSTALLATION

.1 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.

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

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

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

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

.6 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.

.7 Install sleepers as indicated.

.8 Use caution when working with particle board. Use dust collectors and high quality respirator masks.

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

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

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning .

.1 Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Roof curbs.

.2 Blocking in wall and roof openings.

.3 Blocking around window and door openings

.4 Wood furring and grounds.

.5 Telephone and electrical panel back boards.

.6 Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim and all other wall mounted equipment or furnishings shown on Drawings or Schedules.

.7 Preservative treatment of wood.

1.2 RELATED SECTIONS

.1 Section 06 20 00 – Finish Carpentry.

.2 Section 06 41 11 – Architectural Woodwork.

.3 Section 08 11 00 - Metal Doors and Frames.

.4 Section 08 44 13 – Glazed Aluminum Curtain Wall.

.5 Section 09 22 16 – Non-Structural Metal Stud Framing.

.6 Section 10 28 14 – Toilet and Bath Accessories.

.7 Structural, Mechanical and Electrical Specifications.

1.3 REFERENCES

.1 CSA-O80 Series-08 - Wood Preservation.

.2 CSA-O121-08 - Douglas Fir Plywood

.3 CAN/CSA-O141-05 (R2009) - Softwood Lumber.

.4 CSA-O151-09 - Canadian Softwood Plywood.

.5 CSA-O153-M1980 (R2008) - Poplar Plywood.

.6 CSA-O437-93 (R2006) - OSB and Waferboard.

.7 NPA A208.1-2009 - Particleboard.

.8 APA (American Plywood Association) - Grades and Specifications.

.9 CANPLY (Canadian Plywood Association) - Canadian Plywood Handbook.

.10 National Lumber Grades Authority (NLGA) - Standard Grading Rules for Canadian Lumber, 2007 Edition.

1.4 QUALITY ASSURANCE

.1 Lumber Products: Graded and stamped to NLGA requirements.

.2 Plywood Products: Certified and graded to CANPLY requirements.

Part 2 Products

2.1 MATERIALS

.1 Lumber: NLGA (Standard Grading Rules for Canadian Lumber).

.1 CAN/CSA-O141, softwood, SPF species, Select grade.

.2 19% maximum moisture content, pressure preservative treat.

.2 Plywood: CSA-O121 (DFP).

.3 Particleboard: NPA A208.1; sanded.

.4 Mat-Formed Panelboards: CSA-O437, OSB.

2.2 ACCESSORIES

.1 Fasteners and Anchors:

.1 Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.

.2 Anchors: Toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete, and bolt or ballistic fastener for anchorages to steel, as required.

2.3 FACTORY WOOD TREATMENT

.1 Wood Preservative (Pressure Treatment): CSA-O80 Series using water borne preservative with 0.25% retainage.

.2 Wood Preservative (Surface Application): Clear type.

Part 3 Execution

3.1 FRAMING

.1 Set members level and plumb, in correct position.

.2 Place horizontal members, crown side up.

.3 Construct curb members of single pieces.

.4 Space framing as indicated on Drawings.

.5 Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

.6 Coordinate curb installation with installation of decking and support of deck openings and roofing vapour retardant.

3.2 SHEATHING

.1 Secure sheathing to framing members with ends over firm bearing and staggered.

.2 Install telephone and electrical panel back boards with plywood sheathing material where required. Size the back board as indicated on Electrical Drawings and specifications.

3.3 SITE APPLIED WOOD TREATMENT

.1 Apply preservative treatment in accordance with manufacturer's written instructions.

.2 Brush apply two (2) coats of preservative treatment on wood in contact with cementitious materials or roofing and related metal flashings. Treat Site-sawn cuts.

.3 Allow preservative to dry prior to erecting members.

3.4 DOOR & WINDOW FRAME INSTALLATION

.1 Install door and window frames in rough openings square and level.

.2 Install a 300mm (12") wide strip of vapour barrier to window and door frames prior to installation. Lap and seal to wall vapour barrier as detailed on Drawings.

3.5 SURFACE-APPLIED WOOD PRESERVATIVE

.1 Before installation, treat surfaces of material with wood preservative. Apply preservative after materials have been cut and fit to size.

.2 Apply preservative by dipping, brush, or spray to completely saturate and maintain a wet film on the surface for a minimum of 3 minutes.

.3 Re treat surfaces exposed by cutting, trimming, or boring with liberal brush application of preservative before installation.

.4 Touch-up all material as follows:

.1 Wood backing, curbs, nailers, sleepers on roof deck or below grade.

.2 Blocking for windows and exterior door frames.

END OF SECTION

Approved: 2017-04-25

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 06 08 99 - Rough Carpentry for Minor Works

.3 Section 06 41 11 - Architectural Woodwork.

.4 Section 07 46 23 – Wood Siding

.5 Section 09 91 13 – Exterior Painting

.6 Section 09 91 23 - Interior Painting

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)

.1 ANSI A208.1-09 , Particleboard.

.2 ANSI A208.2-09 , Medium Density Fibreboard (MDF) for Interior Applications.

.3 ANSI/HPVA HP-1-10 , American National Standard for Hardwood and Decorative Plywood.

.4 ANSI/BHMA A156.16 Auxiliary Hardware.

.5 ANSI/ASME 18.6.1 1981 (R2012) Wood Screws (Inch Series).

.2 American Wood Protection Association (AWPA):

.1 Guidance Document N – Data Requirements for Listing Thermally Modified Wood

.2 AWPA E10-14 – Soil Block Decay Test

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)

.1 Architectural Woodwork Quality Standards, 2nd edition, 2014 .

.4 ASTM International

.1 ASTM A 153/A 153M-16 , Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM E1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

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

.4 ASTM D143 – Standard Test Methods for Small Clear Specimens of Timber.

.5 ASTM D2395 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials

.5 Canadian General Standards Board (CGSB)

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

.6 CSA Group (CSA)

.1 CSA O121-08(R2013) , Douglas Fir Plywood.

.2 CSA O151-09(R2014) , Canadian Softwood Plywood.

.3 CSA O153-M13 , Poplar Plywood.

.4 CAN/CSA-Z809-08(R2013] , Sustainable Forest Management.

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

.1 Material Safety Data Sheets (MSDS).

.8 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S104-10 , Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC-S105-09 , Standard Specification for Fire Door Frames.

.9 NEMA (National Electric Manufacturers Association) LD3-2000 - High Pressure Decorative Laminates.

.10 NLGA (National Lumber Grades Authority) - Standard Grading Rules for Canadian Lumber, 2007 Edition.

.11 NHLA (National Hardwood Lumber Association).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.

.2 Submit two copies of WHMIS MSDS.

.3 Shop Drawings:

.1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.

.2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.

.3 Indicate materials, thicknesses, finishes and hardware.

.4 Include schedule or key plan.

.5 Show profiles, elevations and details at scales recommended by AWMAC AWS.

.6 Where necessary, show location and type of blocking and backing required within supporting assemblies.

.4 Samples:

.1 Submit triplicate 300 mm long representative samples of each typical item of finish carpentry.

.1 Wood Siding/Soffit: 300 mm long.

.2 Samples for site applied finish:

.1 Furnish four samples of each finish carpentry item and composite panel material to Contractor for preparation of field applied finish samples.

.3 Submit duplicate samples of each hardware item to be left exposed in final construction. Samples will be returned for incorporation into the work.

.5 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics, physical properties and requirements of referenced standards.

.6 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

1.4 QUALITY ASSURANCE

.1 Perform Work of this Section by finish carpentry contractor with minimum 5 years of current experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section.

.2 Mock-ups:

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

.1 Wood Soffit/Ceiling:

.1 Provide mock-up of wood soffit on actual substrate. Provide a large enough mock-up to illustrate edge conditions, fasteners, applied finish, condition around aluminum window frames, wall and light fixture.

.2 Wood Siding:

.1 Provide mock-up of wood siding on actual substrate. Provide a large enough mock-up to illustrate edge conditions, fasteners, applied finish, condition around aluminum window frames and powder coated metal fins.

.2 Install where directed by Contract Administrator.

.3 Allow 24 hours for inspection of mock-up by Contract Administrator before proceeding with Work.

.4 When accepted, mock-up will demonstrate minimum standard for Work.

.5 Do not proceed with work prior to receipt of written acceptance of mock-up by Contract Administrator.

.6 Accepted mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with AWS recommendations and as follows.

.2 Deliver finish carpentry materials only when area of work is enclosed, plaster and concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.

.3 Storage and Handling Requirements:

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

.2 Maintain indoor temperature and humidity within range recommended by AWS for location of the Work.

.3 Store products on site as specified for minimum 72 hours prior to installation.

.4 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.

.5 Replace defective or damaged materials with new.

Part 2 Products

2.1 QUALITY GRADE

.1 Provide all materials and perform all work of this Section in accordance with AWMAC AWS Custom Grade.

.2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.2 MANUFACTURERS

.1 Acceptable Manufacturer: Arbor Wood Co., which is located at: 1325 N 59th Ave. W., Duluth, MN 55807; Toll Free Tel: 1-877-970-7877; Email: info@arborwoodco.com; Web: arborwoodco.com

.2 Siding, Trim, and Furring shall be manufactured from Arbor Wood Co. thermally modified wood, certified conforming to AWPA Use-Class UC3B, Above Ground, Exposed (see AWPA Guidance N for required tests). Manufacturer should be able to present certification, and documentation of the quality processes used during thermal modification.

2.3 THERMALLY MODIFIED INTERIOR WOOD SIDING AND CEILING (same as exterior wood siding soffit)

.1 Siding used as exterior rainscreen system over wood furring strips and/or attached with concealed rainscreen clips.

.2 Species: White Ash

.3 Grade: FAS / Select & Better

.4 Size: 1 x 6 nominal siding, with lap.

.5 Length: 6’-0” or Longer.

.6 Exposed Texture: Smooth.

.7 Color: Medium brown/190 deg cook. Color and appearance is a natural feature of wood, and may vary slightly from one piece to another. Wood will naturally patina when left unfinished.

.8 Fasteners: nails to CSA B111, 16 gauge Stainless Steel Broad Nail, sized as required.

2.4 GENERAL FASTENINGS

.1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.

.2 Exposed fasteners to match finish of hardware.

.3 Nails and staples: to ASTM F1677, stainless steel (16 gauge broad nail) for exterior and interior work.

.4 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, galvanized to ASTM A 153/A 153M for exterior work, interior humid areas, stainless steel for other locations.

.5 Splines: wood.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with AWS tolerances and requirements of Contract Documents.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been.

3.2 PREPARATION

.1 Back prime woodwork before installation, to AWS.

3.3 INSTALLATION

.1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items.

.2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.

.3 Install items of finish carpentry at locations shown on drawings.

.1 Position accurately, level, plumb straight.

.2 Fasten and anchor securely.

.4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.5 Form joints to conceal shrinkage.

3.4 CONSTRUCTION

.1 Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

3.6 TOUCHUP AND PROTECTION

.1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to AWS standards. Replace damaged items that cannot be repaired to AWS standards.

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

.3 Repair damage to adjacent materials caused by finish carpentry installation.

.4 Leave work to be site finished ready for finishing by Section 09 91 23- Interior Painting.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00- Metal Fabrications

.2 Section 06 20 00- Finish Carpentry

.3 Section 06 47 00 - Plastic Laminate Finishing

.4 Section 06 61 16 – Solid Surfacing Fabrications

.5 Section 09 91 23- Interior Painting

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)

.1 ANSI/ASME 18.6.1 1981 (R2012) Wood Screws (Inch Series).

.2 ANSI/BHMA A156.9-2010 , Cabinet Hardware.

.3 ANSI/BHMA A156.11-2014, Cabinet Locks.

.4 ANSI/BHMA A156.16-2013, Auxiliary Hardware.

.5 ANSI/BHMA A156.18-2012, Materials and Finishes.

.6 ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.

.7 ANSI A208.1-09, Particleboard.

.8 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.

.9 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)

.1 Architectural Woodwork Standards (AWMAC AWS), 2014.

.3 ASTM International

.1 ASTM A 153/A 153M-16, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM E 1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.

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

.4 Canadian General Standards Board (CGSB)

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

.2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.3 CAN/CGSB-71.19-M88 , Adhesive, Contact, Sprayable.

.5 CSA Group (CSA)

.1 CSA O112-M Series 1977 (R2006) Standards for Wood Adhesives.

.2 CSA O121-08(R2013), Douglas Fir Plywood.

.3 CSA O141-05 (R2014), Softwood Lumber.

.4 CSA O151-14, Canadian Softwood Plywood.

.5 CSA O153-M1980 (R2014), Poplar Plywood.

.6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.

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

.1 Material Safety Data Sheets (MSDS).

.7 National Electrical Manufacturers Association (NEMA)

.1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Prepare and submit shop drawings in accordance with AWMAC AWS and as follows.

.2 Submit electronic sets of shop drawings for initial review in accordance with requirements of Division 01. Revise as directed, submit electronic copies for final acceptance and distribution.

.3 Indicate details of construction, profiles, jointing, fastening and other related details.

.1 Scales: profiles full size, details half full size.

.4 Indicate materials, thicknesses, finishes and hardware.

.5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.6 Show location on casework elevations of backing required in supporting structure for attachment of casework.

.7 Indicate AWMAC AWS quality grade where different from predominant grade specified.

.8 Include color schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.

.3 Samples:

.1 Washroom Countertops: Submit two (2) 300mm x 300mm samples of laminate showing veneer, surface finish and edge profile.

.2 Staff Room Countertops: Submit two (2) 300mm x 300mm samples of laminate showing veneer, surface finish and edge profile.

.3 Kitchen Countertops: Submit two (2) 300mm x 300mm samples of laminate showing veneer, surface finish and edge profile.

.4 Samples will be reviewed by Contract Administrator for colour, texture, and pattern only. Compliance with other specified requirements is the exclusive responsibility of the Contractor.

1.4 CLOSEOUT SUBMITTALS

.1 Section 01 78 00- Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 Perform Work of this Section by single architectural wood casework fabricator with minimum 5 years of current architectural casework production experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section.

.2 Perform work to AWMAC/AWS Custom quality.

.3 Maintain one copy of AWMAC/AWS Manual on Site.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.

.3 Protect millwork against dampness and damage during and after delivery.

.4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by AWMAC AWS for location of project.

.5 Store materials indoors in clean, dry, well-ventilated area.

.6 Protect architectural woodwork and hardware from nicks, scratches, and blemishes.

.7 Replace defective or damaged materials with new.

1.7 WARRANTY

.1 All materials and workmanship covered by this Section will carry a one (1) year warranty from date of acceptance.

Part 2 Products

2.1 QUALITY GRADE

.1 Provide all materials and perform all fabrication in accordance with AWMAC AWS Custom Grade.

.2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.2 LUMBER

.1 Lumber: To the requirements of AWMAC/AWS grades specified.

.2 Hardwood Lumber: to NHLA “FAS” Grade.

.1 Birch species, plain sawn, maximum moisture content of 7%; with vertical grain, of quality suitable for transparent finish. Finger jointing not permitted.

.3 Softwood Lumber: to CSA 0141 1970.

.1 Douglas Fir species, plain sawn, maximum moisture content of 6%; with grain, of quality suitable for transparent finish; to AWMAC premium grade.

2.3 SHEET MATERIALS

.1 Refer to drawings for locations.

.2 Sheet Materials: To the requirements of AWMAC/AWS grade specified.

.3 Hardwood Plywood: CSA O121; Veneer core; Douglas Fir Birch face species, rotary cut; of quality suitable to opaque finish.

.4 Softwood Plywood: to CSA 0151 M1978; Veneer core; Douglas Fir to CSA 0121 face species, rotary cut; of quality suitable for opaque finish.

.5 Particleboard: NPA A208. 1; medium density; of grade to suit application; sanded faces.

.6 Medium Density Fibreboard (MDF): NPA A208.2; composed of wood fibres, medium density, moisture resistant (when in plumbing cabinetry); of grade to suit application; sanded faces.

2.4 CUSTOM FABRICATED WOODWORK

.1 Shop assemble work where applicable in sizes that can be easily transportable to the Site. Custom cabinetry integrated with building walls and structure to be Site constructed.

.2 Provide cutouts for plumbing fixtures, electrical services, kitchen appliances and other equipment and fixtures built.

.3 Refer to Drawings for custom fabricated woodwork details, materials and finishes.

.4 Casework:

.1 Fabricate caseworks to AWMAC premium quality grade, flush overlay style, supplemented as follows.

.2 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.

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

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

.3 Framing softwood lumber, SPF, AWMAC custom grade or better.

.4 Case bodies (ends, backs, divisions and bottoms): plywood, ¾” (19 mm) thick. All faces to be finished with plastic laminate, 1/8” (3mm) PVC at all exposed edges..

.5 Toe kicks: particleboard, ¾” (19 mm) thick. Where finished with floor materials leave unfinished.

.6 Backs: Particleboard, ¼” (6 mm) thick. Laminated with HPDL VGS grade.

.7 Shelving: Particle board. All faces to be finished with plastic laminate. Panel thickness in accordance with AWMAC Quality Standards, except not less than 19 mm. Max shelf width not to exceed 3’ (915mm).

.5 Drawers:

.1 Sides, Backs, and Bottoms: Plywood, ½” (12 mm) thick. All faces to be finished plastic laminate.

.2 Fronts: Particle board, ¾" (19 mm) thick. All faces to be finished with plastic laminate, 1/8" (3mm) PVC on all exposed edges .

.6 Casework Doors:

.1 Particle board, ¾" (19 mm) thick. All faces to be finished with plastic laminate, 3mm PVC on all exposed edges.

2.5 COUNTERTOPS

.1 Plastic Laminate Countertops:

.1 Plastic laminate countertops as specified in Section 06 47 00 – Plastic Laminate Finishing

.2 Splashbacks: of same material and finish as tops, heights indicated, coved joint. Provide splashback returns where countertops abut sidewalls.

.3 Apply backing sheet to underside of countertops.

.4 Refer to Section 012300 - Alternatives

.2 Solid Surface Countertops:

.1 Countertop substrate to be softwood and/or poplar plywood DFP or CSP or PP grade A, square edge, 1" (25 mm) thick.

.2 Solid surfacing tops: as specified in Section 06 61 16 – Solid Surface Fabrications.

2.6 CABINET HARDWARE

.1 Hardware substitutions are acceptable on written request and approval by Contract Administrator. Confirm prior to shop drawing submission. Hardware must be institutional grade.

.2 Hinges: 110 degree semi-concealed, complete with spring closure, mounting, 3 way adjustment and lifetime warranty.

.1 Doors up to 5' high: provide three (3) hinges

.2 Doors above 5' high: provide four (4) hinges

.3 Shelf Pilaster and Shelf Clips (For Office Cabinets): 5/8" Stainless Steel Pilaster, 15/32" wide x length to suit.

.1 Standard of Acceptance: Knape & Vogt 2553084, White. Complete with 25630 White Pilaster complete with compatible clips

.4 Shelf Supports: ¼" (6mm) nickel plated shelf pin.

.5 Drawer Slides: sizes as required to suit drawer:

.1 Kitchen drawers: steel zinc finish, side mount, full extension, 100 lbs. capacity, steel ball bearings.

.2 Standard of acceptance: Accuride 3832A; Liberty D750 Series.

.6 Cabinet Pull Handles: Contemporary Right-angle pull, brushed nickel plated. 100mm (4") center to center distance.

.1 Standard of acceptance: Richelieu Contemporary Metal Pull 873

.7 Grommet: 40mm (2") diameter, Stainless Steel.

.8 Office Shelving Millwork Cam Lock, Satin Chrome, ¾" (19 mm) diameter.

.1 Standard of acceptance: Richelieu BP1401100140

.9 Countertop support brackets (for staff room desk):

.1 Standard of Acceptance: Richleleu Kolossus Concealed Bracket. Product no. 624114181890, 18" projection for 20.5" (520mm) shelf width.

.2 Finish: Black finish.

.3 Refer to drawing for location.

2.7 ACCESSORIES

.1 Adhesive Type: recommended by AWMAC/AWS to suit application.

.2 Fasteners: Size and type to suit application as recommended by AWMAC/AWS.

.3 Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; zinc finish in concealed locations and stainless steel finish in exposed locations.

.4 Concealed Joint Fasteners: Threaded Steel.

.5 Tape: Aluminum foil, insulating and heat dissipating tape.

.6 Nails and staples: to CSA B111 and ASTM F1667.

.7 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.8 FABRICATION

.1 Shop prepare and identify components for matching during Site assembly.

.2 Shop assemble for delivery to Site in units easily handled and to permit passage through building openings.

.3 When necessary to cut and fit on Site, provide materials with ample allowance for Site cutting and scribing.

.4 Inspect material for defects prior to fabrication.

.5 Obtain governing dimensions before fabricating items, which are to accommodate or abut appliances, equipment and other materials.

.6 Ensure adjacent parts of continuous work match in colour and pattern.

.7 Provide cutouts for service penetrations. Verify locations of cutouts from on-Site dimensions. Finish cut edges as indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

.2 Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

.1 Install architectural wood casework in accordance with AWMAC AWS Premium Grade for respective items.

.2 Install to manufacturer’s recommendations.

.3 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

.4 Install prefinished millwork at locations shown on drawings.

.1 Position accurately, level, plumb straight.

.5 Fasten and anchor millwork securely.

.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.6 Countersink mechanical fasteners at exposed and semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.

.7 Use draw bolts in countertop joints.

.8 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.9 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00- Joint Sealants.

.10 Apply moisture barrier between wood framing members and masonry or cementitious construction.

.11 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.12 Make cutouts for inset equipment and fixtures using templates provided.

3.3 ADJUSTING

.1 Test installed work for rigidity and ability to support loads.

.2 Adjust moving or operating parts to function smoothly and correctly.

.3 Fill and retouch nicks, chips, and scratches. Replace damaged items that cannot be repaired.

3.4 CLEANING

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

.1 Leave Work area clean at end of each day.

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

.1 Clean woodwork.

.2 Remove excess glue, pencil and ink marks from surfaces.

3.5 PROTECTION

.1 Protect woodwork from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

3.6 SCHEDULES

.1 Refer to Drawings for millwork details and locations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00 - Architectural Woodworking

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)

.1 ANSI 208.1-09, Particleboard.

.2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)

.1 Architectural Woodwork Standards (AWS), 2nd edition, 2014.

.3 ASTM International

.1 ASTM E 1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.

.2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.5 CSA Group (CSA)

.1 CSA O112-M Series 1977 (R2006) Standards for Wood Adhesives.

.2 CSA O121-08, Douglas Fir Plywood.

.3 CSA O151-09, Canadian Softwood Plywood.

.4 CSA O153-M1980(R2008), Poplar Plywood.

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

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

.1 Material Safety Data Sheets (MSDS).

.7 National Electrical Manufacturers Association (NEMA)

.1 ANSI/NEMA LD-3-05, High Pressure Decorative Laminates (HPDL).

.8 Scientific Equipment and Furniture Association (SEFA)

.1 SEFA 8-99, Laboratory Furniture.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings

.1 Prepare and submit shop drawings in accordance with AWMAC AWS and as follows.

.2 Indicate AWMAC AWS quality grade where different from predominant grade specified.

.3 Include color schedule of all plastic laminate work, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.

.4 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 MOCK-UPS

.1 Refer to Section 06 40 00 – Architectural Woodwork.

1.5 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00- Closeout Submittals.

1.6 QUALITY ASSURANCE

.1 Perform Work of this Section by plastic laminate fabricator with minimum 5 years of current experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Maintain indoor temperature and humidity within range recommended by the AWMAC Quality Standards for location of the project.

.3 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 SUSTAINABILITY CHARACTERISTICS

.1 Composite wood products: contain no added formaldehyde within the following limits when tested in accordance with ASTM E1333.

.1 Hardwood plywood with veneer core (HWPW-VC): 0.05 ppm.

.2 Hardwood plywood with composite core (HWPW-CC): 0.05 ppm.

.3 Particleboard (PB): 0.09 ppm.

.4 Medium density fibreboard (MDF): 0.11 ppm.

.5 Thin (less than 8 mm) medium density fibreboard (tMDF): 0.13 ppm.

.2 Fibreboard must contain less than 10 % roundwood by weight, using weighted average over three month period at manufacturing locations.

.3 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.2 QUALITY GRADE

.1 Provide all materials and perform all fabrication in accordance with AWMAC AWS Custom Grade except where specified otherwise.

.2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.3 MATERIALS

.1 Kitchen and Staff Room Desk Millwork (PL-1)

.1 Laminated plastic for flatwork: to NEMA LD3.

.1 Type: general purpose.

.2 Grade: HGS.

.3 Thickness: 1.2mm (3/64") thick.

.4 Colour: integral colour throughout

.5 Core: Coloured core (JJ)

.6 Pattern: Solid.

.7 Finish: Matte. (anti-fingerprint)

.8 Standard of Acceptance:

.1 Fenix Nero Ingo J0720 or approved equal.

.2 Office Shelving Millwork (Vertical Surfaces) (PL-2)

.1 Laminated plastic for flatwork: to NEMA LD3.

.1 Type: general purpose.

.2 Grade: HGS.

.3 Thickness: 1.2mm (3/64") thick.

.4 Colour: integral colour throughout

.5 Core: Coloured core

.6 Pattern: Solid.

.7 Finish: High Gloss 01

.8 Standard of Acceptance:

.1 Wilsonart Solicor High Gloss Designer White D354 or approved equal.

.3 Office Shelving Millwork (Horizontal Surfaces) (PL-3)

.1 Laminated plastic for flatwork: to NEMA LD3.

.1 Type: general purpose.
.2 Grade: HGS.
.3 Thickness: 1.2mm (3/64") thick.
.4 Colour: integral colour throughout
.5 Core: Coloured core
.6 Pattern: Solid.
.7 Finish: Textured Gloss 07
.8 Standard of Acceptance:
.1 Wilsonart Solicor Textured Gloss Designer White D354 or approved equal.

.4 Laminated plastic adhesive: water resistant type recommended by laminate manufacturer for high-pressure bonding, low VOC. Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.

.5 Sealer: water-resistant sealer or glue acceptable to laminate manufacturer, low VOC type. Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.

.6 Sealant: mildew resistant silicone as specified in Section 07 92 00 - Joint Sealants.

.7 Draw bolts and splines: as recommended by fabricator.

2.4 FABRICATION

.1 Fabricate plastic laminate finished items in accordance with NEMA LD3, Annex A and specified AWMAC AWS quality grade requirements.

.2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.3 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 8' (2400 mm). Keep joints 2' (600 mm) from sink cutouts.

.5 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.6 Edge treatment:

.1 For HPDL edge treatment use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.2 Use PVC edging to cover exposed edge of core material where indicated/

.3 Apply plastic edge mouldings in accordance with manufacturer's instructions.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Install laminated plastic work in accordance with AWMAC AWS Custom Grade.

.2 Install work plumb, true and square, neatly scribed to adjoining surfaces.

.3 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.4 Use draw bolts and splines in counter top joints. Make flush hairline joints.

.5 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.6 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00- Joint Sealants.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

.1 Clean to NEMA LD3, Annex B.

.2 Remove traces of primer, caulking, epoxy and filler materials and clean doors and frames.

3.4 PROTECTION

.1 Cover finished laminated plastic veneered surfaces with heavy kraft paper or put in cartons during shipment.

.2 Protect installed laminated surfaces in accordance with manufacturer's written recommendations.

.1 Remove protection only immediately before final inspection.

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

.4 Repair damage to adjacent materials caused by laminate, adhesive, and core materials installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00 - Architectural Woodworking

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Detailed specification of construction and fabrication.

.2 Manufacturer’s installation instructions.

.3 Manufacturer’s detailed recommendations for handling, storage, installation,

.4 protection, and maintenance.

.3 Shop Drawings:

.1 Indicate materials, colours, patterns and finishes, sizes and dimensions, profiles, edge details, installation details including location and layout of each type of fabrication and accessory.

1.3 CLOSEOUT SUBMITTALS

.1 Provide closeout submittals in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide manufacturer’s care and maintenance information for incorporation in operation and maintenance manual.

.3 Provide one maintenance kit with instructions.

1.4 QUALITY ASSURANCE

.1 Fabricator Qualifications: certified by solid surface manufacturer.

.2 Installer Qualifications: firm experienced in installation or application of systems similar in complexity to those required for project, including specific requirements indicated. Acceptable to or licensed by solid surface material manufacturer.

.3 Source Limitations: obtain materials and products from single source.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Maintain indoor temperature and humidity within range recommended by the AWMAC Quality Standards for location of the project.

.3 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 SOLID SURFACING MATERIAL

.1 Solid surfacing: homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

.1 Standard of Acceptance:

.1 Jet Black 3100 from the Classico Collection by Ceasarstone or approved equal.

.2 Nominal sheet thickness: 13 mm.

.3 Pattern: Speckled.

.4 Edge: Eased edge (3mm)

.5 Finish: Polished finish.

.6 Location: Washroom Vanity. Refer to drawings for location and details

2.2 ACCESSORIES

.1 Joint adhesive: manufacturer's standard adhesive to create inconspicuous, nonporous joints, with a chemical bond (WA8215).

.2 Sealant: mildew resistant silicone as specified in Section 07 92 00 - Joint Sealing.

.3 Sink/bowl mounting hardware: bowl clips, brass inserts and fasteners for attachment of under mount sinks/bowls, of type recommended by manufacturer.

2.3 FABRICATION

.1 Fabricate components in shop to greatest extent practical to size and shape indicated, in accordance with reviewed shop drawings and manufacturer's published requirements.

.2 Form joints between components using manufacture's standard joint adhesive. Make joints inconspicuous in appearance and without voids. Attach 100 mm wide reinforcing strip under joints.

.3 Provide holes and cutouts for plumbing, bath accessories, and other components.

.4 Rout and finish component edges to a smooth, uniform finish. Rout cutouts and sand edges smooth. Repair or reject defective or inaccurate work.

.5 Finish surfaces to uniform finish.

.6 Thermoforming:

.1 Comply with forming data from manufacturer.

.2 Construct matching molds to form components shape.

.3 Form pieces to shape prior to seaming and joining.

.4 Cut pieces larger than finished dimensions, sand edges, remove nicks and scratches.

.5 Heat entire component uniformly between 280°−325°F during forming. Prevent blistering, whitening or cracking of material during forming.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates to receive solid surfacing. Identify conditions detrimental to proper or timely installation and provide written report to Contractor. Do not commence installation until conditions have been corrected.

3.2 PREPARATION

.1 Precondition solid surfacing in accordance with manufacturer's printed installation instructions.

3.3 INSTALLATION

.1 Install components plumb and level, in accordance with reviewed shop drawings, project installation details and manufacturer's printed instructions.

.2 Form joints using approved adhesive, with joints inconspicuous in finished work.

.3 Adhere under mount sinks/bowls to countertop using manufacturer's recommended joint adhesive.

.4 Adhere top mount sinks/bowls to countertop using manufacturer's recommended adhesive/silicone sealant.

.5 Remove excessive adhesive and sealants.

.6 Coordinate plumbing installation with plumbing Subcontractor.

3.4 INSTALLATION OF VANITIES

.1 Install plumb, level, true and straight. Shim as necessary using concealed shims.

.2 Attach top securely to base unit or support brackets in accordance with manufacturer's printed instructions.

.3 Seal between wall and component with silicone sealant.

3.5 3.5 PROTECTION

.1 Protect surfaces from damage until date of Substantial Performance of the Work. Repair or replace damaged components that cannot be repaired to Contract Administrator's satisfaction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 21 13- Board Insulation

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-37.2-M88 , Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB-37.3-M89 , Application of Emulsified Asphalts for Dampproofing or Waterproofing.
- .3 CAN/CGSB-37.5-M89 , Cutback Asphalt Plastic Cement.
- .4 CGSB 37-GP-6Ma-83 , Asphalt, Cutback, Unfilled, for Dampproofing.
- .5 CGSB 37-GP-9Ma-83 , Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .6 CGSB 37-GP-11M-76(R1984) , Application of Cutback Asphalt Plastic Cement.
- .7 CGSB 37-GP-12Ma-84 , Application of Unfilled Cutback Asphalt for Dampproofing.
- .8 CGSB 37-GP-15M-76(R1984) , Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .9 CAN/CGSB-37.16-M89 , Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
- .10 CAN/CGSB-37.28-M89 , Reinforced Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and for Waterproofing.
- .11 CGSB 37-GP-36M-76 , Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
- .12 CGSB 37-GP-37M-77 , Application of Hot Asphalt for Dampproofing or Waterproofing.

.2 CSA Group (CSA)

- .1 CAN/CSA-A123.4-04(R2008) , Asphalt for Construction of Built-Up Roof Coverings and Waterproofing Systems.

.3 Health Canada

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect dampproofing materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions: temperature, relative humidity, moisture content.

.1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

.2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.

.3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.

.4 Do not apply dampproofing in wet weather.

.2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

Part 2 Products

2.1 MANUFACTURERS

.1 Bakor, Product: 710-11 Bituminous Dampproofing, or approved equal.

2.2 MATERIALS

.1 Asphalt:

.1 For application and curing at temperatures above 5 degrees C: to CAN/CSA-A123.4 ASTM 449, Type 1.

.1 Solvent-based asphalt mastics: Cold-applied, asbestos-free, non-fibered asphalt compounds for exterior concrete surfaces below grade.

.2 Sealing mastic: ASTM D4586, asbestos-free asphalt cement for trowel application.

.3 Asphalt primer: to CGSB 37-GP-9Ma, ASTM D41 Type 1, compatible with substrate.

2.3 ACCESSORIES

.1 Protection Board: Rigid insulation specified in Section 07 21 13- Board Insulation.

Part 3 Execution

3.1 EXAMINATION

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

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Before applying dampproofing:

.1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

.2 Protect adjacent surfaces not designated to receive dampproofing.

.3 Clean and prepare surfaces to receive dampproofing to manufacturer’s written instructions.

.4 Do not apply dampproofing to surfaces unacceptable to manufacturer.

3.3 APPLICATION

.1 Do sealing work in accordance with CGSB 37-GP-11M.

.2 Do priming of surface in accordance with CGSB 37-GP-15M.

.3 Apply primer to CGSB primer standard.

.4 Apply bitumen dampproofing with mop, roller, or by spray application in accordance with manufacturer’s instructions best suited for site application.

.5 Apply bitumen continuous and uniform, at a rate of 1.5 L/sq.m. (3.6 gal/100 sq ft.), to provide a minimum thickness of 3 mm (1/8”).

.6 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.7 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

.8 Seal items projecting through dampproofing with mastic. Seal watertight.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by dampproofing application.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Board insulation at roof and exterior cavity wall construction, and perimeter foundation wall.

.2 Board insulation where indicated on Drawings.

1.2 RELATED SECTIONS

.1 Section 04 22 00 – Concrete Unit Masonry.

.2 Section 05 41 00 – Structural Lightweight Framing

.3 Section 06 10 00 – Rough Carpentry

.4 Section 07 11 13 - Bituminous Damproofing

.5 Section 07 26 00 - Vapour Retarders

.6 Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.3 REFERENCES

.1 ASTM C208-08a - Cellulosic Fibre, Insulating Board.

.2 ASTM C552-07 - Cellular Glass Thermal Insulation.

.3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C591-09 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.5 ASTM C612-09 - Mineral Fibre Block and Board Thermal Insulation.

.6 ASTM C1126-04 - Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.

.7 ASTM C1289-08e1 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.8 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.

.9 ASTM E96/E96M-05 - Test Methods for Water Vapor Transmission of Materials.

.10 ASTM D 1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.

.11 CAN/ULC-S102-07 - Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.12 CAN/ULC-S701-05 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.13 CAN/ULC-S702-09 - Thermal Insulation, Mineral Fibre, for Buildings.

.14 CAN/ULC-S703-09 - Cellulose Fibre Insulation (CFI) for Buildings.

.15 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.16 CAN/ULC-S706-09 - Wood Fibre Thermal Insulation for Buildings.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with Section 04 22 00 for installation of vapour retarder.

.3 Coordinate the work with Section 07 52 00 for the installation of Modified Bitumen Membrane Roofing.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS.

.3 Samples:

.1 Submit 300 x 300 mm Sample of each material

.4 Certificates:

.1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports:

.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect materials from nicks, scratches, and blemishes .

.3 Replace defective or damaged materials with new.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Procedures.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

Part 2 Products

2.1 INSULATION MATERIALS

.1 Extruded Polystyrene Insulation (XPS) **(below grade)**: CAN/ULC-S701, Type 4; cellular type, conforming to the following:

.1 Thermal Resistance @ 24ºC: RSI-0.87 (R-5.0) per inch.

.2 Board Thickness: as indicated on Drawings.

.3 Board Edges: Butt edges.

.4 Flame/Smoke Properties: to CAN/ULC-S102.

.5 Product: Styrofoam SM, manufactured by Dow or approved equal.

.6 Insulation Protection Refer to Section 07 44 56 - Mineral Fiber Reinforced Cementitious Panels

.2 Extruded Polystyrene Insulation **(sloped metal roof)**: CAN/ULC-S701, cellular type, conforming to the following:

.1 Thermal Resistance @ 24ºC: RSI-0.87 (R-5.0) per inch.

.2 Board Thickness: as indicated on Drawings.

.3 Board Edges: Butt edges.

.4 Flame/Smoke Properties: to CAN/ULC-S102.

.5 Product: Styrofoam Deckmate, manufactured by Dow or approved equal.

.3 Semi-rigid mineral Fibre Insulation **(exterior walls and parapet walls)**: CAN/ULC-S702 Type 1 ASTM C612 Type 1VB, non-combustible, water repellent, semi-rigid board, with the following characteristics:

.1 Board Density: 64 kg/cu m (4.0 lb/cu ft).

.2 Thermal Resistance: RSI value/25.4 mm at 24 º C: 0.76 m^2K/W to ASTM C518.

.3 Thickness: As shown on Drawings.

.4 Facing: Unfaced.

.5 Board Edges: Square.

.6 Flame/Smoke Properties: In accordance with CAN/ULC-S102.

.1 Flame spread: 0.

.2 Smoke developed: 5

.7 Standard of Acceptance:

.1 Cavityrock DD; manufactured by Roxul or approved equal

.4 Acoustical Sound Insulation **(interior walls)**: Semi-rigid, non-combustible mineral fibre batt insulation, type 1 compliant.

.1 Acoustical Performance: NRC 0.7

.2 Thickness: As shown on Drawings.

.3 Standard of Acceptance:

.1 Roxul AFB or approved equal

.5 Roof Insulation **(flat roof areas)**:

.1 Refer to Section 07 52 00 - Modified Bituminous Membrane Roofing

2.2 ADHESIVE MATERIALS

.1 Adhesive Type 1: Type recommended by insulation manufacturer for application.

2.3 ACCESSORIES

.1 Sheet Vapour Retarder: Specified in Section 07 26 00.

.2 Tape: Polyethylene self-adhering type, mesh reinforced, 50 mm (2 inch) wide.

.3 Insulation Fasteners: Impaling clip of galvanized steel with washer retainer, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.

.2 Verify substrate surface is flat, free of honeycomb, fins, irregularities and materials or substances that may impede adhesive bond.

3.2 INSTALLATION – ACOUSTIC INSULATION

.1 Refer to Drawings.

3.3 INSTALLATION - FOUNDATION PERIMETER

.1 Install rigid insulation on concrete foundation walls and concrete grade beams using H40 Hilti gun X-1E 6 –50min D152 washer/ fastener spaced 600mm (24”) vertically and horizontally or with purpose made multi-clinch metal strip c/w Gripcon® nail. Set metal strip flush into cut rigid insulation at 600mm (24”) spacing.

.2 Install boards on foundation wall and grade beam perimeter, as best suited to maintain thermal continuity.

.1 Place boards in a method to maximize contact bedding.

.2 Stagger side/ end joints.

.3 Butt edges and ends tight to adjacent board and to protrusions.

.3 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

3.4 INSTALLATION - EXTERIOR WALLS

.1 Apply adhesive in three (3) continuous beads per board length.

.2 Install boards on wall surface, vertically. Place membrane surface of insulation against adhesive.

.3 Place boards in a method to maximize contact bedding. Stagger end joints. Butt edges and ends tight to adjacent board and to protrusions.

.4 Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

.5 Tape insulation board joints.

3.5 PROTECTION OF FINISHED WORK

.1 Do not permit work to be damaged prior to covering insulation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 53 - Miscellaneous Rough Carpentry

.2 Section 07 21 13- Board & Semi-Rigid Insulation

.3 Section 07 26 00 – Vapour Retarders

.4 Structural Specifications

1.2 REFERENCE STANDARDS

.1 Canadian Urethane Foam Contractors Association Inc. (CUFCA)

.2 Green Seal (GS)

.1 GS-11-2013 , Standard for Paints and Coatings.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S101-07, Standard Methods of Fire Tests of Building Construction and Materials.

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

.3 CAN/ULC-S705.1-01 , Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification. Includes Amendment 1.2.

.4 CAN/ULC-S705.2-05 , Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Test Reports:

.1 Submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Applicators to conform to CUFCA Quality Assurance Program.

.2 Qualifications:

.1 Installer: person specializing in sprayed insulation installations approved by manufacturer and with documented experience.

.2 Manufacturer: company with experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.

.3 Health and Safety Requirements: worker protection:

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:

.2 Workers must wear dust masks, gloves, eye protection, respirators, long sleeved clothing, protective clothing as per manufacturer’s instructions when applying foam insulation.

.3 Workers must not eat, drink or smoke while applying foam insulation.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect specified materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 51 00- Temporary Utilities.

.2 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

Part 2 Products

2.1 MATERIALS

.1 Insulation: spray polyurethane foam insulation/air barrier **(at locations indicated on Drawings including but not limited to roof assembly and at exterior wall crevices requiring a thermal seal and at jntions of dissimilar wall and roof materials to achieve a thermal and air seal)**: to CAN/ULC-S705.1.

.1 Type: Closed cell, Medium Density, Spray Applied

.2 Thermal Resistance: R-30 min.

.3 Product: WALLTITE ECO, manufactured by BASF or approved equal.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sprayed insulation application accordance with manufacturer's written instructions.

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions.

.2 Use primer where recommended by manufacturer.

.3 Apply sprayed foam insulation in thickness as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

.1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Sheet and sealant materials for controlling vapour diffusion.

1.2 RELATED SECTIONS

.1 Section 04 22 00 – Concrete Unit Masonry.

.2 Section 07 11 13 - Bituminous Dampproofing.

.3 Section 07 21 13 – Board & Semi-Rigid Insulation.

.4 Section 07 21 29.03 – Sprayed Insulation - Polyurethane Foam.

.5 Section 07 52 00 – Modified Bituminous Membrane Roofing

.6 Section 07 92 00 - Joint Sealants: Sealants.

.7 Section 08 11 00 - Metal Doors and Frames.

.8 Section 08 44 13 - Glazed Aluminum Curtain Walls

.9 Section 08 50 00 - Windows

1.3 REFERENCES

.1 ASTM C920-08 - Elastomeric Joint Sealants.

.2 ASTM C1311-10 - Solvent Release Sealants.

.3 ASTM E96/E96M-05 - Test Methods for Water Vapour Transmission of Materials.

.4 CGSB-19-GP-14M-1984 - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.5 CAN/CGSB-19.13-M87 - Sealing Compound, One-component, Elastomeric, Chemical Curing.

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

.7 SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 DEFINITION

.1 Vapour Retarder: A material or assembly of materials that resists water vapour diffusion through it.

1.5 SYSTEM DESCRIPTION

.1 Materials and installation methods to provide continuity of vapour retarder:

.1 In conjunction with materials described in Section 07 21 13 and 07 21 29.03.

.2 To seal gaps between enclosure components and opening frames.

1.6 PERFORMANCE REQUIREMENTS

.1 Vapour Permeability (Perm): Maximum water vapour permeance of 57.4 ng/(Pa•s•m^2) (1.0 perm) measured to CAN/CGSB-51.34, CAN/CGSB-51.33, ASTM E96/E96M.

1.7 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with other work having a direct bearing on work of this section.

.2 Sequencing:

.1 Sequence Work to permit installation of materials in conjunction with other retardant materials and seals , and air barrier assemblies.

.2 Do not install vapour retarder until items penetrating it are in place.

1.8 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

1.9 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's special installation requirements, including preparation and installation requirements, techniques.

1.10 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.11 QUALITY ASSURANCE

.1 Section 01 45 00: Quality Control.

Part 2 Products

2.1 MATERIALS

.1 Sheet Retarder (for Exterior Walls): Self-adhesive rubberized asphalt bonded to sheet polyethylene, regular temperature, nominal total thickness of 1.5 mm.

.1 Product: BAKOR, manufactured by Blue Skin SA (use appropriate grade depending on outdoor air temperatures at time of installation)

.2 Sheet Retarder (for Flat Roof Assembly): refer to Section 07 52 00.

.3 Sheet Retarder (for Sloped Metal Roof Assembly):

.1 Self-adhesive Air/Vapour Barrier: composed of bitumen modified with thermoplastic polymers and high-density polyethylene film. The self-adhesive underface is covered with a silicone release sheet. Water vapour permeability: 0.92 ng/Pa.s.m2 (0.016 Perm)

.1 Acceptable material:

.1 Sopravap'r by Soprema

.4 Foam-In-Place Seal expansion, spray-applied polyurethane foam insulation. Refer to Section – 07 21 29.03.

2.2 SEALANTS

.1 Acoustical Sealant: Single component, sound dampering, non-hardening, non-skinning; colour dark grey:

.1 Product: Acoustic Sealant, manufactured by Tremco.

.2 Cleaner: Non-corrosive type; recommended by sealant manufacturer; compatible with adjacent materials.

2.3 ADHESIVES

.1 Mastic Adhesive: asphalt type, compatible with sheet barrier and substrate, thick mastic of uniform consistency.

.2 Adhesive: Compatible with sheet barrier and substrate, permanently non-curing.

2.4 ACCESSORIES

.1 Thinner and Cleaner for Butyl Sheet: As recommended by sheet material manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verify condition of substrate and adjacent materials.

3.2 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion.

.2 Clean and prime substrate surfaces to receive adhesive/ sealants in accordance with manufacturers' written instructions.

3.3 INSTALLATION

.1 Install materials to manufacturer's written instructions.

.2 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges or where compatibility with adjacent materials may be in doubt.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 074233 – Composite Wall Panels

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13M-M87 , Sealing Compound, One Component, Elastomeric Chemical Curing.

.2 CAN/CGSB-19.24M-M90 , Multi-Component, Chemical Curing Sealing Compound.

.3 CGSB 19-GP-14M-84 , Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00- Quality Control .

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures .

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Applicator: company specializing in performing work of this section with minimum 3 years experience with installation of air/vapour barrier systems .

.1 Completed installation must be approved by the material manufacturer.

.2 Single Source Responsibility:

.1 Obtain air barrier and auxiliary materials including adhesive/primer, air barrier, flashings, and sealants from a single Air Barrier Manufacturer regularly engaged in the manufacturing and supply of the specified products.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements .

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.6 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00- Temporary Utilities .

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.7 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

Part 2 Products

2.1 SHEET MATERIALS

.1 Exterior Walls/Parapet at Aluminum Composite Wall Panels and Wood siding on Fascia

.1 Primary Sheet: Self-adhered vapor permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film; having the following typical physical properties:

.1 Color: Blue

.2 Thickness: 23 mils (0.58 mm)

.3 Water Vapor Permeance (ASTM E96): 29 perms

.4 Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass

.5 Air Permeance (ASTM E2178): Pass

.6 Nail Sealability (ASTM D1970): Pass

.7 Dry Tensile Strength (ASTM D882):

.8 41 lbf /182N MD

.9 29 lbf /129N CD

.10 Surface Burning Characteristics (ASTM E84):

.11 Flame Spread: Class A

.12 Smoke Development: Class A

.13 Low Application Temperature: 20 degrees F (-7 degrees C)

.14 Basis of design: Blueskin VP160 Self-Adhered Water Resistive Air Barrier by Henry

.2 Vapour Permeable Flashing: Self-adhered water resistive vapor permeable air barrier consisting of a reinforced modified polyolefin tri-laminate film surface and patented adhesive technology with split-back poly-release film; having the following typical physical properties:

.1 Color: Blue

.2 Thickness: 23 mils (0.58 mm)

.3 Water Vapor Permeance (ASTM E96): 29 perms

.4 Nail Sealability (ASTM D1970): Pass

.5 Low Application Temperature: 20 degrees F (-7 degrees C)

.6 Basis of design: Blueskin VP160 Self-Adhered Water Resistive Air Barrier manufactured by Henry.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 00- Joint Sealants

.2 Building Envelope Sealant:

.1 Moisture cure, medium modulus polymer modified sealing compound; having the following typical physical properties:

.2 Basis of design: Henry® 925 BES Sealant

.3 Color: Varies

.4 Elongation: 450 – 550%.

2.3 ADHESIVES

.1 Standard VOC adhesive:

.1 Synthetic rubber based quick setting adhesive; having the following typical physical properties:

.2 Basis of design: Henry® Blueskin® Adhesive

.3 Color: Blue

.4 Maximum VOC: 450 g/L

.5 Drying time (initial set): 30 minutes

.6 Low Application Temperature: 10 degrees F (-12 degrees C)

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation .

.2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation .

.3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials and installations .

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Contract Administrator.

.4 Do not start work until deficiencies have been corrected.

.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Lap sheet onto roof vapour retarder and seal with adhesive .

.1 Caulk to ensure complete air seal .

.2 Position lap seal over firm bearing .

.3 Install sheet seal frames and adjacent wall seal materials with doors and windows

.1 Caulk to ensure complete seal .

.2 Position lap seal over firm bearing.

.4 Apply sealant within recommended application temperature ranges.

.1 Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11- Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.7 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00- Common Product Requirements .

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 08 99 – Rough Carpentry for Minor Works

.2 Section 07 21 13 – Board and Semi Rigid Insulaton

.3 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 REFERENCE STANDARDS

.1 The Aluminum Association, Inc. (AA)

.1 AA DAF45-03 , Designation System for Aluminum Finishes.

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

.1 ASTM A167-99 (2004) , Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A240/A240M-05a , Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.3 ASTM A480/A480M-05 , Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

.4 ASTM D523-89(R1999) , Standard Test Method for Specular Gloss.

.5 ASTM D822-01 , Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-14M-76(R1984) , Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 Green Seal Environmental Standards

.1 Standard GC-03-93 , Anti-Corrosive Paints.

.2 Standard GS-11-97 , Architectural Paints.

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

.1 Material Safety Data Sheets (MSDS).

1.3 SYSTEM DESCRIPTION

.1 Architectural panel system comprised as follows:

.1 Aluminum-faced polyethylene corepanels with high performance fluorocarbon finish coating.

.2 Extruded aluminum panel frame and perimeter frame assembly, including back plates, top caps, inside and outside corner frames, and end frames.

.3 Extruded aluminum snap-lock top cap with high performance fluorocarbon finish for final attachment of panels to frame assembly.

1.4 DESIGN REQUIREMENTS

.1 Design metal cladding to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.2 Structural Design: Composite wall panel system capable of withstanding dead loads, wind loads, snow loads and normal thermal movement without evidence of buckling, oil canning or other permanent deformation of assemblies or components.

.3 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

.4 General Panel Properties:

.1 Thermal Expansion: ASTM D696, $2.4x10^{-5}$ per degree C

.2 Fire Propagation: CAN/ULC-S102

.1 Mineral Core Panel to ULC-S102

1. Smoke Developed = 5
2. Flame Spread = 1

.3 Wind-Pressure Resistance: ASTM E330: Tested. See Technical Data Sheet (Wind Loads).

.4 Pressure Cycling: ASTM E1288: Passed 100 cycles.

.2 Fire Resistance: CAN/ULC-S134

.1 Passed:

.1 Allowable average limit – ULC-S134: < 35 kW/m^2;

.2 Visual flame spread – ULC-S134: did not exceed 3 m.

.3 High Performance Fluorocarbon Finish Coating:

.1 Minimum Thickness - ISO 2360: 27 micrometers

.2 Gloss - ASTM D523: 20-45%

.3 Pencil Hardness - ASTM D3363: 2H

.4 Toughness - ASTM D4145: 2T no rift

.5 Adhesive Force - ASTM D3359: 4B

.6 Impact Resistance - ASTM D2794: >100 kg.cm

.7 Abrasion Resistance - ASTM D968: 64.6 L/mil

.8 Mortar Resistance - AAMA 2605.2: 24 hrs no blister

.9 Humidity Resistance - ASTM D714: 3000 hrs no blister

.10 Boiling Water Resistance - ASTM D3359: passed

.11 Salt-Spray Resistance - ASTM B117: 3000 hrs no blister

.12 Acid Resistance - ASTM D1308: No effect

.13 Alkali Resistance - ASTM D1308: Passed

.14 Solvent Resistance - ASTM D2248: Passed

.15 Colour Retention - ASTM D2244: Delta E = 0.34

.16 Chalk Resistance - ASTM D4214: No chalking

.17 Gloss Retention - ASTM D2244: >80 percent

.5

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature for cladding system materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.

.3 Colour Charts: Submit panel manufacturer’s colour charts showing full range of standard colours and finishes.

.4 Shop Drawings:

.1 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba , Canada.

.2 Indicate dimensions and thickness of panels, fastening and anchoring methods, detail and location of joints and gaskets, thermal movement provision, wall openings, head, jamb and sill details, materials and finish, compliance with design criteria and requirements of related work.

.5 Samples:

.1 Submit duplicate 100 x 100 mm samples of wall system, representative of materials, finishes and colours.

.6 Quality assurance submittals: submit following in accordance with Section 01 45 00- Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that composite wall panels comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning .

.3 Warranties: Submit manufacturer’product warranties.

1.6 QUALIFICATIONS

.1 Manufacturer: company specializing in producing composite wall panels with 5 years experience and with sufficient capacity to produce and deliver required units without causing delay in work.

.2 Installer: person specializing in composite wall panel installations approved by manufacturer with documented 5 experience.

.3 Mock-ups: construct mock-ups in accordance with Section 01 45 00- Quality Control and to requirements supplemented as follows:

.1 Provide mock-up for evaluation of surface finishes and workmanship.

.2 In mock-up, demonstrate prepared substrate, support/attachment framing, panel façade, exterior finishes and aesthetic appearance.

.3 Provide initial production units for job-site assembly with other materials for review.

.4 Co-ordinate type and location of mock-ups with project requirements.

.5 Accepted units will be used as standard for acceptance of production units.

.6 Remove and replace units which are not accepted.

.7 Do not proceed with remaining work until workmanship, colour, and finish are approved by Contract Administrator .

.8 Refinish mock-up area as required to produce acceptable work.

.9 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

.1 Approved mock-up may remain as part of finished work.

.4 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning on-site installation , with Contract Administrator in accordance with Section 01 32 16.19- Construction Progress Schedule - Bar (GANTT) Chart to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Ordering: Conform to manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

.3 Deliver, store and protect material in accordance with panel manufacturer's recommendations.

.4 Do not expose panels with strippable film to direct sunlight or extreme heat.

1.8 PROJECT/SITE CONDITIONS

.1 Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work

.2 Undertake installation work only when weather conditions meet manufacturers’ specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.

Part 2 Products

2.1 MATERIALS

.1 Aluminum-faced composite architectural panels:

.1 Panel Size: 4 feet x 8 feet (1220mm x 2440mm).

.2 Panel Thickness: 4mm (0.157 inch)

.3 Core Material: polyethylene.

.4 Panel Weight: Polyethylene core: 4mm/0.50mm (0.16 inch/0.02 inch): 5.71 kg/m^2 (1.17 lb/ft^2)

.5 Aluminum face sheets: AA A3003-H24 alloy aluminum sheet with nominal thickness of 0.5mm (0.020 inches).

.6 Finish: fluorocarbon coating per AAMA 2605.

.7 Colour: Solid colour as selected by City of Winnipeg from manufacturer's standard finish guide.

.8 Acceptable Materials:

.1 AL13 Architectural Panels ® as manufactured by Anenda Systems Inc.

.2 Attachment Framing:

.1 Girts: Fabricated from minimum 18-gauge (1.27mm) thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating. Material visible after assembly of wall panel shall be finished to match aluminum panels.

.2 Sub-girts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.

.1 Back Plates, Corner Frames and End Frames: AA 6063-T5 extruded aluminum, wall thickness generally 1.57mm (0.062 inches) thick.

.2 Panel Joint Top Caps: AA 6063-T5 extruded aluminum snap-lock top cap providing 46.5mm (1.83 inch) wide flat cap and 13mm (0.51 inches) deep reveal by 13.1mm (0.52 inches) [at bottom] to 15.1mm (0.59 inches). The reveal has drafted side walls of 5 degrees.

.3 Coating: High performance fluorocarbon finish.

.4 Colour: as selected by City of Winnipeg from manufacturer's finish guide

.5 Acceptable Materials: As recommended by manufacturer.

.3 Accessories:

.1 Fasteners:

.1 Attachment of System frame components to Wood Substrate: #12-14 x 38mm (1 ½ inch) mini drill-point fasteners with EPDM composite washers and corrosion-resistant coating. Installed every 40.64cm (16 inches) on center, unless securing a segmented (8.25cm) (3 ¼ inch) backplate (installed 40.64cm (16 inches) on center), in which case two fasteners per segmented piece are required.

.2 Acceptable Materials:

.1 #12-14 x 1 ½ inch AL13® Hex-Head Fastener, coated with mini-drill point.

.3 Fastener Corrosion Resistance:

.1 Carbon Steel: Coated to provide not less than 1,700 hours of ASTM B117 salt spray performance with no white or red rust;

18 cycles of ASTM G87 (DIN 50018) SO^2 Kesternich testing with not more than 15 percent red rust.

.2 Stainless Steel: 304, 305, or 316 Series Stainless Steel.

.2 Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.

.3 System Sealants: Sealants within the panel system, as recommended by manufacturer, colour to match adjacent surface].

.4 Gaskets: Santoprene or EPDM.

.5 Flashings: Fabricate flashing from 1.57mm (0.062 inch) minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Provide lap strip under flashing at abutted conditions; with lapped surfaces sealed with a full-bed of non-hardening sealant.

2.2 FABRICATION

.1 Aluminum wall panels and components shall comply with details as indicated on shop drawings.

.2 All components shall be factory fabricated ready for field installation. All components shall match quality and installation of accepted mock-up specified above.

.3 Tolerances:

.1 Panel bow shall not exceed 0.8 percent of panel overall dimension in width or length.

.2 Panel dimensions shall allow for field adjustment and thermal movement.

.3 Panel lines, breaks and curves shall be sharp, smooth and free of warps or buckles.

.4 Panel shall be visually flat.

.5 Panel surfaces shall be free of scratches or marks caused during fabrication or installation.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

.1 Installing Contractor shall obtain all dimensions from job site.

.2 Ensure all structural support is aligned, planar and in acceptable condition.

.3 Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Contract Administrator of conditions not acceptable for installation of system.

.4 Inspect wall system and components before installation and verify that there is no shipping damage.

.5 Do not install damaged panels; repair or replace as required for smooth and consistent finished appearance.

3.3

3.4 EXAMINATION

.1 Before installation examine alignment of substrate and notify Contract Administrator in writing if substrate does not comply with requirements of panel installer.

3.5 INSTALLATION

.1 Install panel system and components in accordance with manufacturer's published installation instructions and shop drawings.

.2 Ensure continuity of building envelope air barrier and vapor retarder systems.

.3 Erect components plumb and true.

.1 Attachment system shall allow for vertical and horizontal thermal movement due to thermal changes. The product shall not be installed where surface temperatures are anticipated to exceed 82°C (180°F). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement shall not be permitted.

.4 Drill 6.35mm (0.25 inch) drainage weep holes length of horizontally oriented bottom end frames located at base of panelized wall areas as recommended by building envelope engineer.

.5 Adjust assembly to secure panels safely to wall while allowing for expansion and contraction of components. Ensure extrusion tabs overlap panel edges by at least half of extrusion tab depth.

.6 Do not install defective component parts, including warped, bowed, dented, abraised, and broken members.

.7 Do not cut, trim, weld, or braze component parts during erection in manner which would damage finish, decrease strength, or result in visual imperfection or failure in performance. Return component parts which require alteration to shop for further fabrication, if possible, or for replacement with new parts.

.8 Site Tolerances:

.1 Variation from plane or location shown on shop drawings: 10mm over 10m (0.4 inches over 33-feet) length to maximum of 20mm over 100m (0.79 inches over 328 feet).

.2 Deviation of vertical and horizontal members: 3mm maximum over 8.5m (0.12 inches over 28-feet) run.

.3 Offset between two adjacent members abutted end-to-end, in line: maximum 0.75mm (0.03 inch) from true alignment.

.9 Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint as needed to correct minor paint flaws.

.10 Remove strippable coating from panels as they are erected.

3.6 CLEANING AND PROTECTION

.1 Proceed in accordance with Section 01 74 11- Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

.4 Remove and replace panels damaged beyond repair as direct result of panel installation.

.5 Repair panels with minor damage

.6 Provide additional protection required after installation to protect assembly and finishes during construction.

.7 Weep holes and drainage channels shall be unobstructed and free of dirt and sealants.

.8 Upon final acceptance of installation, remove surplus and protective materials, excess materials, rubbish, tools and equipment from site.

.9 Leave panels clean and free of debris and residue. Where required, clean exposed panel surfaces using non-abrasive detergent and clean water in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for foundation wall systems comprising fibre reinforced cementitious composite panel.

.1 Fiber cement panels, furring strips and accessories engineered for climate.

.2 Installation of panels to be done by Section 06 20 00.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 05 41 00 - Structural Metal Lightweight Framing

.3 Section 06 08 99 – Rough Carpentry for Minor Works

.4 Section 07 21 13 - Board, and Semi Rigid Insulation

.5 Section 07 62 00 - Sheet Metal Flashing and Trim

1.3 REFERENCES

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

.1 ASTM A653/A653M-02a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM E96-00e1, Standard Test Methods for Water Vapour Transmission of Materials.

.3 ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets

.4 ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

.5 ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

.2 Department of Justice Canada (Jus).

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

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

.1 Material Safety Data Sheets (MSDS).

.4 National Research Council (NRC).

.5 Underwriters Laboratories' of Canada (ULC).

.1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 CAN/ULC-S702-1997, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

.3 CAN/ULC-S704-2001, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.4 CAN/ULC-S706-02, Standard for Wood Fibre Thermal Insulation for Buildings.

1.4 DESIGN REQUIREMENTS

.1 Design composite building panel wall to provide for thermal movement of component materials caused by ambient temperature range of Winnipeg, MB without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

1.5 SAMPLES

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

.2 Submit duplicate 300 x 300 mm samples of fibre cement panel, representative of materials, finishes and colours.

1.6 QUALITY ASSURANCE

.1 Installer Qualifications: Minimum of 2 years experience with installation of similar products.

1.7 MOCKUPS

.1 Refer to Section 01 45 00.

.1 Provide site mock-up of Fibre Cement Cladding on exterior foundation wall of the building.

.2 Provide approximate 1200mm wide x actual height of wall, illustrating full boards, trims and fasteners and condition at corner.

.3 Include, insulation and sheet metal trims as part of mock-up.

.4 Include self adhesive air/vapour barrier.

.5 Locate where directed by Contract Administrator.

.6 Approved mock-up may remain as part of the Work if acceptable to Contract Administrator.

.7 If not accepted, make necessary changes for Contract Administrator to review.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Store products in manufacturer's unopened packaging until ready for installation.

.2 Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

.3 Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

.1 Product Warranty: Limited, Lifetime Warranty.

.2 Workmanship Warranty: Application limited warranty for 2 years.

Part 2 Products

2.1 FIBRE REINFORCED CEMENTITIOUS COMPOSITE PANEL

.1 Manufacturers approved to bid the work of this division are:

.1 Finex

.2 Other manufacturers wishing to bid the work of this division shall, if necessary, modify their products to meet this specification, and shall submit to the Contract Administrator for review.

.2 Foundation Wall Cladding:

.1 Finex Multi-purpose Fiber Cement Panels suitable for contact with the ground and complying with ULC S-102/ULC S-114 as manufactured by FINEX Inc.

.2 Type: Smooth Finish siding panel to accommodate panels sizes as per architectural drawings. Supply panels in either 1220mm x 1220mm (4’ x 4’) or 1220mm x 2440mm (4’x8’). Cut to suit installation.

.3 Thickness: 6mm (1/4) for vertical applications.

.4 Refer to Drawings for installation details.

.5 Provide Pre-finished Metal flashing at vertical joints as per manufacturers instructions

.3 Fasteners

.1 For Panels Products:

.1 Purpose made, colour matched nails fasteners, lengths and sizes to suit application, in accordance to manufacturer’s recommendations. Refer to Drawings for details. Colour matched screw fasteners permitted if allowed by panel manufacturer for installation.

Part 3 Execution

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.1 Install water-resistive barriers and claddings to dry surfaces.

.2 Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.

.3 Protect siding from other trades.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

.3 Install a water-resistive barrier is required in accordance with local building code requirements if indicated on Drawings.

.4 The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

3.3 INSTALLATION

.1 Install in strict accordance with manufacturer's installation instructions.

.2 Install panels 300mm (12”) below ground level and fasten every 600mm (24” along the width and height of the panels.

.3 Drill holes using a bit with a diameter that is 2mm (5/64”) larger than the diameter of the screws. Fasteners must penetrate at least 19mm (3/4") into the furring strips.

.4 Fasteners must be placed 25mm (1”) minimum from the edges of the panels. 38mm (1 ½”) is recommended. Do not countersink screw head in 6mm (1/4”) panel.

.5 At corners of panels, place fasteners in an asymmetric position at a minimum of 63mm (2-1/2”) from courner and 25mm (1”) from the edge.

.6 Leave a minium space of 3mm (1/8” between panels for expansion. If a flexible adhesive sealant is used, leave a miniumum space of 6mm (1/4”). A bond breaking tape is required to prevent he flexible sealant from adhering under the joint. Sealing of the joints is not required.

.7 Provide 38mm wide 26 gauge prefinished metal flashing at all exposed panel joints. Colour: Black

.8 Refer to Drawings for additional details.

3.4 PROTECTION

.1 Protect installed products until completion of project.

.2 Repair damage to adjacent materials caused by mineral fibre reinforced panel installation.

.3 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS:

.1 Section 06 10 00 – Rough Carpentry

.2 Section 06 20 00 – Finish Carpentry.

.3 Section 07 62 00 – Sheet Metal Flashing and Trim

.4 Section 09 91 13- Exterior Painting.

.5 Section 09 91 23 – Interior Painting

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM D5116-10 , Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.2 ASTM A 153/A 153M-16 , Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM E1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

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

.5 ASTM D143 – Standard Test Methods for Small Clear Specimens of Timber.

.6 ASTM D2395 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials

.2 American Wood Protection Association (AWPA):

.1 Guidance Document N – Data Requirements for Listing Thermally Modified Wood

.2 AWPA E10-14 – Soil Block Decay Test

.3 CSA Group

.1 CSA B111-1974 R2003 , Wire Nails, Spikes and Staples.

.2 CSA O121-08 R2013 , Douglas Fir Plywood.

.3 CSA O151-09 R2014 , Canadian Softwood Plywood.

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

.4 National Lumber Grading Authority (NLGA)

.1 NLGA Standard Grading Rules for Canadian Lumber 2010 .

.5 Underwriters Laboratories (UL)

.1 UL 2761 Sealants and Caulking Compounds.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: sequence with other work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Indicate dimensions, siding and soffit/ceiling profiles, attachment methods, schedule of wall elevations, trim and closure pieces, and related work.

.4 Samples:

.1 Submit duplicate cladding samples, with specified finish.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Installer Qualifications: minimum three years documented experience with products specified.

.2 Mock-Up:

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

.1 Wood Soffit/Ceiling:

.1 Provide mock-up of wood soffit on actual substrate. Provide a large enough mock-up to illustrate edge conditions, fasteners, applied finish, condition around aluminum window frames, wall and light fixture.

.2 Wood Siding:

.1 Provide mock-up of wood siding on actual substrate. Provide a large enough mock-up to illustrate edge conditions, fasteners, applied finish, condition around aluminum window frames and powder coated metal fins.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect wood siding from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.8 SITE CONDITIONS

.1 Execute work of this Section within environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturer: Arbor Wood Co., which is located at: 1325 N 59th Ave. W., Duluth, MN 55807; Toll Free Tel: 1-877-970-7877; Email: info@arborwoodco.com; Web: arborwoodco.com

.2 Siding, Trim, and Furring shall be manufactured from Arbor Wood Co. thermally modified wood, certified conforming to AWPA Use-Class UC3B, Above Ground, Exposed (see AWPA Guidance N for required tests). Manufacturer should be able to present certification, and documentation of the quality processes used during thermal modification.

2.2 THERMALLY MODIFIED INTERIOR WOOD SIDING AND CEILING (same as exterior wood siding soffit)

.1 Siding used as exterior rainscreen system over wood furring strips and/or attached with concealed rainscreen clips.

.2 Species: White Ash

.3 Grade: FAS / Select & Better

.4 Size: 1 x 6 nominal siding, with tongue and groove.

.5 Length: 8’-0” or Longer.

.6 Exposed Texture: Smooth.

.7 Color: Medium brown/190 deg. cook. Color and appearance is a natural feature of wood, and may vary slightly from one piece to another. Wood will naturally patina when left unfinished.

.8 Fasteners: nails to CSA B111, 16 gauge Stainless Steel Broad Nail, sized as required.

Part 3 Execution

3.1 EXAMINATION

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

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions remedied.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Repair substrate flaws or defects before applying siding or soffits.

.3 Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions.

3.3 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 INSTALLATION

.1 Install one layer sheathing paper horizontally by stapling or nailing, lapping edges 4”.

.2 Install sill flashings, wood starter strips, inside corner flashings, edgings and flashings over openings.

.3 Fasten wood siding in straight, aligned lengths to strapping with two nails at each fixing location.

.4 Vertical alignments as indicated on Elevations.

.1 Seal cut surfaces.

.2 Use full board lengths.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by wood siding installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Insulation.

.2 Modified bituminous membrane roofing, and flashings.

1.2 RELATED SECTIONS

.1 Section 06 10 13 - Wood Blocking and Curbing

.2 Section 07 21 13 – Board & Semi-Rigid Insulation.

.3 Section 07 26 00 – Vapour Retarders

.4 Section 07 62 00 - Sheet Metal Flashing and Trim.

.5 Mechanical Specification.

.6 Electrical Specifications.

1.3 REFERENCES

.1 ASTM C208-08a - Cellulosic Fibre, Insulating Board.

.2 ASTM C552-07 - Cellular Glass Thermal Insulation.

.3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C612-09 - Mineral Fiber Block and Board Thermal Insulation.

.5 ASTM C726-05e1 - Mineral Fiber Roof Insulation Board.

.6 ASTM C728-05(2010) - Perlite Thermal Insulation Board.

.7 ASTM C1002-07 - Steel Self-Piercing, Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.8 ASTM C1177/C1177M-06 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.9 ASTM C1289-07 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

.10 ASTM D41-05 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

.11 ASTM D312-00(2006) - Asphalt Used in Roofing.

.12 ASTM D2178-04 - Asphalt Glass Felt Used in Roofing and Waterproofing.

.13 ASTM D2822-05 - Asphalt Roof Cement.

.14 ASTM D6162-00a(2008) - Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

.15 ASTM D6163-00(2008) - Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements

.16 ASTM D6164-05e1 - Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements

.17 ASTM D6222-08 - Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements

.18 ASTM D6223/D6223M-02(2009)e1 - Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

.19 ASTM D6298-05e1 - Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Bituminous Sheet with a Factory Applied Metal Surface.

.20 CAN/CSA-A123.4-04 (R2008) - Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.21 CSA-O121-08 - Douglas Fir Plywood.

.22 CSA-O151-09 - Canadian Softwood Plywood.

.23 CGSB-37-GP-9Ma-83 - Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.24 CAN/CGSB-37-GP-56M-1985- Membrane Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.25 CAN/ULC-S107-03 - Methods of Fire Tests of Roof Coverings.

.26 CAN/ULC-S701-05 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.27 CAN/ULC-S702-09 - Thermal Insulation, Mineral Fibre, Boards for Buildings.

.28 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Fixed.

.29 CAN/ULC-S706-09 - Wood Fibre Thermal Insulation for Buildings.

.30 FM (Factory Mutual) - Roof Assembly Classifications.

.31 Province of Manitoba Roofing Contractors Association – Roofing Specifications Manual.

.32 CRCA (Canadian Roofing Contractors' Association) – CRCA Roofing Specifications Manual.

.33 ULC (Underwriters Laboratories of Canada) - List of Equipment and Materials for:

.1 Building Materials.

.2 Fire Resistance.

1.4 SYSTEM DESCRIPTION

.1 Assembly of components include two (2) ply membrane system, heat-welded, with granulated surface, and insulation.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with the installation of associated metal flashings, as the work of this section proceeds.

.2 Pre-installation Meetings:

.1 Review preparation and installation procedures and coordinating and scheduling required with related work.

.2 The roofing material manufacturer to delegate a representative to visit the work Site at commencement of work.

.3 The Contractor shall permit and facilitate access to the work Site and roofs to said manufacturer's representative at all times.

1.6 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Indicate setting plan for tapered insulation, layout of seams, direction of laps, base flashing details.

.3 Product Data: Provide product data for membrane, flashing materials, and insulation.

1.7 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's special installation requirements, including special precautions required for seaming the membrane.

.3 Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

.4 Field Reports: Indicate procedures followed, ambient temperatures and wind velocity during application.

1.8 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.9 QUALITY ASSURANCE

.1 Perform Work to CRCA Roofing Specifications Manual and manufacturer's written instructions. Maintain one (1) copy of each document on Site.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience and approved by the manufacturer.

1.10 REGULATORY REQUIREMENTS

.1 Conform to applicable code for roof assembly fire hazard requirements.

.2 CAN/ULC-S107: Class A Fire Hazard Classification.

1.11 DELIVERY, STORAGE, AND HANDLING

.1 Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

.2 Store products in weather protected environment, clear of ground and moisture.

.3 Stand roll materials on end.

1.12 ENVIRONMENTAL REQUIREMENTS

.1 Do not apply roofing membrane during inclement weather. Consult manufacture for temperatures requirements prior to membrane application.

.2 Do not apply roofing membrane to damp or frozen deck surface.

.3 Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.13 WARRANTY

.1 Contractor's Warranty: Provide Roofing Contractor Association of Manitoba (RCAM) five (5) year warranty on roofing, dated from time of Substantial Performance.

.2 Manufacturer's Warranty: Provide a ten (10) year manufacturer's warranty to include coverage for failure to meet specified requirements, including damage to building resulting from failure to prevent penetration of water.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Contract Administrator stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

2.2 VAPOR BARRIER

.1 Self-adhesive Air/Vapour Barrier: composed of bitumen modified with thermoplastic polymers and high-density polyethylene film. The self-adhesive underface is covered with a silicone release sheet. Water vapour permeability: 0.92 ng/Pa.s.m2 (0.016 Perm)

.1 Acceptable material:

.1 Sopravap'r by Soprema

2.3 POLYISOCYANURATE INSULATION

.1 Non-Sloped Insulation (top layer): To CAN/ULC-S704, closed-cell polyisocyanurate foam core integrally laminated between two heavy coated-glass facers, 100mm (4") thickness, RSI as indicated.

.1 Acceptable material:

.1 Sopra-Iso Plus by Soprema.

2.4 RIGID INSULATION (slope if required)

.1 Sloped Insulation (bottom layer): Expanded polystyrene (EPS): to CAN/ULC-S701.

.1 Type: 2.

.2 Refer to drawings for location and required slope.

2.5 ROOF MEMBRANES

.1 Base Sheet Membrane: SBS modified bitumen and glass mat reinforcement, nominal thickness 2.5 mm (98.4 mils).

.1 Application: fully adhered.

.2 Top surface: thermofusible plastic film.

.3 Underside: discontinuous self adhesive strips, covered with a release protection film.

.4 Acceptable material:

.1 Colvent 810 Base by Soprema

.2 Base Sheet Flashing: SBS modified bitumen and composite reinforcement, nominal thickness 3mm, (118 mils). Suitable grade dependent on outdoor temperature.

.1 Application: fully adhered

.2 Top surface: thermofusible plastic film

.3 Underside: self-adhesive

.4 Acceptable material:

.1 Sopralene Flam Stick by Soprema

.3 Cap Sheet Membrane: SBS modified bitumen and composite reinforcement, nominal thickness 4.0 mm (157.5 mils).

.1 Application: heat welded with propane torch

.2 Top surface: coloured granulars.

.3 Top surface Colour: Black (Contract Administrator reserves the right to select from Manufacturers full range of colours).

.4 Underside: thermofusible plastic film.

.5 Acceptable material:

.1 Colvent 860 Traffic Cap by Soprema

2.6 MEMBRANE ADHESIVE

.1 Low rise, two component polyurethane adhesive.

.1 Acceptable material:

.1 Duotack by Soprema.

2.7 MEMBRANE PRIMER

.1 This is to be the primer recommended by the membrane manufacturer being used (for self adhering stripping)

2.8 PITCH BOX FILLER

.1 Firestone FillGard Pourable Sealer, or approved equal in accordance with B7.

2.9 PLUMBING VENT FLASHING

.1 These shall be Insulated Stack Jack Flashings (with metal cap not neoprene seal) SJ-20 as manufactured by Thaler.

2.10 METAL FLASHING

.1 Flashing shall be a minimum of 22 gauge in thickness, unless shown otherwise on Drawings. Metal is to be prefinished and is to be chosen from the standard in stock range of Stelco 8,000 series of colors or approved equal in accordance with B7.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and Site conditions are ready to receive work.

.2 Verify deck is supported and secured.

.3 Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.

.4 Verify deck surfaces are dry and free of snow or ice. Verify flutes of metal deck are clean and dry.

.5 Verify roof openings, curbs, pipes, conduit, sleeves, ducts, and vents through roof are solidly set, and wood nailing strips are in place.

3.2 INSULATION APPLICATION

.1 Install insulation to manufacturer's written instructions.

.2 Place tapered thickness insulation to required slope pattern, to manufacturer's written instructions.

.3 Fully adhere rigid insulation to roof deck, and to hold each layer of insulation together. Apply adhesive to manufacturer's specifications. Fasteners not allow without the consent of the Contract Administrator.

.4 Lay boards with edges in moderate contact without forcing.

.5 Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

.6 Apply no more insulation than can be covered with membrane in same day.

3.3 MEMBRANE APPLICATION

.1 Apply membrane and primer to manufacturer's written instructions.

.2 Apply membrane; lap and seal edges and ends permanently waterproof.

.3 Apply membrane smooth, free from air pockets, wrinkles, or tears. Ensure full bond of membrane to substrate.

.4 Extend membrane up parapets and onto vertical surfaces as shown on Drawings.

.5 Seal membrane around roof protrusions and penetrations.

.6 Provide waterproof cut-off to membrane at end of day's operation. Remove cut-off before resuming roofing.

3.4 FLASHINGS AND ACCESSORIES

.1 Apply flexible sheet base flashings to seal membrane to vertical elements.

.2 Secure to nailing strips at 100 mm (4 inches) on centre.

.3 Coordinate installation of roof drains, curbs and related flashings.

.4 Seal flashings and flanges of items penetrating or protruding through the membrane.

3.5 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection testing.

.2 Require Site attendance of roofing and insulation material manufacturers during installation of the Work.

.3 Monitor and report installation procedures, unacceptable conditions to Contract Administrator.

.4 Correct identified defects or irregularities.

3.6 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

3.7 PROTECTION OF FINISHED WORK

.1 Section 01 78 40: Protecting installed work.

.2 Protect building surfaces against damage from roofing work.

.3 Where traffic must continue over finished roof membrane, protect surfaces.

.4 During roofing work, exposed surfaces of finished walls shall be protected with tarps in order to prevent damage. Contractor shall assume full responsibility for any damage.

END OF SECTION

Part 1 SECTION INCLUDES

.1 Materials and installation for standing seam metal roofing, including on exterior walls.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 45 00 - Quality Control

.3 Section 05 41 00 – Structural Metal Lightweight Framing

.4 Section 07 21 13 – Board and Semi-Rigid Insulation

.5 Section 07 62 00 – Sheet Metal Flashing and Trim

.6 Section 07 92 00 - Joint Sealing

1.3 SCOPE OF WORK

.1 Supply and install standing seam metal roofing and snow guards as specified herein.

.2 Supply and install rigid insulation and Z supports to sloped roof and exterior walls.

.3 Supply and install rainware including gutters and downspouts for metal roof.

.4 Supply and install standing seam metal panels on vertical walls as indicated on the drawings.

.5 Fabricate metal closures and membrane waterproofing to all roof mounted mechanical equipment and roof vents to make watertight.

.6 Refer to Section 05 41 00 for requirements of both metal roof panel and exterior wall metal panel support systems to be designed by a registered professional engineer, licensed to practice in Manitoba.

1.4 REFERENCES

.1 Aluminum Association (AA).

.1 AA DAF-45-R03, Designation System for Aluminum Finishes - 9th Edition.

.2 AA ASM-35-October 2000, Specifications for Aluminum Sheet Metal Work in Building Construction, Section 5.

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

.1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A240/A240M-[02a], Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.3 ASTM A653/A653M-02a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A792/A792M-02, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.

.5 ASTM B32-00e1, Standard Specification for Solder Metal.

.6 ASTM B370-98, Standard Specification for Copper Sheet and Strip for Building Construction.

.7 ASTM D523-89(1999), Standard Test Method for Specular Gloss.

.8 ASTM D822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.

.2 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound.

.3 CAN/CGSB-51.32- M77, Sheathing, Membrane, Breather Type.

.4 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.4 Canadian Standards Association (CSA International).

.1 CAN/CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.

.5 Department of Justice Canada (Jus).

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

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

.1 Material Safety Data Sheets (MSDS).

.7 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC).

.1 CCMC-2002, Registry of Product Evaluations.

.8 Transport Canada (TC).

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

1.5 SUBMITTALS

.1 Submit proof of manufacturer's CCMC Listing and listing number to Contract Administrator.

.2 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures, etc.

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

.4 Submit product data sheets for insulation. Include:

.1 Product characteristics.

.2 Performance criteria.

.3 Limitations.

.5 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.6 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.

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

.8 Submit 300 x 300mm (min.) samples of each sheet metal material.

1.6 QUALITY ASSURANCE

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

.2 Fabricate 300 x 300 mm sample roofing panel using identical project materials and methods to include typical seam and submit to Contract Administrator for approval prior to proceeding with the work.

1.7 MOCK-UP

.1 Provide a 1200mm wide, full height section of exterior metal wall panel, including mitre joint at roof eave. Locate at outside corner of building and include all trims, flashings and closures.

.2 Mock-up will be used:

.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.3 Locate where directed by Contract Administrator.

.4 Allow 24 hours for inspection of mock-up by Contract Administrator before proceeding with sheet metal flashing work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.8 DESIGN REQUIREMENTS

.1 Design roof system to resist:

.1 Snow loads and snow build-up and rain load, expected in this geographical region NBCC climatic data, 50 year probability.
.2 Wind loads, positive and negative, expected in this geographical region NBCC climatic data, 50 year probability.
.3 Dead load of roof system.
.4 If the roof system is to be designed as a shear diaphragm, then the factored shear design loads “Q” and the flexibility factors “F” must be shown on the structural drawings.

.2 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

Part 2 Products

2.1 PREFINISHED STEEL SHEET

.1 Prefinished galvanized steel sheet with factory applied polyvinylidene fluoride based on Kynar 500® resin, (PVF2), formulated by a Pennwalt licensed manufacturer's approved applicator.

- .1 **Steel sheet**: to be 22ga. 0.76mm rhickness, grade C, G-90, hot dipped galvanized, as per ASTM A446.
- .2 **Colour**: QC 18262 – Black from Agway Metals. Provide a 20 year exposure warranty.
- .3 **Coating**: coating system shall provide minimum 1.1 mil dry film thickness, consisting of primer and minimum 0.75 mil dry film colour coat.
- .4 **Seaming Style**: 180 degree "I" Style.
- .5 Use for roof & wall panels, and all related flashing, and caps and rainware.
  - .1 Standard of Acceptance:
    - .1 AR Standing Seam Roof, Type AR-38 by Agway Metals

.2 Insulation: as specified in Section 07 21 13.

.3 Concealed Clips & Fasteners:

- .1 Thermally responsive clips to be fabricated from a minimum of 0.61 mm (0.018") steel, with minimum Z275 galvanized coating designed to accommodate expansion and contraction of the roof sheet. Design of clips to be by Manufacturer.
- .2 Roof Fasteners: As specified by Manufacturer, to resist wind uplift and sliding snow forces.

.4 Weather Resistant Barrier:

- .1 To be applied over tongue and groove exterior plywood and roof z-bars in accordance with manufacturer's recommendations. Refer to Drawings.
  - .1 Standard of Acceptance:
    - .1 Titanium UDL 30 synthetic roofing underlayment

.5 Snow Guard:

- .1 Supply and install purpose made, pre-finished metal snow guard, engineered to support sliding snow loads. Colour of metal to match roof panels.

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Flashings: In accordance to Section 07 62 00. Formed from same materials as the roof / wall panel sheet. Custom fabricated to suit architectural details as required.

.3 Plastic cement: to CAN/CGSB-37.5.

.4 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer. Refer to Section 07 92 00 - Joint Sealing.

.5 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.

.6 Cleats: of same material, and temper as sheet metal, minimum 50mm wide. Thickness same as sheet metal being secured.

.7 Fasteners: concealed.

.8 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.9 Solder: to ASTM B32.

.10 Flux: rosin, cut muriatic acid, or commercial preparation suitable for materials to be soldered.

.11 Touch-up paint: as recommended by sheet metal roofing manufacturer.

2.3 FABRICATION

.1 Fabricate aluminum sheet metal in accordance with AA ASM-35.

.2 Form individual pieces in maximum lengths possible. Make allowances for expansion at joints.

.3 Hem exposed edges on underside 12 mm, mitre and seal.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.

.6 Protect metals against oxidization by back-painting with isolation coating where indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Architectural Sheet Metal Manual specification shall govern for material and workmanship not otherwise specified herein. The work shall be done by qualified journeymen having a record of experience with similar applications. The quality of the work shall meet or exceed the industry standards for this type of construction. Manufacturer shall provide trained metal craftsmen to supervise performance of installation activities.

.2 Install exterior prefinished roof panels on panel support clips, using manufacturer's proper construction procedure. Ensure metal roofing sheet side-lap is positively retained by clips, and proper sheet coverage is maintained.

.3 Install the seam-cap at all side laps as shown on the approved shop drawings. Add sealant as required.

.4 Where indicated on approved shop drawings, secure the end-lap of metal roofing sheets in accordance with the manufacturers specifications and details to provide a weather-tight seal. Exposed fasteners to match colour of the roof sheet.

.5 Provide notched and formed closures, sealed against weather penetration, at changes in pitch, and at ridges and eaves, where required.

.6 Install all companion flashing and gutters as shown on the shop drawings. Use concealed fasteners when possible. Exposed fasteners to match colour of roof sheet.

.7 Flash roof penetrations with material matching roof panels and make watertight.

.8 Install rigid insulation in two (2) layers as indicated on Drawings. Tightly butt against support z-bars and ensure no gaps between successive boards. Stagger joints between layers.

3.2 WALL PANELS

.1 Install wall panels in same method as sloped roof.

.2 Support clips to be placed at manufacturer's recommended spacing to secure panels for wind design loads and to avoid dimpling.

.3 Install drip flashings and closures laminated such that all exposed faces are prefinished in colour to match wall panels.

3.3 CLEAN UP

.1 Clean exposed panel surfaces in accordance with manufacturer’s instructions.

.2 Repair and touch up with colour matching high grade enamel minor surface damage, only where permitted by the Contract Administrator and only where appearance after touch-up is acceptable to Contract Administrator.

.3 Replace damaged panels and components that, in opinion of the Contract Administrator, cannot be satisfactorily repaired.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Metal parapet, sill, lintel flashings, metal scuppers, rainware, and metal fascia panels.

1.2 RELATED SECTIONS

.1 Section 07 11 13 - Bituminous Dampproofing.

.2 Seciton 07 42 43 – Composite Wall Panels

.3 Section 07 42 46 –Fibre Reinforced Cementitious Panels

.4 Section 07 52 00 - Modified Bituminous Membrane Roofing

.5 Section 07 92 00 - Joint Sealants.

.6 Mechanical Specifications – Heating, Ventilating, and Air-Conditioning (HVAC).

.7 Electrical Specifications: Flashing sleeves and collars for electrical items protruding through roofing membrane.

1.3 REFERENCES

.1 ASTM A167-99(2009) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM B32-08 - Solder Metal.

.4 ASTM B101- 07 - Lead-Coated Copper Sheet and Strip for Building Construction.

.5 ASTM B209M-07 - Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM D2178-04 - Asphalt Glass Felt Used in Roofing and Waterproofing.

.7 ASTM D4586-07 - Asphalt Roof Cement, Asbestos-Free.

.8 ASTM D226-06 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

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

.10 CCBDA (Canadian Copper & Brass Development Association) - Copper in Architecture Handbook.

.11 Province of Manitoba Roofing Contractors Association – Roofing Specifications Manual.

.12 NRCA (National Roofing Contractors Association - USA) - Roofing and Waterproofing Manual.

.13 SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) - Architectural Sheet Metal Manual.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal Procedures.

.2 Installation Data: Manufacturer's special installation requirements.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.8 QUALITY ASSURANCE

.1 Perform Work to NRCA standard details and requirements. Maintain one (1) copy of each document on site.

.2 Fabricator Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Common Product Requirements.

.2 Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

.3 Prevent contact with materials which may cause discolouration or staining.

Part 2 Products

2.1 SHEET MATERIALS

.1 Pre-Coated Galvanized Steel: ASTM A653/A653M, Z275 (275 g/m^2), (G90 (0.90 oz/ft^2) zinc coating designation; 22 gauge unless indicated otherwise on Drawings.

.2 Galvanized Steel: ASTM A653/A653M, Z275 (G90) zinc coating designation; 0.6 mm (24 gauge) unless otherwise indicated on Drawings.

2.2 ACCESSORIES

.1 Fasteners: Same material and finish as flashing metal.

.2 Primer: Zinc chromate type.

.3 Protective Backing Paint: Bituminous.

.4 Sealant: Type specified in Section 07 92 00.

.5 Bedding Compound: Rubber-asphalt type.

2.3 FABRICATION

.1 Form sections true to shape, accurate in size, square, and free from distortion or defects.

.2 Fabricate cleats of same material as sheet, minimum 100 mm (4 inches) wide, interlockable with sheet.

.1 Shop fabricate metal flashing and trim components to the maximum length possible, forming metal work with clear, sharp, straight and uniform bends and rises. Hem exposed edges of flashings 12mm (1/2") to the underside.

.2 Form flashing components from single full width sheet. Provide shop fabricated mitred corners, joined using closed end pop rivets and joint sealant.

.3 Fabricate related sheet metal work in accordance with approved shop drawings and applicable standards.

.4 Provide linear sheet metal items in minimum 3000mm (10') sections except as otherwise noted on Drawings. Form flashing using single pieces for the full width. Provide shop fabricated, mitred and joined corners.

2.4 RAINWARE

.1 Downspout: Fabricate 100 x 100mm (4" x 4") open face downspout conductor with 300mm (12") long angled discharge at splash pad. Close face of conductor for top 1200mm (4'-0") and base 1200mm (4'-0"). Fasten through back of open face to substrate. Strap anchors not allowed. Fastener to be 6mm (1/4") diameter by 65mm (2 1/2") long expansion type ZAMAC rivet spaced 1200mm (4'-0")(maximum). Inside exposed faces

to be finished with prefinished material with same colour as outside exposed faces. Fabricate with two-ply metal to achieve prefinished inside faces.

2. Eaves Troughs: Custom fabricated 22 gauge, 6" x 6" (152 x 152 mm) prefinished metal. Provide drop outlets, connectors hangers and brackets as required to suit installation

2.5 SOFFIT VENTS

.1 Provide soffit vent strips prefinished, aluminum c/w bent louvre venting pattern.

.2 Standard of Acceptance:

.1 Air Vent Inc. SV 202 MF, Custom painted black

.3 Coordinate with work of other sections.

.4 Fasteners: Secure to solid soffit framing with self-tapping screws, size to suit.

.5 Refer to drawings for details and locations.

Part 3 Execution

3.1 EXAMINATION

.1 Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.

.2 Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

.1 Install starter and edge strips, and cleats before starting installation.

.2 Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.3 INSTALLATION

.1 Install all prefinished metal flashing and trim such that liner face is not exposed to view. Where liner face is exposed, prepaint to match prefinished exposed face, or fabricate 2-ply installation.

.2 Oil-canning or crimping at fasteners securing metal flashing or trim, will not be acceptable. Contract Administrator to review upon completion.

.3 Install butt joints and lapped joints at locations acceptable to the Contract Administrator.

.4 Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

.5 Install plumb, straight, and true to adjacent work in continuous lengths without flashings, closures or horizontal laps.

.6 Install parapet flashing, miscellaneous flashing, and closure caps as per drawings to provide a watertight roof system.

.7 Seal all metal joints weathertight.

3.4 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection.

.2 Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.5 SCHEDULES

.1 Refer to drawings.

.2 Colour of all pre-finished metal (interior and exterior) to be selected by Contract Administrator from Standard Architectural Stock Colours.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.2 DEFINITIONS

.1 Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between fire rated wall and floor assemblies.

1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

2. Safing slot gaps between edge of floor slabs and curtain walls.

3. Openings between structurally separate sections of wall or floors.

4. Gaps between the top of walls and ceilings or roof assemblies.

5. Expansion joints in walls and floors.

6. Openings and penetrations in fire-rated partitions or walls containing fire doors.

7. Openings around structural members which penetrate floors or walls.

1.4 RELATED WORK OF OTHER SECTIONS

1. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including Mechanical and Electrical specification divisions.

1.5 REFERENCES

.1 Test Requirements: CAN/ULC-S115-11, "Standard Method of Fire Tests of Through Penetration Fire Stops".

.2 Underwriters Laboratories of Canada (ULC) of Scarborough runs CAN/ULC-S115-11 under their designation of ULC-S115-11 and publishes the results in their "FIRE RESISTANCE RATINGS DIRECTORY" that is updated annually.

Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their “Products Certified for Canada (cUL) Directory.

Omega Point Laboratories runs ASTM E-814 and publishes the results annually in their “Omega Point Laboratories Directory”

.3 Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems”. These test requirements provide more guidelines for testing moving joints than that given in CAN4-S115-M. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their “Products Certified for Canada (cUL) Directory

.4 Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops.”

.5 Test Requirements: ASTM E 2307, “Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus”

.6 International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

.7 CAN/ULC-S102-M, Standard Test Method for Surface Burning Characteristics of Building Materials.

.8 ASTM D6904, “Standard Practice for Resistance to Wind Driven Rain for Exterior Coatings Applied on Masonry”

.9 ASTM C 679, “Standard Test Method for Tack-Free Time of Elastomeric Sealants”

.10 All major building codes: NBC, with Manitoba Amendments

.11 NFPA 101 - Life Safety Code

.12 Canadian Electrical Code

1.6 QUALITY ASSURANCE

.1 A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

.2 Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.

.3 Firestop System installation must meet requirements of CAN/ULC-S115-11 or UL 2079 tested assemblies that provide a fire rating as shown in Section 2.03 Clauses R, S & T below.

.4 Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

.5 Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

.6 For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council

1.7 SUBMITTALS

.1 Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of ULC or cUL firestop systems to be used and manufacturer's installation instructions to comply with Section 01 33 00.

.2 Manufacturer's engineering judgment identification number and drawing details when no ULC or cUL system is available for an application. Engineered judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

.3 Submit material safety data sheets provided with product delivered to job-site.

1.8 INSTALLER QUALIFICATIONS

.1 Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacture’s products per specified requirements. A supplier’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

.2 Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.

.3 The work is to be installed by a contractor with at least one of the following qualifications:

FM 4991 Approved Contractor
UL Approved Contractor
Hilti Accredited Fire Stop Specialty Contractor

.4 Firm with not less than 3 years of experience with fire stop installation.

1.9 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and ULC or cUL label where applicable.

.2 Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

.3 Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

.4 Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

.5 Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

.1 Do not use materials that contain flammable solvents.

.2 Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.

2. Schedule installation of Drop-In firestop devices after placement of concrete but before installation of the pipe penetration. Diameter of sleeved or cored hole to match the listed system for the device

3. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

.3 Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

.4 Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

.5 During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

1. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

2. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

.3 Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

.4 Provide a round fire-rated cable management device whenever cables penetrate fire rated walls, where frequent cable changes and additions may occur. The fire-rated cable management device shall consist of a corrugated steel tube with zinc coating, contain and inner plastic housing, intumescent material rings, and inner fabric smoke seal membrane. The length of the sleeve shall be 12.4 inches. The fire-rated cable management device shall contain integrated intumescent firestop wrap strip materials sufficient to maintain the hourly rating of the barrier being penetrated. The fire-rated cable management device shall contain a smoke seal fabric membrane or intumescent firestop plugs sufficient to achieve the L-Rating requirements of the barrier type. Install device per the manufacturer's published installation instructions.

.5 Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11

F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

.6 Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with CAN/ULC-S115-11.

F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
W-Rating (if applicable): Class 1 rating in accordance with water leakage test per UL 1479.

.7 Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

.8 Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

.9 Rain and water resistance: provide perimeter joint sealant tested in accordance with ASTM D 6904 with less than 1 hour tack free time as tested in accordance with ASTM C 679.

2.2 ACCEPTABLE MANUFACTURERS

.1 Subject to compliance with through penetration firestop systems and joint systems listed in the U.L.C Fire Resistance Directory – Volume III or UL Products Certified for Canada (cUL) Directory, provide products of the following manufacturers as identified below:

Basis of Design:

.1 Hilti (Canada) Corporation,
1-800-363-4458

2.3 MATERIALS

.1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

.2 Approved firestop product assemblies to include all materials, sealants, foams, mineral wool and other devices, which are purpose-made for all firestop conditions, including but not limited to:

.1 Cable penetrations (all types)
.2 Pipe penetrations (all types)
.3 Ductwork penetrations (all types)
.4 Combustible material penetrations (all types)
.5 Construction joints (all types)
.6 Metal deck profile closures
.7 Structurally separated walls and floor assemblies
.8 Electrical box enclosures

.3 For penetrations through a Fire Separation wall provide a firestop system with a "F" Rating as determined by ULC or cUL as indicated below:

Fire Resistance Rating of Separation	Required ULC or cUL "F" Rating of Firestopping Assembly
30 minutes	20 minutes
45 minutes	45 minutes
1 hour	45 minutes
1.5 hours	1 hour
2 hours	1.5 hours
3 hours	2 hours
4 hours	3 hours

For combustible pipe penetrations through a Fire Separation provide a firestop system with a "F" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.

.4 For penetrations through a Fire Wall or horizontal Fire Separation provide a firestop system with a "FT" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.

.5 Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

2.04 ACCEPTABLE FIRESTOP CONTRACTORS

.1 National Firestop Ltd.
300 Transport Rd,
Oakbank, MB. R0E 1J0
Ph. 204-777-0100

2. Total Firestop Systems Ltd.
Box 464
Stony Mountain, Mb., R0C 3A0
Ph. 204-344-5696

3. Secure Firestop
B-580 Dobbie Avenue
Winnipeg, Mb., R2K 1G4
Ph. 204-667-8859

4. Western Construction Services Ltd.
300 Dawson Road North
Winnipeg, Mb., R2J 0S7
Ph. 204-956-9475

.5 Penta Protective Coatings
39 Merit Crescent
West St. Paul, Mb., R2P 2W5
Ph. 204-992-2603

PART 3 - EXECUTION

3.1 PREPARATION

.1 Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

1. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.

2. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

.3 Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

.4 Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector.

3.3 INSTALLATION

1. Regulatory Requirements: Install firestop materials in accordance with ULC Fire Resistance Directory or UL Products Certified for Canada (cUL) Directory or Omega Point Laboratories Directory.

2. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

    1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.
    2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
    3. Protect materials from damage on surfaces subjected to traffic.

3.4 FIELD QUALITY CONTROL

.1 Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

.2 Keep areas of work accessible until inspection by applicable code authorities.

.3 Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

.4 Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

.5 Manufacturer’s Field Services: During Installation, provide periodic destructive testing inspections to assure proper installation/application. After installation is complete, submit findings in writing indicating whether or not the installation of the tested system identified was installed correctly.

3.5 IDENTIFICATION & DOCUMENTATION

.1 The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.

.2 The Documentation Form for through penetrations is to include:

A Sequential Location Number
The Project Name
Date of Installation
Detailed description of the penetrations location
Tested System or Engineered Judgment Number
Type of assembly penetrated
A detailed description of the size and type of penetrating item
Size of opening
Number of sides of assemblies addressed
Hourly rating to be achieved
Installers Name

.3 The Documentation Form for Construction Joints is to include:

A Sequential Location Number
The Project Name
Date of Installation
Detailed description of the Construction Joints location
Tested System or Engineered Judgment Number
Type of Construction Joint
The Width of the Joint
The Lineal Footage of the Joint
Number of sides addressed
Hourly rating to be achieved
Installers Name

.3 Copies of these documents are to be provided to the general contractor at the completion of the project.

.4 Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's Name, address, and phone number.
3. Through-Penetration firestop system designation of applicable testing and inspection agency.
4. Date of Installation.
5. Through-Penetration firestop system manufacturer's name.
6. Installer's Name.

.5 Permanently attach identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping.

3.6 ADJUSTING AND CLEANING

.1 Remove equipment, materials and debris, leaving area in undamaged, clean condition.

.2 Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.7 LABOR USE TO INSTALL FIRESTOP SYSTEMS

.1 If firestopping is not assigned to a single-source firestop specialty contractor, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreement.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 04 22 00 – Concrete Unit Masonry

.2 Section 07 11 13 – Bituminous Dampproofing

.3 Section 07 26 00 - Vapour Retarders

.4 Section 07 84 00 – Firestopping

.5 Section 07 52 00 - Modified Bituminous Membrane Roofing

.6 Section 07 61 00 – Sheet Metal Roofing & Wall Panels

.7 Section 07 62 00 – Sheet Metal Flashing and Trim

.8 Section 08 11 00 – Metal Doors and Frames

.9 Section 08 44 13 – Glazed Aluminum Curtain Walls

.10 Section 08 50 00 – Windows

.11 Section 08 80 00 - Glazing

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C919-08 , Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984 , Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.13-M87 , Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M-1984 , Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.4 CAN/CGSB-19.17-M90 , One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24-M90 , Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)

.1 FS-SS-S-200-E(2)1993 , Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

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

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit (2) samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Perform work to sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

.2 Perform structural sealant application work to ASTM C1401.

.3 Perform acoustical sealant application work to ASTM C919.

.4 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.5 Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.6 WARRANTY

.1 Section 01 78 00: Closeout Submittals.

.2 Warranty: Include coverage for installed sealants and accessories which fail to achieve air tight seal and water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

.3 Provide manufacturer's twenty (20) year material warranty for installed silicone sealant.

.4 Defective work shall include, but not be restricted to joint leakage, cracking, crumbling, melting, running, loss of adhesion, loss of cohesion, or staining of adjoining or adjacent work or surfaces.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect joint sealants from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.8 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

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

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1: Sealant for all locations except where another type is specified in this section. Multi-component, polyepoxide urethane sealant. To meet specified requirements of CGSB Specification CAN2.19-24.M80.

.1 Standard of Acceptance:

.1 Tremco Dymeric 511

.2 Sonolastic NP-2

.3 Permapol RC-2.

.4 Morton Thiokol

.5 Sikaflex 2CNS/SL

.2 Type 2: Sealant for construction joints in lieu of Type 1 where pre-approved by Contract Administrator. One part elastomeric sealants: to meet specified requirements of NSC/CGSB 25-B-N moisture curing hybrid polyurethane.

.1 Standard of Acceptance:

.1 Tremco Dymonic.

.2 Sonolastic 150.

.3 Permapol RC-1.

.4 Morton Thiokol.

.5 Sikaflex 1A.

.6 Bostik Chem-Calk900.

.7 Note: Dow Corning 790 low modulus silicon is also acceptable for Type 1 applications.

.3 Type 3: Sealant for glass to glass, sloped glazing systems, glass to metal, and metal to metal joints. One part low modulus silicone elastomeric sealant to meet specified requirements of NSC/CGSB Specification CAN2-19.13-M82.

.1 Standard of Acceptance:

.1 Dow Corning 795

.2 Tremco Spectrum 2.

.3 GE Silglaze 2800.

.4 GE Silpruf 2000.

.4 Type 4: Use at all perimeter joints and openings in sound rated drywall systems and sealing polyethylene air/vapour barriers. One part acoustical sealant to meet specified requirements of CGSB Specification 19-GP-21M.

.1 Standard of Acceptance:

.1 Tremco Acoustical sealant.

.2 Gibson Homans 2210.

.5 Type 5: Sealant for finishing interior construction joints subject to minimal movement and not otherwise specified in this section. One part paintable latex.

.1 Standard of Acceptance:

.1 Tremco Latex 100.

.2 Bulldog Acrylic Latex

.6 Type 6: Sealant for sealing gutters and rainware. One part high quality synthetic rubber blended with a synthetic resin for metal to metal and metal to plastic joints.

.1 Standard of Acceptance:

.1 Tremco Gutter Seal

.7 Type 7: Sealant for masonry joints including control joints, reglets, etc.: Ultra-low modulus, one part silicone joint sealant. 790 or moisture curing hybrid polyurethane 150.

.1 Standard of Acceptance:

.1 Sonolastic 150.

.8 Type 8: Metal Roof Sealant for Standing Seam panel

.1 Standard of Acceptance:

.1 Novaflex Metal Roof Sealant, Colour MR126 (to match panel colour)

.9 Type 9: Polyurethane Sealant for exterior and interior horizontal traffic joints

.1 Standard of Acceptance:

.1 Tremco THC-900.

.2 Permapol RC-2S1.

.3 Sonolastic SL2.

.4 Sikaflex 2CSL.

.5 Bostik Chem-Calk 550.

2.3 ACCESSORIES

.1 Primer: Non-staining type, recommended by sealant manufacturer to suit application.

.2 Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

.3 Joint Backing: ASTM C1330; round, closed cell polyethylene foam rod; oversized 30% to 50% larger than joint width.

.4 Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

.5 Masking tape: Non-staining, non-absorbent type compatible with sealant and adjacent surfaces.

.6 Setting Blocks and Spacers: Compatible with silicone sealant and recommended by sealant manufacturer.

Part 3 Execution

3.1 EXAMINATION

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

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Joint Backing Material: shall be extruded polyolefin foam

.1 Standard of Acceptance: Tremco Sof Rod.

.2 Apply bond breaker tape where required to manufacturer's instructions.

.3 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

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

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Clean adjacent surfaces immediately.

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

.4 Remove masking tape after initial set of sealant.

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

3.8 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hollow metal steel frames.

.2 Pressed steel doors.

1.2 RELATED SECTIONS

.1 Section 07 92 00 – Joint Sealants.

.2 Section 08 71 00 - Door Hardware – Common Requirements

.3 Section 08 71 01 – Door Hardware – Groups

.4 Section 09 91 13 – Exterior Painting.

.5 Section 09 91 23 – Interior Painting.

1.3 REFERENCES

.1 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized).

.2 ASTM C553-08 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.3 ASTM C578-09e1 - Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C591-09 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.5 ASTM C665-06 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

.6 ASTM C1289-08e1 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.7 ASTM E90-09 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.8 ASTM E413-04 - Classification for Rating Sound Insulation

.9 CAN/ULC S104-10 - Standard Method for Fire Tests of Door Assemblies.

.10 CAN/ULC S105-09 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.

.11 CAN/ULC-S704-03 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.12 CAN/CSA-G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.13 CSA-W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.14 CSDMA (Canadian Steel Door Manufacturers Association)

.1 Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000.

.2 Selection and Usage Guide for Commercial Steel Doors and Frames, 2009.

.15 DHI (Door Hardware Institute) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

.16 NFPA 80 - Fire Doors and Fire Windows (2010 Edition).

.17 NFPA 252-2008 - Methods of Fire Tests of Door Assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with frame opening construction, door, and hardware installation.

.2 Sequencing: Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data: Indicate door and frame configurations and finishes, location of cut-outs for hardware reinforcement.

.3 Provide shop drawings: in accordance with Section 01 33 00- Submittal Procedures.

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

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

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

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

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Conform to requirements of CSDMA. Maintain one (1) copy of document on Site.

.3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.8 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.

.2 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 for ratings specified or indicated.

.3 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E152, and listed by nationally recognized agency having factory inspection services.

.4 Installed Door and Frame Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Refer to Section 01 61 00.

.2 Remove doors and frames from wrappings or coverings upon receipt on Site and inspect for damage.

.3 Store in vertical position, spaced with blocking to permit air circulation between components.

.4 Store materials on planks or dunnage, out of water and covered to protect from damage.

.5 Clean and touch up scratches or disfigurement caused by shipping or handling with zinc-rich primer.

Part 2 Products

2.1 MANUFACTURERS

.1 Allmar.

.2 Other acceptable manufacturers offering functionally and aesthetically equivalent products.

.1 Penner Doors & Hardware

.3 Substitutions: Refer to City of Winnipeg Bid Opportunity. Approved equals to be in accordance with B7.

2.2 MATERIALS

.1 Sheet Steel: Galvanized steel to ASTM A653/A653M, commercial grade (CS), Type B.

.1 Exterior Doors and Frames: Coating designation Z275 (G90).

.2 Interior Doors and Frames: Coating designation ZF120 (A40).

.2 Reinforcement Channel: To CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653/A653M, coating designation to match door.

2.3 DOOR CORE MATERIALS

.1 Honeycomb Core: Structural small cell 25.4 mm (1 inch) maximum kraft paper honeycomb; weight 36.3 kg (80 lb) per ream minimum, density 16.5 kg/cu m (1.03 pcf) minimum, sanded to required thickness.

.1 Fire Rated Doors: Refer to Drawings and Schedules.

.2 Polystyrene Core: ASTM C578, Type 1, rigid extruded fire retardant, closed cell board, density 16 to 32 kg/cu m (1 to 2 pcf), thermal values RSI-1.0 (R-6.0) minimum.

2.4 ADHESIVES

.1 Cores and Steel Components: Heat resistant, structural reinforced epoxy, resin-based adhesive.

.2 Lock Seam: Reinforced epoxy resin, high viscosity, thicksotroptic sealant.

2.5 PRIMERS

.1 Rust inhibitive touch-up only.

2.6 ACCESSORIES

.1 Door Silencers: Single stud rubber/neoprene.

.2 Exterior Top Caps: Steel

.3 Frame Thermal Breaks: Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.

.4 Weatherstripping: Specified in Section 08 71 00.

.5 Door bottom seal: Refer to Section 08 71 00- Door Hardware

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

.7 Fire labels: metal riveted.

.8 Sealant: Refer to Section 07 92 00- Joint Sealing

.9 Glazing: Refer to Section 08 80 00- Glass and Glazing

.10 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.

.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.

2.7 FABRICATION - DOORS

.1 Exterior Doors: Laminated core construction.

.2 Interior Doors: Laminated core construction.

.3 Longitudinal Edges: Tack welded, filled and sanded with no visible edge seams.

.4 Mortised, blanked, reinforced, drilled and tapped for templated hardware, in accordance with templates provided by hardware supplier.

.5 Reinforce for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware.

.6 Top and Bottom Channels: Inverted, recessed, welded steel channels.

.7 Exterior Door: Flush PVC top caps.

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

.9 Sound Rated Door after Fabrication: STC of minimum 48, measured to ASTM E413.

2.8 LAMINATED CORE CONSTRUCTION

.1 Exterior Doors: Both face sheets 1.2 mm (18 gauge) steel, with polystyrene core, laminated under pressure to face sheets.

.2 Interior Doors: Both face sheets 1.2 mm (18 gauge) steel with honeycomb core (refer to Schedule), laminated under pressure to face sheets.

2.9 FABRICATION - FRAMES

.1 Exterior Frames: 1.6 mm (14 gauge) thick base metal thickness.

.1 Frames: Welded type construction thermally broken.

.2 Interior Frames: 1.6 mm (14 gauge) thick base metal thickness.

.1 Door Frames and Window Assemblies: Welded type construction.

.2 Fire rated Frames: Refer to Drawings and Schedules.

.3 Mortised, blanked, reinforced, drilled and tapped for templated hardware, in accordance with templates provided by hardware supplier.

.4 Prepare frames for silencers. Provide three (3) single silencers for single doors and mullions of double doors on strike side. Provide two (2) single silencers on frame head at double doors without mullions.

.5 Configure exterior frames with special profile to receive recessed weatherstripping.

.6 Attach fire rated label to each fire rated door unit.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that opening sizes and tolerances are acceptable; check floor area within path of door swing for flatness.

.2 Verify doors and frames are correct size, swing, rating and opening number.

.3 Remove temporary shipping spreaders.

3.2 INSTALLATION

.1 Install doors and frames to CSDMA.

.2 Install fire-rated doors and frames in accordance with NFPA 80, and local authority having jurisdiction.

.3 Coordinate with masonry, gypsum board and concrete wall construction for anchor placement and throat depths.

.4 Coordinate installation of doors and frames with installation of hardware and view holes specified in Section 08 71 00.

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

.6 Secure anchorages and connections to adjacent construction.

.7 Brace frames rigidly in position while building-in. Install wood spreaders at third points of frame rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1 200 mm (48 inches) in width.

.8 Remove wood spreaders after frames have been built-in.

.9 Make allowance for deflection to ensure structural loads are not transmitted to frame product.

.10 Install doors, and hardware in accordance with hardware templates and manufacturer's instructions.

.11 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, and thresholds: 13 mm.

.12 Adjust operable parts for correct clearances and function.

.13 Install door silencers.

.14 Finish paint as specified in Section Section 09 91 13 and Section 09 91 23.

.15 Install glazing for doors in accordance with Section 08 80 00- Glazing.

.16 Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

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

3.4 ERECTION TOLERANCES

.1 Section 01 73 00: Execution Requirements.

.2 Maximum Diagonal Distortion: 1.5 mm (1/16 inch) measured with straight edges, crossed corner to corner.

3.5 SCHEDULE

.1 Refer to Section 08 71 00 and Door Schedule on drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00- Joint Sealants

.2 Section 08 44 13- Glazed Aluminum Curtain Wall

.3 Section 08 71 00- Doors Hardware

.4 Section 08 80 00- Glazing

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 DAF 45 2003, Designation System For Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)

.1 AAMA 609/610-15 , Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

.3 ASTM International (ASTM)

.1 ASTM E330-E330M-14 , Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-12.1-M90 , Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.20-M89 , Structural Design of Glass for Buildings.

.5 CSA Group (CSA)

.1 CSA G40.20/G40.21-04(R2009) , General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for aluminum, panels, styles, rails, components, accessories, doors and frames and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Submit list on aluminum door manufacturer’s letterhead of materials, components and accessories to be incorporated into Work.

.2 Include product names, types and series numbers.

.3 Include contact information for manufacturer and their representative for this Project.

.3 Shop Drawings:

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

.2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:

.1 Interior trim and exterior junctions with adjacent construction.

.2 Junctions between combination units.

.3 Elevations of units.

.4 Core thicknesses of components.

.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.

.6 Location of caulking.

.7 Each type of door system including location.

.8 Arrangement of reinforcing for hardware and joints.

.9 Arrangement of hardware and required clearances.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements to AAMA CW-10:

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

.2 Store and protect aluminum doors and frames from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Manufacturer's warranty: Submit, for Contract Administrator acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights City of Winnipeg may have under Contract Documents.

.2 Warranty period: 1 year commencing on Date of Substantial Performance of Work.

Part 2 Products

2.1 THERMALLY BROKEN ALUMINUM DOORS

.1 Aluminum-framed, thermally broken swing door with glass insert suitable for inclusion in curtain wall or storefront system.

.2 Medium stile aluminum doors. Ensure stiles and top and bottom rail dimensions match Non-Thermally Broken Aluminum Doors.

.3 Standard of Acceptance: Alumicor ThermaPorte 7700 Medium stile doors or approved equal by Kawneer or C.R. Laurence. Doors and framing by same manufacturer.

.1 Stile width: 4 inches

.2 Top rail: 3.875 inches

.3 Centre rail: NONE

.4 Bottom rail: 7 inches

.4 Door glazing: dual glazed, 6 mm tempered clear glass with Vitro Architectural Glass (formerly PPG) Solarban 60 coating on surface #2. Coordinate with Section 08 50 00- Glazing.

.5 Coordinate with Section 08 44 13- Glazed Aluminum Curtain Walls

2.2 NON-THERMALLY BROKEN ALUMINUM DOORS

.1 Aluminum-frame swing door with glass insert suitable for inclusion in curtain wall or storefront system.

.2 Medium Stile aluminum doors. Ensure stiles and top and bottom rail dimensions match Thermally Broken Aluminum Doors.

.3 Standard of Acceptance: Alumicor Canadiana Medium stile doors or approved equal by Kawneer or C.R. Laurence. Doors and framing by same manufacturer.

.1 Stile width: 4 inches

.2 Top rail: 3.875 inches

.3 Centre rail: NONE

.4 Bottom rail: 7 inches

.4 Door glazing: single glazed, 6 mm tempered clear glass with Vitro Architectural Glass.

.5 Coordinate with Section 08 44 13- Glazed Aluminum Curtain Walls.

2.3 ALUMINUM FINISHES

.1 Exposed aluminum surfaces: To AA DAF-45-M10C21A41, Architectural Class I, anodized 18 μm (0.0007 inches) minimum thickness coloured black (Anodized Aluminum Finish).

.2 .1 Acceptable material: Alumicor Ltd., Class I Anodic Finish.

.3 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.

2.4 FABRICATION

.1 Doors and framing by same manufacturer.

.2 Do aluminum welding to CAN/CSA W59.2.

.3 Fabricate aluminum assemblies of extruded sections to sizes and profiles indicated.

.1 Ensure stiles and rails are tubular extrusions designed for mechanical shear block fastening in combination with SIGMA deep penetration plug welds and fillet welds at all stile/rail connections.

.2 Provide complete separation of interior and exterior components of door leaf by means of a porthole extruded structural thermal break.

.4 Door Thickness: 57 mm (2.25 inches).

.5 Construct doors square, plumb and free from distortion, waves, twists, buckles or other defects detrimental to performance or appearance.

.6 Accurately fit and secure joints and corners.

.1 Ensure joints are flush and hairline

.7 Use only concealed or semi-concealed fasteners

.1 Where fasteners cannot be concealed, countersunk screws finished to match adjacent material may be used.

.8 Install door hardware. Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00- Doors Hardware.

.9 Locate manufacturer’s labels on exterior side of door bottom rail.

.10 Provide structural steel reinforcement as required.

.11 Fit joints tightly and secure mechanically.

.12 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

.13 Acceptable Material: Alumicor Limited; ThermaPorte, thermally broken doors.

2.5 HARDWARE

.1 Hardware in accordance with Section 08 71 00- Door Hardware.

.1 Ensure hardware is supplied and factory-installed by door manufacturer.

2.6 SUBSTITUTIONS

.1 Ensure components come from one manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for aluminum doors and frames installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.3 Anchor securely.

.4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.5 Adjust door components to ensure smooth operation.

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

.7 Glaze aluminum doors and frames in accordance with Section 08 80 50- Glazing.

.8 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

.9 Apply sealant in accordance with Section 07 92 00- Joint Sealants . Conceal sealant within aluminum work except where exposed use permitted by Contract Administrator.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.4 Clean aluminum with damp rag and approved non-abrasive cleaner.

.5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.6 Clean glass and glazing materials with approved non-abrasive cleaner.

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

.2 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of stainless steel finishes for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect access doors from nicks, scratches, and blemishes.

.3 Apply temporary protective coating to finished surfaces. Remove coating after installation.

.1 Use coatings in accordance with manufacturer's written instructions that are easily removable.

.2 Leave protective coating in place until final cleaning of building.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 ACCESS DOORS

.1 Sizes: as follows unless indicated:

.1 Wood Bulkhead (above Kitchenette): 300 wide x 600 mm deep (12 inches x 24 inches) Custom Size

.1 Rating: N/A

.2 Insulation: N/A

.3 Details: Designed with a 5/8” recess door to accept wood siding. Coordinate with Wood siding installer.

.4 Operation: Key operated cylinder cam latch, Piano hinge

.5 Standard of Acceptance: Cendrex AHA-10 Recessed Access Door Without Flange or approved equal.

.6 All ceiling access hatches to be lockable. Provide 2 keys for each location.

.7 Refer to Drawings for location.

.2 Staff Room Drywall: 600 x 600 mm (24 inches x 24 inches)

.1 Rating: N/A

.2 Insulation: N/A

.3 Details: Designed with a 5/8” recess door to accept gypsum wall board Coordinate with gypsum wall board installer.

.4 Operation: Key operated cylinder cam latch, Piano hinge

.5 Standard of Acceptance: Cendrex AHA-GYP-00 Recessed Access Door With Drywall Bead Flange or approved equal.

.6 All ceiling access hatches to be lockable. Provide 2 keys for each location.

.7 Refer to Drawings for location.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.

.1 Install gypsum board surfaces: in accordance with Section 09 21 16- Gypsum Board Assemblies.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Electric overhead sectional door.

.2 Operating hardware, supports, and controls.

1.2 RELATED SECTIONS

.1 Section 04 22 00 – Concrete Unit Masonry

.2 Section 05 50 00 - Metal Fabrications

.3 Section 06 10 13 - Wood Blocking and Curbing

.4 Section 07 92 00 - Joint Sealants

1.3 REFERENCES

.1 ASTM A653/A653M-07 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM E330-02 - Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

.3 CAN/CSA-C22.2 No. 100-04 - Motors and Generators.

.4 CSA C22.2-06 - Canadian Electrical Code, Part 2.

.5 CSA G164-M92(R2003) - Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 NEMA MG1 - Motors and Generators.

.7 UL - Fire Resistance Directory.

.8 ULC - Fire Resistance Directory.

1.4 SYSTEM DESCRIPTION

.1 Panels: Flush steel, insulated. Stile and rail steel with glazed panels.

.2 Lift Type: High lift operating style with track and hardware as described herein.

.3 Operation: Electric.

.4 Loads: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as measured in accordance with ASTM E330.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, installation details.

.3 Product Data: Provide component construction, anchorage method & hardware.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's special installation requirements, special procedures, perimeter conditions requiring special attention.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Operation and Maintenance Data:

.1 Include electrical control adjustments.

.2 Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

.3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in The City's name and registered with manufacturer.

1.8 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years experience. approved by the manufacturer.

1.9 REGULATORY REQUIREMENTS

.1 Conform to applicable code for motor and motor control requirements.

1.10 WARRANTY

.1 Correct defective Work within a five (5) year period after Date of Substantial Completion.

.2 Warranty: Include coverage for electric motor.

.3 Provide five (5) year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Garaga Industries Model or approved equal.

.2 Model: Garaga G-5000.

.3 Colour: Black (premium colour).

.4 Thickness: 50mm (2”).

.5 R value (Total): R-16.

.6 Windows: G-4400 Sections (Full Vision), Black

2.2 MATERIALS

.1 Sheet Steel: ASTM A653/A653M galvanized to Z180, pre-coated with silicone polyester finish, plain surface.

.2 Insulation: polyurethane, RSI value of 2.8 per inch, same thickness as core framing members, bonded to facing.

.3 Metal Primer Paint: Zinc chromate type.

2.3 PANEL CONSTRUCTION

.1 Panels: Flush steel construction; outer steel sheet of 3.658 mm thick, flat profile; inner steel sheet of 1.5 mm thick, flat profile; core reinforcement of 3.658 mm thick sheet steel roll formed to channel Z- shape, rabbeted weather joints at meeting rails; insulated.

.2 Door Nominal Thickness: 45 mm thick.

.3 Glazing: 25mm (1”) double thermopane, tempered glass window, supplied by this Section.

.4 Glazed Lights: full vision glazing in one panel section, across full width of door, set in place with resilient glazing channel.

2.4 DOOR COMPONENTS

.1 Track: Rolled galvanized steel, 2.6 mm thick; 75 mm wide, continuous one piece per side; galvanized steel mounting brackets 6 mm thick.

.2 Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

.3 Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.

.4 Sill Weatherstripping: Resilient semi-circular TPE tubing strip, one piece; fitted to bottom of door panel, full length contact.

.5 Jamb Weatherstripping: Roll formed aluminum section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

.6 Head Weatherstripping: EPDM rubber seal, one piece full length.

.7 Panel Joint Weatherstripping: PVC, one piece full length.

.8 Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle; keyed according to building's master key system.

2.5 ELECTRICAL HOIST OPERATOR

.1 Lift Master Model MH, ½ HP/115 V Single Phase.

.2 UL 325-2010 compliant, medium duty logic programmable integrated circuit board.

.3 Disconnect Switch: Factory mount disconnect switch on equipment.

.4 Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.

.5 Control Station: Standard three button (open-close-stop) momentary type, control for each electric operator; 24 volt circuit, surface mounted. Include key operated switch located at inside door jamb.

.6 Radio Control Antenna Detector.

.7 Photo Eye: At bottom of door panel, full width; sensitized type, wired to reverse door upon striking object; hollow neoprene rubber covered to provide weatherstrip seal.

2.6 FINISHES

.1 Exterior Surfaces: Prime & finish paint for finish specified in Section 09 91 99.

.2 Interior Surfaces: Prime & finish paint for finish specified in Section 09 91 99.

PART 3 EXECUTION

3.1 EXAMINATION

.2 Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

.3 Verify that electric power is available and of the correct characteristics.

3.2 PREPARATION

.1 Prepare opening to permit correct installation of door unit to perimeter air and vapour barrier seal.

3.3 INSTALLATION

.1 Install door unit assembly to manufacturer instructions.

.2 Anchor assembly to wall construction and building framing without distortion or stress.

.3 Securely brace door tracks suspended from structure. Secure tracks to structural members only.

.4 Fit and align door assembly including hardware.

.5 Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

.6 Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00.

.7 Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

.1 Maximum Variation from Plumb: 1.5 mm.

.2 Maximum Variation from Level: 1.5 mm.

.3 Longitudinal or Diagonal Warp: Plus or minus 3 mm from 3 m straight edge.

.4 Maintain dimensional tolerances and alignment with adjacent work.

3.5 MANUFACTURER'S FIELD SERVICES

.1 Ensure the operation and adjustments to door assembly for specified operation.

3.6 ADJUSTING

.1 Adjust door assembly to smooth operation and in full contact with weatherstripping.

3.7 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Clean doors, frames and glass.

.3 Remove temporary labels and visible markings.

3.8 PROTECTION OF FINISHED WORK

.1 Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 62 00 - Metal Flashing and Trim: Flashings

.2 Section 07 92 00 - Joint Sealing

.3 Section 08 11 16 - Aluminum Doors and Frames

.4 Section 08 80 00 – Glass & Glazing

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009) , Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)

.1 AAMA CW-10-04 , Care and Handling of Architectural Aluminum From Shop to Site.

.2 AAMA CW-11-85 , Design Wind Loads and Boundary Layer Wind Tunnel Testing.

.3 AAMA T1R-A1-04 , Sound Control for Fenestration Products.

.4 AAMA 501-05 , Methods of Test for Exterior Walls.

.5 AAMA 611-98 , Voluntary Specifications for Anodized Finishes Architectural Aluminum.

.6 AAMA 612-02 , Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum.

.7 AAMA 2603-02 , Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

.8 AAMA 2604-05 , Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

.3 ASTM International

.1 ASTM A36/A36M-08 , Specification for Carbon Structural Steel.

.2 ASTM A123/A123M-09 , Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A167-99(2009), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.4 ASTM A653/A653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM B209-07 , Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221-08 , Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.7 ASTM E283-04 , Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.8 ASTM E330-02 , Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.

.9 ASTM E331-00(2009) , Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.

.10 ASTM E413-04 , Classification for Rating Sound Insulation.

.11 ASTM E1105-00(2008) , Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.108-M89 , Bituminous Solvent Type Paint.

.2 CAN/CGSB-12.20-M89 , Structural Design of Glass for Buildings.

.5 CSA Group (CSA)

.1 CSA G40.20/G40.21-[04(R2009)] , General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA S136-07 , North American Specification for the Design of Cold Formed Steel Structural Members.

.3 CAN/CSA-S157/S157.1-05 , Strength Design in Aluminum/Commentary on CAN/CSA-S157, Strength Design in Aluminum.

.4 CSA W59.2-M1991(R2008) , Welded Aluminum Construction.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: co-ordinate work of this Section with installation of flashing placement, vapour retarder placement, air barrier placement, fire stopping, components or materials.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Submit Product Confirmation on curtain wall manufacturer’s letterhead of materials, components and accessories to be incorporated into Work.

.2 Include product names, types and series numbers.

.3 Include contact information for manufacturer and their representative for this Project.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

.4 Delegated Design Submittals:

.1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

.3 Record Documentation: In accordance with Section 01 78 00- Closeout Submittals.

.1 List materials used in curtainwall work.

.2 Warranty: Submit warranty documents specified.

1.6 QUALITY ASSURANCE

.1 Mock-ups: Construct full size 3m x 3m (10’ x 10’) mock-up of vertical glazed aluminum curtain wall using proposed procedures, materials and quality of work where directed by Contract Administrator and in accordance with Section 01 43 00 - Quality Assurance.

.2 Include intermediate mullion, corner mullion, sill, column cover and vision glass light.

.3 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

.4 Purpose: To judge quality of work and material installation.

.5 Allow Contract Administrator 24 hours minimum prior to inspection of mock-up.

.6 Do not proceed with work prior to receipt of written acceptance of mock-up by Contract Administrator.

.7 When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.

.8 Approved mock-up will remain part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Handle work of this Section in accordance with AAMA CW-10.

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

.3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.

.4 Protect prefinished aluminum surfaces with strippable coating or wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.5 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

.1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.

.2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.9 WARRANTY

.1 Manufacturer’s warranty: Submit, for City of Winnipeg’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to and not intended to limit other rights City of Winnipeg may have under Contract Conditions.

.2 Warranty period: 1 years commencing on Date of Substantial Performance of Work.

Part 2 Products

2.1 CURTAIN WALL

.1 50mm (2”) profile thermally broken, vertical stick-built glazed aluminum curtain wall system of tubular aluminum sections with self supported framing, shop fabricated, factory prefinished, vision glass, column covers, related flashings, anchorage and attachment devices. Aluminum frames with black anodized finish.

.2 Ensure assembled system design permits re-glazing of individual glass and infill panels from exterior without requiring removal of structural mullions.

.3 Standard of Acceptance: Alumicor ThermaWall TW2200 or acceptable equal by Kawneer or C.R. Laurence.

2.2 INTERIOR ALUMINUM FRAMES

.1 Non-thermally broken storefront system, 45mm x 115mm (1 ¾” x 4 ½”) framing with 6mm (¼”) single pane tempered glazing. Aluminum with black anodized finish.

.2 Standard of Acceptance: Alumicor Flushglaze TL 1800

2.3 ALUMINUM DOORS

.1 Refer to Section 08 11 16- Aluminum Doors. Doors and framing by same manufacturer.

2.4 DESIGN CRITERIA

.1 Design curtain wall to AAMA CW-DG-1.

.1 Design glazed aluminum curtain wall following rainscreen principles.

.2 Ensure horizontal members are sealed to vertical members to form individual compartments in accordance with rainscreen principles.

.3 Ventilate and pressure equalize air space outside exterior surface of insulation to exterior.

.4 Ensure complete separation of interior and exterior components by means of a structural thermal break. Do not permit screws to penetrate thermal break.

.2 Design aluminum components to CAN/CSA S157.

.3 Design and size curtain wall components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of wall using design pressure of minimum 1.19 kPa (25 psf) to AAMA CW 11/ASTM E330 or local code requirements, whichever is greater.

.1 Design curtain wall system for expansion and contraction caused by cycling temperature range of 95 degrees C over 12 hour period without causing detrimental effect to system components.

.2 Thermal expansion: Ensure curtain wall system can withstand temperature differential of 85 degrees C and is able to accommodate interior and exterior system expansion and contraction without damage to components or deterioration of seals.

.3 Design vertical expansion joints with baffled overlaps and compressed resilient air seal laid between mullion ends.

.4 Ensure system is designed to accommodate:

.1 Movement within curtain wall assembly.

.2 Movement between system and perimeter framing components.

.3 Dynamic loading and release of loads.

.4 Deflection of structural support framing.

.5 Thermal resistance:

.1 Vision glass areas: Insulating Glass Unit; Centre of Glass U .24

.6 Limit mullion deflection to flexure limit of glass 19 mm (0.75 inches) maximum with full recovery of glazing materials.

.7 Glass dimensions: Size glass units to CAN/CGSB-12.20.

.8 Flatness criteria: 6 mm (0.25 inches) maximum in 6 m (20 feet) for each panel.

.9 Air infiltration: 0.2 L/s/m^2 (0.04 cfm/ft^2) maximum of wall area to AAMA /WDMA/CSA 101/I.S.2/A440 and ASTM E283 at differential pressure across assembly of 300 Pa (6.27 psf).

.10 Water infiltration: None to AAMA /WDMA/CSA 101/I.S.2/A440 and ASTM E547 at differential pressure across assembly of 720 Pa (15.04 psf).

.11 Ensure interior surfaces have no condensation before exposed edges of sealed units reach dew point temperatures.

.12 Maintain continuous air barrier and vapour retarder throughout building envelope and curtainwall assembly.

.13 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

2.5 MATERIALS

.1 Curtain Wall System and Components:

.1 Extruded aluminum: To ASTM B221, 6063 alloy with [T5] [T6] temper.

.1 Finish coatings: To AAMA 2603,AAMA 2604, AAMA 2605, AA DAF 45 Architectural Class I, AA DAF 45 Architectural Class II, black anodized 10 µm (0.0004 inches), 18 µm (0.0007 inches) thick minimum.

.2 Sheet aluminum: To ASTM B209, utility grade for unexposed surfaces.

.3 Air barrier liner: Reinforce panels to maintain flat surface.

.1 Concealed locations: 0.952 mm (20 gauge) steel sheet to CSA-S136M and ASTM A653/A653M with 458 g/m^2 (1.25 oz/sq.ft)] galvanized coating and corners sealed at concealed locations.

.2 Interior exposed locations: 1.588 mm (16 gauge) black anodized aluminum sheet.

.4 Fasteners, screws and bolts: Tamperproof, cadmium plated stainless steel 300 or 400 series to meet curtain wall requirements and as recommended by manufacturer.

.5 Anchors: Ensure anchors have three-way adjustment.

.6 Insulating glass units: In accordance with Section 08 80 00 – Glazing.

.7 Aluminum panels: 3 mm (0.125 inches) thick factory formed panels.

.1 Finish after forming to match curtain wall system.

.8 Thermal Break: Glass fibre reinforced polyamide porthole extrusion.

.9 Curtain wall back pan insulation: 100 mm (4 inches) thick.

.1 Density: 64 kg/m^3 (4 lbs/cu ft) minimum.

.2 Acceptable Material: Alumicor Ltd., ThermaWall TW2200 Series or approved equal.

2.6 FABRICATION

.1 Do aluminum welding to CAN/CSA W59.2.

.2 Fabricate aluminum assemblies of extruded sections to sizes and profiles indicated.

.1 Ensure vertical and horizontal members are tubular extrusions designed for shear block corner construction.

.2 Mullion depth sizes as indicated.

.3 Cap depth sizes: 19 mm (0.75 inches).

.4 Ensure caps for mullion assemblies are constructed without gaps exceeding manufacturers guidelines.

.3 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.4 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof where thermally broken system is used.

.5 Prepare components to receive anchor devices. Install anchors.

.6 Arrange fasteners and attachments to ensure concealment from view.

.7 Prepare system components to receive hardware and exterior doors, specified in Section 08 11 16- Aluminum Door and Frames and Section 08 71 00- Doors Hardware.

.8 Reinforce framing members for external imposed loads.

.9 Visible manufacturer's identification labels not permitted.

.10 Infill Panels:

.1 Fabricate infill panels with metal covered edge seals around perimeter of panel assembly, enabling installation and minor movement of perimeter seal.

.2 Reinforce interior surface of exterior panel sheet from deflection caused by wind and suction loads.

.3 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

.4 Place insulation within panel, adhered to exterior face of interior panel sheet over entire area of sheet with impale fasteners.

.5 Ventilate and pressure equalize the air space outside the exterior surface of the insulation, to the exterior.

.6 Arrange fasteners and attachments to ensure concealment from view.

.7 Refer to Drawings.

2.7 FINISHES

.1 Exterior exposed aluminum surfaces: To AA DAF-45-M12C22A44, Architectural Class I, black anodized 18 µm (0.0007 inches) minimum thickness coloured Black (Anodized Aluminum Finish).

.1 Acceptable material: Alumicor Ltd., Class I Anodic Finish.

.2 Interior exposed aluminum surfaces: To AA DAF-45-M12C22A44, Architectural Class I, anodized 18 µm (0.0007 inches) minimum thickness coloured Black (Anodized Aluminum Finish).

.1 Acceptable material: Alumicor Ltd., Class I Anodic Finish.

2.8 ACCESSORIES

.1 Insulation in accordance with Section 07 21 13- Board Insulation.

.2 Sealants in accordance with Section 07 92 00- Joint Sealants.

.3 Flashings to be aluminum profiles as indicated on Drawings and in accordance with Section 07 62 00- Sheet Metal Flashing and Trim.

.4 Miscellaneous components: Covers, copings, special flashings, filler pieces, termination pieces, cap closures, expansion joint covers, and metal bellows to match curtain wall system as indicated.

2.9 PRODUCT SUBSTITUTIONS

.1 Ensure components come from one manufacturer.

2.10 SOURCE QUALITY CONTROL

.1 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

.2 Installer qualifications: company specializing in performing the work of this section approved by manufacturer.

.3 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Manitoba.

.4 Perform welding Work in accordance with CSA W59.2.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Verify dimensions, tolerances, and method of attachment with other work.

.3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.

.4 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install curtain wall system in accordance with manufacturer's instructions.

.2 Do aluminum welding to CAN/CSA W59.2.

.3 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.4 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.5 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.6 Use thermal isolation where components penetrate or disrupt building insulation.

.7 Install flashings.

.8 Co-ordinate installation of fire stop insulation, specified in Section 07 84 00- Fire Stopping, at each floor slab edge and intersection with vertical construction where indicated.

.9 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.10 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.11 Install fire-safing in areas as indicated.

.12 Install operating sash in accordance with Section 08 80 00- Glazing, to method of glazing.

.13 Install glass in accordance with Section 08 80 00- Glazing, and to manufacturer's instructions to suit the method of glazing. Where applicable, place sealant on the up-slope side of the pressure plate cover caps; finish the surface with a slope to encourage drainage over the cap. Cover caps to conceal screws and ensure continuous sightline.

.14 Install perimeter sealant in accordance with Section 07 92 00- Joint Sealants.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Remove protective material from prefinished aluminum surfaces.

.3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 26 00- Vapour Retarders

.2 Section 07 27 00- Air Barriers

.3 Section 07 62 00- Metal Flashing and Trim: Flashings

.4 Section 07 84 00- Firestopping

.5 Section 07 92 00- Joint Sealing

.6 Section 08 80 00- Glazing

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 AA DAF 45OL-03(R2009) , Designation System for Aluminum Finishes.

.2 ASTM International (ASTM)

.1 ASTM A 123/A 123M-15 , Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.

.2 ASTM E 1748-95(2009) , Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group (CSA)

.1 AAMA/WDMA/CSA 101/I.S.2/A440-11(R2016) , NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.

.2 CSA A440S1-09 , Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.

.3 CAN/CSA-A440.2-14 /A440.3-[14] , Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.

.4 CAN/CSA-A440.4-07(R2016) , Window, Door, and Skylight Installation

.5 CAN/CSA-Z91-02(R2013) , Health and Safety Code for Suspended Equipment Operations.

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

.4 Screen Manufacturers Association (SMA)

.1 SMA 1201R-2012 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.1 Submit list on window manufacturer’s letterhead of materials, components and accessories to be incorporated into Work.

.2 Include product names, types and series numbers.

.3 Include contact information for manufacturer and their representative for this Project.

.3 Shop Drawings:

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

.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, junction between combination units, interior and exterior trim, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

.3 Indicate locations, dimensions, openings and requirements of related work.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Material handling: to AAMA CW-10

.2 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.4 Storage and Handling Requirements:

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

.2 Store and protect windows from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Manufacturer's warranty: Submit, for Contract Administrator acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights City of Winnipeg may have under Contract Documents.

Part 2 Products

2.1 PUNCHED WINDOWS

.1 Thermally broken, rain screened, aluminum framed, windows with double glazed insulating glass units and bull nose front design. Black Anodized Aluminum Finish, 1" 'Bullnose' profile, 6" frame depth.

.2 Standard of Acceptance: Alumicor ThermaWall RainBlade 1970 or acceptable equal by Kawneer or C.R. Laurence.

2.2 WINDOW MATERIALS

.1 Main Frame and glass stops: Extruded aluminum: To ASTM B221, 6063 alloy with T5 or T6 temper.

.1 Main Frame Depth: 133 mm (5.25 inches).

.2 Interior colour: Black Anodized Aluminum Finish.

.3 Exterior colour: Black Anodized Aluminum Finish.

.4 Insulating glass units: In accordance with Section 08 80 00 – Glazing.

.2 Thermal Break: Glass fibre reinforced polyamide porthole extrusion.

.3 Primary seal gasket: Dual Durometer PVC

.4 Rain screen gasket: EPDM, 60 Durometer

.5 Glass stop pressure gasket: EPDM, 70 Durometer

.6 Interior and Exterior Sills: Sheet aluminum to ASTM B209, of type and size as detailed and to suit project conditions; minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors and anchoring devices.

2.3 WINDOW CLASSIFICATION

.1 Window Classification: To NAFS – AAMA/WDMA/CSA 101/I.S.2/A440-11

.1 Air tightness: FW-CW – Canadian level: Fixed.

.2 Water tightness: FW-CW100 – Canadian level: B7

.3 Wind load resistance: FW-CW70 – Canadian level: C5.

.4 Forced entry resistance test: Grade 40. Canadian level: F20

2.4 FABRICATION

.1 Fabricate windows to CAN/CSA A440/A440.1 and manufacturer's instructions.

.1 Do glazing in accordance with Section 08 80 00 – Glazing. Ensure proper installation of prime seal gasket whether shop or field glazed.

.2 Fabricate aluminum assemblies of extruded sections to sizes and profiles indicated.

.1 Ensure vertical and horizontal members are tubular extrusions designed for shear block and/or screw spline corner construction.

.2 Provide drainage path from glazing cavity in accordance with rain screen design practices and manufacturer's instructions to permit drainage of extraneous water to the exterior.

.3 Construct units square, plumb and free from distortion, waves, twists, buckles or other defects detrimental to performance or appearance.

.1 Brace frames to maintain squareness and rigidity during installation.

.4 Fabricate units square and true with tolerance of plus or minus 1.5 mm (0.06 inches) maximum for units with diagonal measurement of 1800 mm (6 feet) maximum and plus or minus 3 mm (0.125 inches) maximum for units with diagonal measurement greater than 1800 mm (6 feet).

.5 Accurately fit and secure joints and corners.

.1 Ensure joints are flush, hairline, and weatherproof.

.2 Seal joints and corners in accordance with manufacturer's instructions

.6 Face dimensions detailed are maximum permissible sizes.

.7 Use only concealed tamperproof fasteners

.1 Where fasteners cannot be concealed, countersunk screws finished to match adjacent material may be used upon receipt of written approval from Contract Administrator.

.8 Visible manufacturer's labels are not permitted.

2.5 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.2 Exterior exposed aluminum surfaces: To AA DAF-45-M10C21A41, Architectural Class I, black anodized 18 µm (0.0007 inches) minimum thickness coloured black (Anodized Aluminum Finish).

.1 Acceptable material: Alumicor Ltd., Class I Anodic Finish.

.3 Interior exposed aluminum surfaces: To AA DAF-45-M10C21 A41, Architectural Class I, anodized 18 µm (0.0007 inches) minimum thickness coloured Black (Anodized Aluminum Finish).

.1 Acceptable material: Alumicor Ltd., Class I Anodic Finish.

2.6 ISOLATION COATING

.1 Coatings: in accordance with manufacturer's recommendations for surface conditions.

.2 Isolate aluminum from following components, by means of isolation coating:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.7 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:

.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly. Acceptable products: Tremco ProGlaze ETA or other approved by Contract Administrator.

.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior

2.8 GLAZING

.1 Insulating glass units: In accordance with Section 08 80 00 – Glazing.

.2 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.9 HARDWARE

.1 Hardware: stainless steel sash locks and aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

.3 Include special keyed opening device for windows normally locked.

2.10 ACCESSORIES

.1 Gasketing: To CCD-45 Black EPDM gaskets.

.2 Setting Blocks: To CCD-45 and ASTM D2240. Manufacturer's standard, notched to permit water drainage through the glazing cavity.

.3 Spacers: To CCD-45 and ASTM D2240. Manufacturer's standard.

.4 Sealant: To CAN/CGSB-19.13, Class 40, one-component, cold-applied, non-sagging silicone.

.1 Acceptable material: Dow Corning 795 or approved equal.

.2 Refer to Section 07 92 00- Joint Sealing.

.5 Sealant Bond Breaker: Open cell foam backer rod sized to suit project requirements.

.6 Flashings: 3 mm (0.125 inches) thick aluminum flashing to profiles indicated and in accordance with Section 07 62 00- Sheet Metal Flashing and Trim.

.7 Liquid Foam Insulation: Single component, moisture cure, low expansion rate spray-in-place polyurethane liquid foam insulation to ULC-S710.1 and in accordance with manufacturer's written recommendations.

.8 Fasteners: Tamperproof, cadmium plated stainless steel 300 or 400 series to meet window requirements and as recommended by manufacturer.

2.11 SUBSTITUTIONS

.1 Substitions or equal request must be made during tender period.

.2 Ensure components come from one manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Window installation:

.1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.2 Install perimeter prime seal gasket in accordance with manufacturer’s instructions, seal corners. Continuous wet seal heel beads are not permitted.

.3 Arrange components to prevent abrupt variation in colour.

.4 Coordinate attachment and seal of perimeter vapour retarder in accordance with Section 07 26 00- Vapour Retarders.

.5 Coordinate attachment and seal of perimeter air barrier in accordance with Section 07 27 00- Air Barriers.

.2 Sill installation:

.1 Install aluminum sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.

.2 Cut sills to fit window opening.

.3 Secure sills in place with anchoring devices located at ends and joints of continuous sills and evenly spaced 600 mm (24 inches) on centre in between.

.4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.

.5 Maintain 6 to 9 mm (0.25 to 0.375 inches) space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

.3 Caulking:

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 00- Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Contract Administrator.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Hardware for hollow metal doors.

1.2 RELATED SECTIONS

.1 Section 08 11 00 –Metal Doors and Frames.

.2 Section 08 71 00 – Door Hardware - Groups

1.3 REFERENCES

.1 CAN4-S104-M80(R1985) - Method for Fire Tests of Door Assemblies.

.2 CAN/ULC-S132-2007 - Emergency Exit and Emergency Fire Exit Hardware.

.3 CSDMA (Canadian Steel Door Manufacturers Association).

.4 DHI (Door and Hardware Institute Canada) - AHC and EHC certification programs.

.5 DHI (Door Hardware Institute) - A115 series.

.6 DHI (Door Hardware Institute) - WDHS.3 - Hardware Locations for Wood Flush Doors.

.7 BHMA (Builders Hardware Manufacturers Association) - A156 series.

.8 NFPA 80 - Fire Doors, Fire Windows.

.9 NFPA 252 - Fire Tests of Door Assemblies (2008 Edition).

.10 UL 10B - Fire Tests of Door Assemblies.

.11 UL 305 - Panic Hardware.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with other work having a direct bearing on work of this section.

.1 Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

.2 Coordinate City of Winnipeg's keying requirements during the course of the Work.

.2 Sequencing: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal Procedures.

.2 Shop Drawings:

.1 Indicate locations and mounting heights of each type of hardware, schedules, catalogue cuts, electrical characteristics and connection requirements, including make, model, material, function, finish, and all other pertinent information for each door or pair of doors. Use standard typed hardware list. "Horizontal" list not permitted.

.3 Samples:

.1 Submit one (1) sample of each type hardware specified, when requested by Contract Administrator illustrating style, colour, and finish.

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

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submittal Procedures.

.2 Installation Data: Manufacturer's special installation requirements.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Procedures.

.2 Operation and Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

.3 Provide maintenance data, parts list, and manufacturer's instructions for each type door closers, locksets, door holders, and panic hardware for incorporation into maintenance manual.

.4 Brief maintenance staff regarding proper care of hardware such as lubrication of locksets, adjustments of door closers, cleaning, and general maintenance.

.5 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in City of Winnipeg's name and registered with manufacturer.

.6 Record Documentation:

.1 Record actual locations of installed cylinders and their master key code.

.2 Keys: Deliver with identifying tags to City of Winnipeg by security shipment direct from hardware supplier.

1.8 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

.2 Tools:

.1 Provide special wrenches and tools applicable to each different or special hardware component.

.2 Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.9 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.2 Perform Work to the following requirements:

.1 BHMA A156 series.
.2 DHI - A115 series.
.3 DHI - WDHS.3.
.4 CSDMA.
.5 NFPA 252.
.6 UL 10B.
.7 UL 305.
.8 ULC S132.
.9 CAN4-S104.

.3 Use ULC listed and labelled hardware for doors in fire separations and exit doors.

.4 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.5 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

1.10 REGULATORY REQUIREMENTS

.1 Conform to applicable code for Products requiring electrical connection. Listed and classified by ULC as suitable for the purpose specified and indicated.

1.11 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.12 WARRANTY

.1 See Bid Opportunity.

Part 2 Products

2.1 SUPPLIERS

.1 Acceptable Suppliers: As indicated in Hardware Schedule.

2.2 MANUFACTURERS

.1 Acceptable Manufacturers: As indicated in Hardware Schedule.

2.3 KEYING

.1 Contractors to supply, install and make use of construction cylinders in all exterior doors. City of Winnipeg will exchange all construction cylinders at building turnover.

2.4 FINISHES

.1 Finishes: Identified in Schedule at end of section.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that doors and frames are ready to receive work and dimensions are as indicated on Shop Drawings.

.2 Verify that electric power is available to power operated devices and is of the correct characteristics.

3.2 INSTALLATION

.1 Install hardware to manufacturer's written instructions.

.2 Use templates provided by hardware item manufacturer.

.3 Mounting heights for hardware from finished floor to centre line of hardware item.

3.3 ADJUSTING

.1 Adjust hardware for smooth operation.

3.4 PROTECTION OF FINISHED WORK

.1 Do not permit adjacent work to damage hardware or finish.

3.5 SCHEDULES

.1 Refer to Door Hardware Schedule and Door Schedule on drawings

END OF SECTION

Hardware Sets

Set: 1.0

4	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	BSP	MK
1	Deadlatch	4900	335	AD
1	Paddle Operator	4591	335	AD
1	Best Core	By City of Winnipeg		BE
1	Mortise Cylinder	BEST to Suit	BLK	BE
1	Door Pull	RM3310-72" Mtg-Type 12HD	315	RO
1	Push Bar	47-PB 12HD	315	RO
1	Conc Overhead Stop	6-336	BSP	RF
1	Automatic Opener	5730	BSP	NO
1	Threshold	252x3AFG		PE
1	Weatherstrip and Sweep	By Door Supplier		OT
1	Interlocking Astragal	Frontline to Suit or Equal	Match Door	OT
2	Full Height Actuator	639		NO
1	Card Reader	By Security/Electrical		OT
1	Guide Rail	Curran CE-803-MB Size to Suit	BLK	OT
1	Power Supply	By Security/Electrical		OT

Notes: Door locked/unlocked by access control system/card reader. Outside actuator to be disabled when door is locked. When door is unlocked the outside actuator is to be enabled and will release the electric strike and power open the door. Pressing the inside actuator will always release the electric strike and power open the door.

Set: 2.0

4	Hinge, Full Mortise	TA2714 NRP 4-1/2" x 4"	BSP	MK
1	Mortise Deadlock	MS1850S	335	AD
1	Best Core	By City of Winnipeg		BE
1	Mortise Cylinder	BEST to Suit	BLK	BE
1	Thumbturn	4066	335	AD
1	Push Bar & Pull	BF15847	315	RO
1	Conc Overhead Stop	6-336	BSP	RF
1	Automatic Opener	5730	BSP	NO
1	Floor Stop	441/443	BSP	RO
1	Interlocking Astragal	Frontline to Suit or Equal	Match	OT

			Door	
2	Full Height Actuator	639		NO
1	Power Supply	By Security/Electrical		OT

Notes: Operator to be manually turned on or off by use of toggle switch on operator header.

Set: 3.0

4	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	BSP	MK
1	Mortise Deadlock	MS1850S	335	AD
1	Best Core	By City of Winnipeg		BE
1	Mortise Cylinder	BEST to Suit	BLK	BE
1	Thumbturn	4066	335	AD
1	Push Bar & Pull	BF15847	315	RO
1	Conc Overhead Stop	6-336	BSP	RF
1	Surface Closer	1601	BSP	NO
1	Threshold	252x3AFG		PE
1	Weatherstrip and Sweep	By Door Supplier		OT
1	Interlocking Astragal	Frontline to Suit or Equal	Match Door	OT

Set: 4.0

4	Hinge, Full Mortise	TA2714 4-1/2" x 4"	BSP	MK
1	Entrance Lock	ALX53 .SAT	622	SC
1	Floor Stop	441/443	BSP	RO

Set: 5.0

4	Hinge, Full Mortise	TA2714 4-1/2" x 4"	BSP	MK
1	Pull Plate	111x70C	BSP	RO
1	Push Plate	70C-RKW	BSP	RO
1	Automatic Opener	5710	BSP	NO
1	Kick Plate	K1050 10"	BSP	RO
1	Floor Stop	441/443	BSP	RO
2	Full Height Actuator	639		NO

Notes: Pressing actuator on either side of door will power open the door.

Set: 6.0

3	Hinge, Full Mortise	TA2714 4-1/2" x 4"	BSP	MK
1	Storeroom Lock	ALX80 .SAT	622	SC
1	Floor Stop	441/443	BSP	RO

Set: 7.0

3	Hinge, Full Mortise	TA2714 4-1/2" x 4"	BSP	MK
1	Bath/Bedroom Privacy Lock	ALX40 .SAT	622	SC
1	Wall Stop	406	BSP	RO

Set: 8.0

4	Hinge, Full Mortise	TA2714 4-1/2" x 4"	BSP	MK
1	Bath/Bedroom Privacy Lock	ALX40 .SAT	622	SC
1	Wall Stop	406	BSP	RO

Set: 9.0

3	Hinge, Full Mortise	TA2714 NRP 4-1/2" x 4"	BSP	MK
1	Storeroom Lock	ALX80 .SAT	622	SC
1	Surface Closer	CLP8301	BSP	NO
1	Kick Plate	K1050 10"	BSP	RO
1	Gasketing	S88BL		PE

Set: 10.0

3	Hinge, Full Mortise	TA2714 NRP 4-1/2" x 4"	BSP	MK
1	Entrance Lock	9K37AB 15D	622	BE
1	Best Core	By City of Winnipeg		BE
1	Electric Strike	1500C	BSP	HS
1	Automatic Opener	5730	BSP	NO
1	Kick Plate	K1050 10"	BSP	RO
1	Floor Stop	441/443	BSP	RO
1	Gasketing	S88BL		PE
2	Full Height Actuator	639		NO
1	Power Supply	By Security/Electrical		OT

Notes: Operator to be manually turned on or off by use of toggle switch on operator header. When door is locked operator must be turned off.

Set: 11.0

8	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	BSP	MK
2	Flush Bolt	555	BSP	RO
1	Dust Proof Strike	570	BSP	RO
1	Dormitory Lock	45H7TD 15H	622	BE
1	Best Core	By City of Winnipeg		BE
2	Surface Closer	CLP8301T	BSP	NO
2	Kick Plate	K1050 10"	BSP	RO
1	Threshold	252x3AFG		PE
1	Gasketing	2891BSPS		PE
2	Sweep	18100BSPNB		PE
1	Astragal	By Door Supplier		OT

Notes: Mortise lock has built in deadbolt. Outside lever is locked when deadbolt is thrown and unlocked when deadbolt is retracted. Turning inside lever will release the latch and retract the deadbolt with one motion. Door closers have built in thumbturn hold open.

Set: 12.0

4	Hinge, Full Mortise	TA2314 NRP 4-1/2" x 4"	BSP	MK
1	Dormitory Lock	45H7TD 15H	622	BE
1	Best Core	By City of Winnipeg		BE
1	Surface Closer	CLP8301	BSP	NO
1	Kick Plate	K1050 10"	BSP	RO
1	Threshold	252x3AFG		PE
1	Gasketing	2891BSPS		PE
1	Sweep	18100BSPNB		PE
1	Astragal	3572SP		PE

Notes: Mortise lock has built in deadbolt. Outside lever is locked when deadbolt is thrown and unlocked when deadbolt is retracted. Turning inside lever will release the latch and retract the deadbolt with one motion.

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 08 11 00 – Metal Doors and Frames

.2 Section 08 44 13- Glazed Aluminum Curtain Walls

.3 Section 08 50 00- Windows

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C542-05 , Standard Specification for Lock-Strip Gaskets.

.2 ASTM D790-07e1 , Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.3 ASTM D1003-07e1 , Standard Test Method for Haze and Luminous Transmittance of Plastics.

.4 ASTM D1929-96(R2001)e1 , Standard Test Method for Determining Ignition Temperature of Plastics.

.5 ASTM D2240-05 , Standard Test Method for Rubber Property - Durometer Hardness.

.6 ASTM E84-10 , Standard Test Method for Surface Burning Characteristics of Building Materials.

.7 ASTM E330-02 , Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.8 ASTM F1233-08 , Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-12.1-M90 , Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.2-M91 , Flat, Clear Sheet Glass.

.3 CAN/CGSB-12.3-M91 , Flat, Clear Float Glass.

.4 CAN/CGSB-12.4-M91 , Heat Absorbing Glass.

.5 CAN/CGSB-12.6-M91 , Transparent (One-Way) Mirrors.

.6 CAN/CGSB-12.8-97 , Insulating Glass Units.

.7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.

.8 CAN/CGSB-12.9-M91 , Spandrel Glass.

.9 CAN/CGSB-12.10-M76 , Glass, Light and Heat Reflecting.

.10 CAN/CGSB-12.11-M90 , Wired Safety Glass.

.11 CAN/CGSB-12.12-M90 , Plastic Safety Glazing Sheets.

.12 CAN/CGSB-12.13-M91 , Patterned Glass.

.3 Glass Association of North American (GANA)

.1 GANA Glazing Manual - 2008 .

.2 GANA Laminated Glazing Reference Manual - 2009 .

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

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

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit duplicate samples of finish and sealant material.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect glazing and frames from nicks, scratches, and blemishes.

.3 Protect prefinished aluminum surfaces with strippable coating.

.4 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

.1 Ambient Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

Part 2 Products

2.1 MATERIALS

.1 Design Criteria:

.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to design pressure to ASTM E330.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Insulating Glass Units:

.1 Insulating glass units: to CAN/CGSB-12.8, double unit with superspacer;

.1 Glass thickness: 6 mm (1/4 inch)

.2 Air Space: 12.7 mm (1/2 inch)

.3 Glass coating: Low E coating, Clear glass with Solarban 60 coating on surface #2.

.4 Fill: Argon

.5 Edge Seal material Colour: Black

.6 Standard of Acceptance: Vitro Architecture Glass (formerly PPG) or approved equal by Guardian or others.

.7 Door glazing to be tempered.

.3 Flat Glass:

.1 Float glass: to CAN/CGSB-12.3, Single Pane, 6 mm (1/4 inch) tempered glass

.2 Wired Glass:

.1 To CAN/CGSB-12.1 in sidelight at door D116B.

.3 Silvered mirror glass: (1/4 inch)

.1 Type 1A-float glass for normal use.

.2 Polish and grind edges.

.3 Accessories:

.1 CRL Satin Anodized Canadian Style ¼" Deep Nose 'J' Channel (or approved equal) around perimeter of mirror.

.4 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.2 ACCESSORIES

.1 Setting blocks: Per manufacturer's standard type, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method.

.2 Spacer shims: Per manufacturer's standard type, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper;

.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal.

.4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot.

2.3 PLASTIC FILM

.1 Provide Plastic Film applied to Glazing in areas adjacent to Doors D100, D101A, D101B and other location as shown on drawings

.1 Standard of Acceptance

.1 Macal Frosted Glass #9798-01

.2 Approved equal and colour match by 3M.

.3 Pattern and colour to be determined.

Part 3 Execution

3.1 EXAMINATION

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

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Visually inspect substrate.

.4 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.4 INSTALLATION: EXTERIOR - WET METHOD (SEALANT AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Place setting blocks at 1/3 points and install glazing light or unit.

.3 Install removable stops with glazing centred in space by inserting spacer shims both sides at 600 mm intervals, 6 mm below sight line.

.4 Fill gaps between glazing and stops with sealant to depth of bite on glazing, maximum 9 mm below sight line to ensure full contact with glazing and continue air and vapour seal.

.5 Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.

.5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

.6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

.7 Trim protruding tape edge.

3.6 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass [and mirrors] using approved non-abrasive cleaner in accordance with manufacturer's instructions.

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

3.8 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 06 08 99- Rough Carpentry for Minor Works

.2 Section 06 20 00- Finish Carpentry

.3 Section 07 21 13 – Board & Semi Rigid Insulation.

.4 Section 07 21 29.03- Sprayed Insulation – Polyurethane Foam

.5 Section 07 26 00 - Vapour Retarders

.6 Section 07 84 00- Firestopping

.7 Section 09 22 16 – Non-Structural Metal Stud Framing

.8 Section 09 30 13- Ceramic Tiling

.9 Section 09 91 23 – Interior Painting

1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C475-02(2015) , Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C514-04(2014) , Standard Specification for Nails for the Application of Gypsum Board.

.3 ASTM C557-03(2009)e1 , Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C840-16 , Standard Specification for Application and Finishing of Gypsum Board.

.5 ASTM C954-15 , Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.6 ASTM C1002-14 , Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.7 ASTM C1047-14a , Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.8 ASTM C1177/C1177M-13 , Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.9 ASTM C1178/C1178M-13 , Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.10 ASTM C1280-13a , Standard Specification for Application of Gypsum Sheathing.

.11 ASTM C1396/C1396M-14a , Standard Specification for Gypsum board.

.3 Association of the Wall and Ceilings Industries International (AWCI)

.1 AWCI Levels of Gypsum Board Finish-GA-214-2015 .

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988) , Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CAN/CGSB-71.25-M88 , Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Underwriters' Laboratories of Canada (ULC)

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Certifications:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Exercise care in unloading gypsum board materials shipment to prevent damage.

.4 Storage and Handling Requirements in accordance with ASTM C 840–16:

.1 Store gypsum board assemblies materials level flat in dry location off ground indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

.3 Protect gypsum board from direct exposure to rain, snow, sunlight, or other excessive weather conditions.

.4 Protect ready mix joint compounds from freezing, exposure to extreme heat and direct sunlight.

.5 Protect from weather, elements and damage from construction operations.

.6 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.7 Protect prefinished aluminum surfaces with strippable coating or wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.8 Replace defective or damaged materials with new.

1.5 AMBIENT CONDITIONS

.1 Maintain temperature 10 °C minimum, 21 °C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, clean, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products

2.1 MATERIALS

.1 Refer to Drawings for locations.

.2 Standard gypsum board: to ASTM C1396/C1396M, paper-faced; 1200 mm wide x maximum available length in place, tapered edges, ends square cut.

.1 Fire rated core (Type X), 16 mm (5/8 inch) thick.

.1 Standard of Acceptance:

.1 Certainteed Type C drywall

.2 CGC/USG Sheetrock Brand Firecode X Gypsum Board

.3 Approved Equal

.2 Moisture and Mold Resistant (Type X), 13 mm (1/2 inch) thick for wet locations (Room 104 (sink area) 106, 107, 108)

.1 Standard of Acceptance:

.1 Certainteed M2TECH Moisture and Mold Resistant or approved equal.

.3 Abuse Resistant (Type X), 16 mm (5/8 inch) thick.

.1 Standard of Acceptance:

.1 Certainteed Abuse Resistant or approved equal.

.3 Tile Backer Boards:

.1 Ceramic Tile Wall Backer (TB-1) (Room 104, 106, 107, 108): Fully embedded glass mat gypsum tile backer meeting the requirements of ASTM C 1178, Flame spread: ASTM E 84: Class A and Smoke developed: ASTM E 84: Class A.

.1 Type and Thickness: Type X, 5/8 inch (15.9 mm) thick where indicated and as otherwise required to meet fire rating for specific element. 1/2 inch (12.7 mm) elsewhere.

.2 Standard Size: 4 feet by 8 feet (1219 by 2438 mm)j.

.3 Standard of Acceptance:

.1 "Diamondback GlasRoc Tile Backer" with EGRG Technology by CertainTeed Gypsum, Inc.

.2 Waterproof Tile Substrate for Showers (TB-2) (Room 109):

.1 Interior Shower Applications: ASTM E96, C518 and E84. Manufactured from extruded polystyrene foam, with a cement-free reinforcement layer laminated to both sides, 13 mm (1/2 inch) thick, ends square cut.

.2 Standard of Acceptance:

.1 Kerdi-Board, manufactured by Schluter (interior applications).

.4 Ceiling Suspension: Contractor has the option of using either a proprietary suspension system or a three-component direct-hung system to suspend gypsum board ceilings.

.1 Drywall Grid Ceiling Framing

.1 Standard of Acceptance:

.1 Armstrong Drywall Grid Ceiling Framing or approved equal.

.2 Manufacturer Approved method using steel studs and channels suspended by hangar wire

.5 Accessories:

.1 Nails: to ASTM C514-14

.2 Steel drill screws: to ASTM C1002-14.

.3 Stud adhesive: to ASTM C557 and CAN/CGSB-71.25.

.4 Laminating compound: as recommended by manufacturer, asbestos-free.

.5 Sealants: in accordance with Section 07 92 00- Joint Sealants.

.6 Polyethylene: to CAN/CGSB-51.34, Type 2.

.7 Joint compound: to ASTM C475, asbestos-free.

.8 Casing beads: ASTM 1047, GA-216, metal G90 Zinc finish, perforated flanges, one piece length per location.

.1 Product: D-100, manufactured by Bailey Metal Products Ltd. or approved equal

.9 Corner beads: ASTM 1047, GA-216, metal commercial grade sheet steel with G90 Zinc finish perforated and knurled 32mm (1 ¼ inch) flanges; one piece length per location.

.10 Edge trim: to ASTM C1047, GA-216; Type U casing bead.

.11 Drywall metal trim: galvanized steel

.1 Product: D-200, manufactured by Bailey Metal Products Ltd. or approved equal.

.12 Corner Guards (CG): Stepped outside corned, extruded alloy 6063 T5 aluminum, white. Full height of wall

.1 Product: DRMW 50-50, manufactured by Fry Reglet Ltd. or approved equal

2.2 FINISHES

.1 Texture finish: asbestos-free standard white texture coating and primer-sealer, recommended by gypsum board manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C840-16 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C1280-13a.

.3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840-16 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.

.7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.10 Install wall furring for gypsum board wall finishes to ASTM C840–16, except where specified otherwise.

.11 Furr openings and around built-in equipment, cabinets, access panels.

.12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.

.2 Apply single layer gypsum board to wood furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls to ASTM C840-16.

.2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 10” (250) mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 10” (250) mm with base layer joints.

.3 Apply water-resistant gypsum board where indicated. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.4 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts,

.5 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 10” (250) mm.

.6 Install gypsum board on walls vertically to avoid end-butt joints. At high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.7 Install gypsum board with face side out.

.8 Do not install damaged or damp boards.

.9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 6”(150 mm) on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints at changes in substrate construction, or where indicated on drawings. Locate control joints over door openings aligned with corner of door frame and carry up to top of partition.

.8 Install control joints straight and true.

.9 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.

.10 Install expansion joint straight and true.

.11 Install access doors to electrical and mechanical fixtures specified in respective sections. See Section 08 31 00- Access Doors and Panels.

.1 Rigidly secure frames to furring or framing systems.

.12 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.13 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 0: No tapping, finishing or accessories required.

.2 Level 1: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.

.3 Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.

.4 Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.5 Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.6 Level 5: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.14 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.15 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish and painting is completed.

.16 Tape and fill joints above ceiling line to underside of structure in all walls and to floor line for proper installation of base.

.17 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.18 Completed installation smooth, level or plumb, free from waves and other defects and ready for painting or other surface finishes.

.19 Mix joint compound slightly thinner than for joint taping.

.20 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.

.21 Allow skim coat to dry completely.

.22 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

3.7 SCHEDULES

.1 Level 2: Above finished ceilings concealed from view.

.2 Level 4: Walls exposed to view.

.3 Level 4: Ceilings exposed to view.

.4 Construct fire rated assemblies where indicated on drawings.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Formed metal framing of studs and furring, at interior locations.

.2 Framing accessories.

.3 Gypsum board and joint treatment.

.4 Light gauge metal stud wall framing.

.5 Refer to Section 05 41 00 for exterior steel stud framing.

1.2 RELATED SECTIONS

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 06 10 13 - Wood Blocking and Curbing

.3 Section 07 26 00 - Vapour Retarders.

.4 Section 07 21 13 – Board & Semi Rigid Insulation.

.5 Section 07 62 00 – Sheet Metal Flashing and Trim

.6 Section 08 31 00 – Access Doors and Panels

.7 Section 09 21 16 - Gypsum Board Assemblies

.8 Section 09 30 13 – Non-Structural Metal Stud Framing

1.3 REFERENCES

.1 ASTM A123/A123M-09 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A653/A653M-09 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM C645-09a - Non-Structural Steel Framing Members.

.4 ASTM C754-04 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.5 ASTM C1002-07 - Steel Self-Piercing, Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.6 CAN/CGSB-1.181-99 - Ready-Mixed, Organic Zinc-Rich Coating.

.7 CAN/CGSB-7.1-98 - Lightweight Steel Wall Framing Components.

.8 SSPC (The Society for Protective Coatings) - Steel Structures Painting Manual.

.9 Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.10 CAN/CSA-S136-07 - North American Specification for the Design of Cold-Formed Steel Structural Members.

.11 CSA W47.1-03 (R2008) - Certification of Companies for Fusion Welding of Steel Structures.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the placement of components within the stud framing assembly specified elsewhere.

1.5 QUALITY ASSURANCE

.1 Perform Work to ASTM C754 Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

Part 2 Products

2.1 STUD FRAMING MATERIALS

.1 Studs: ASTM A653/A653M, non-load bearing rolled steel, channel shaped, punched for utility access, as indicated on Drawings.

.1 Thickness (Interior): 0.53 mm (25 gauge) unless otherwise noted.

.2 Studs at Ceramic Wall Tile: ASTM A653/A653M, non-load bearing rolled steel, channel shaped, punched for utility access, as indicated on Drawings.

.1 Thickness (Interior): 0.76 mm (20 gauge) unless otherwise noted

.3 Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs.

.1 Compression Track: Supply electrogalvanized 0.9mm (20ga.) nominal core thickness steel track with minimum 50mm (2 inch) deep leg and sufficient width to accommodate deflection movement in structure with compressing wall studs.

.4 Ceiling Runners: Interior Steel Studs and Furring of the Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual With extended leg retainer.

.1 20ga. 0.88mm (0.035 inch), as detailed with leg length to allow for 50mm (2 inch) movement.

.5 Furring and Bracing Members: Of same material as studs; thickness to suit purpose.

.1 0.5mm (25ga.) core thickness.

.2 22 x 65mm (7/8 inch x 2 ½ inch) hat section, galvanized.

.6 Fasteners: ASTM C1002, self drilling, self tapping screws.

.1 Non-load bearing channel stud framing: to ASTM 645-76. "Non-load Bearing Steel Studs, runners (Track), and Rigid Furring Channels for Screws".

.2 Screws for the application to steel studs, runners and furring channels: to ASTM C646-78a "Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gauge Steel Studs".

.3 Screw penetration beyond joined materials shall not be less than 3 exposed threads.

.4 Thread types and drilling capability shall conform to the manufacturer's recommendations.

.5 Screws covered by sheathing materials shall have low profile heads.

.7 Acoustical Insulating Tape: Interior Steel Studs and Furring of the Association of Wall and Ceiling Contractors (A.W.C.C.) Specification Standards Manual.

.8 Bracing: cross bracing 25mm (1 inch) x 16ga. galvanized metal strapping for diagonal bracing.

.9 Sill Gasket: Neoprene purpose made closed cell sill gasket to be installed under base track of exterior steel studs.

.10 Acoustic Sealant: As specified in Section 09 21 16.

.11 Touch-Up Primer for Galvanized Surfaces: CAN/CGSB-1.181.

2.2 FABRICATION

.1 Fabricate assemblies of framed sections to sizes and profiles required.

.2 Fit, reinforce, and brace framing members to suit design requirements.

.3 Fit and assemble in largest practical sections for delivery to Site, ready for installation.

2.3 FINISHES

.1 Accessories: Same finish as framing members.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that rough-in utilities are in proper location.

3.2 ERECTION

.1 Align and secure top and bottom runners at 600 mm (24 inches) on centre.

.2 Place two (2) beads of acoustic sealant between runners and substrate to achieve an acoustic seal.

.3 Place one (1) beads of acoustic sealant between studs and adjacent vertical surfaces to achieve an acoustic seal.

.4 Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

.5 Install studs vertically at 400 mm (16 inches) on centre, unless otherwise noted on Drawings.

.6 Align stud web openings horizontally.

.7 Secure studs to tracks using fastener method. Do not weld.

.8 Stud Splicing: Not permissible.

.9 Fabricate corners using a minimum of three studs.

.10 Double stud at wall openings, door and window jambs, not more than 50 mm (2 inches) from each side of openings.

.11 Brace stud framing assembly rigid.

.12 Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.

.13 Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.

.14 Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, opening frames, and all other wall mounted installations.

.1 Secure wood blocking to studs.

.15 Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through the ceiling to the structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

.16 Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 ACCESS PANELS

.1 Co-ordinate the work and prepare openings for access panels in gypsum wallboard partitions and ceilings. Installation of the access panel will be by Section 09 21 16 - Gypsum Board Assemblies, unless noted otherwise. This section prepares the opening with metal stud back up.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00- Joint Sealing

.2 Section 09 21 16- Gypsum Board Assemblies

.3 Section 10 28 14- Toilet and Bath Accessories

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108.1-99 , Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).

.2 CTI A118.3-92 , Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).

.3 CTI A118.4-92 , Specification for Latex Cement Mortar (included in ANSI A108.1).

.4 CTI A118.5-92 , Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).

.5 CTI A118.6-92 , Specification for Ceramic Tile Grouts (included in ANSI A108.1).

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

.1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.

.2 ASTM C207-06 , Specification for Hydrated Lime for Masonry Purposes.

.3 ASTM C847-06 , Specification for Metal Lath.

.4 ASTM C979-05 , Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988) , Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CGSB 71-GP-22M-78(AMEND.), Adhesive, Organic, for Installation of Ceramic Wall Tile.

.3 CAN/CGSB-75.1-M88 , Tile, Ceramic.

.4 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.4 CSA Group (CSA)

.1 CSA A123.3-05 , Asphalt Saturated Organic Roofing Felt.

.2 CAN/CSA-A3000-03(R2006) , Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.

.2 Tile Maintenance Guide 2000 .

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data in accordance with Section 01 33 00- Submittal Procedures.

.1 Include manufacturer's information on:

.1 Ceramic tile, marked to show each type, size, and shape required.

.2 Chemical resistant mortar and grout (Epoxy and Furan).

.3 Cementitious backer unit.

.4 Dry-set cement mortar and grout.

.5 Divider strip.

.6 Elastomeric membrane and bond coat.

.7 Reinforcing tape.

.8 Levelling compound.

.9 Latex cement mortar and grout.

.10 Commercial cement grout.

.11 Organic adhesive.

.12 Slip resistant tile.

.13 Waterproofing isolation membrane.

.14 Fasteners.

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

.1 Wall tile: submit 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.

.2 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.

.3 Adhere tile samples to 13 mm thick plywood and grout joints to represent project installation.

1.4 QUALITY ASSURANCE

.1 Quality Assurance Submittals:

.1 Manufacturer's Instructions: manufacturer's installation instructions.

1.5 MOCK-UP

.1 Section 01 45 00 – Quality Control: Requirements for mock-up.

.2 Ceramic Wall Tiling

.1 Provide 1 m wide x full height of wall mockup, with backer board, finish grout and specified accessories.

.3 Ceramic Floor Tiling:

.1 Provide 3 m (3 feet) long by 1 m (3 feet) wide mock-up, with cleavage membrane, finish grout, and specified accessories.

.4 Locate where directed by Contract Administrator.

.5 Approved mock-up may remain as part of the Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

1.8 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.

.3 Maintenance material same production run as installed material.

Part 2 Products

2.1 WALL TILE

.1 Ceramic tile (CT-1): to CAN/CGSB-75.1, Type 5, Class MR 4, smooth surface, 305mm (12”) x 902 mm (35.5”) x 9.5 mm (3/8”) thickness, as indicated on drawings.

.1 Product: White Wall, Manufactured by Julian Tile, or approved equal

.1 Colour: White MGW1236, Gloss

.2 Pattern: Horizontal Stacked Bond per interior elevations.

2.2 FLOOR TILE

.1 Porcelain tile (CT-2): to ANSI A137.1, 50mm (2”) x (50mm (2”), 305mm x 305mm (12”x12”) mesh, non-slip abrasive surface (unglazed finish), as indicated on drawings and schedule.

.1 Product: Eclipse by Julian Tile, or approved equal

.1 Colour: Black ECBLMOS2U, Unglazed

2.3 TILE BACKER BOARD

.1 Refer to Section 09 21 16 - Gypsum Board Assemblies for Wall Backer (TB-1) and Waterproof Tile Substrate (TB-2).

2.4 MORTAR AND ADHESIVE MATERIALS

.1 Fibre reinforced, polymer modified thin set mortar.

.1 Standard of Acceptance:

.1 X77 Microtec by Ardex

.2 Approved equal

2.5 GROUT

.1 Epoxy grout and adhesive:

.1 100% solids epoxy grout.

.2 Solvent free, low VOC, two component system.

.3 Job coloured grout are not acceptable.

.1 Product: Ardex WA or approved equal

.2 Colour: To be selected from manufacturer's standard range.

2.6 ACCESSORIES

.1 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Cleavage plane: polyethylene film to CGSB 51-34.

.3 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

.4 Sealant: in accordance with Section 07 92 00- Joint Sealants.

.1 Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.5 Floor sealer and protective coating: to CAN/CGSB-25.20, to tile and grout manufacturers recommendations.

.6 Reducer Strips: purpose made metal extrusion; anodized aluminum type, ball-and-socket hinged profile with sloped, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.1 Standard of Acceptance:

.1 Schluter®, RENO-U.

.1 Profile with sloped exposed surface: 4mm (5/32 inch) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelain/Ceramic Tile and Concrete Transitions.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.7 Finishing and Edge-Protection Profiles for walls: purpose made metal extrusion; anodized aluminum type, profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.1 Standard of Acceptance;

.1 Schluter®, SCHIENE.

.1 Profile: Square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelain/Ceramic Tile terminations and exposed edges.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.2 Schluter®, DILEX-EKE.

.1 Profile: Coved surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Ceramic Tile inside corner edges at and wall transitions.

.4 Installation method: To suit selected ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.3 Schluter®, DILEX-HKA.

.1 Profile: Coved surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At all Porcelian/Ceramic Tile wall to floor transitions.

.4 Installation method: To suit selected porcelain/ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

.4 Schluter®, QUADEC

.1 Profile: Squsre reveal surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

.2 Material and Finish: AE – Satin Anodized Aluminum.

.3 Location: At Ceramic Tile outside corner wall to wall transitions.

.4 Installation method: To suit selected porcelain/ceramic tile thickness.

.5 Install as per the recommendations and specifications of the manufacturer.

2.7 MIXES

.1 To suit substrate and wall tile.

2.8 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 WORKMANSHIP

.1 Do tile work in accordance with the latest edition of TTMAC Tile Installation Manual, "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Use metal trims at all inside and outside corners and at floor to wall transitions.

.9 Use metal trims at termination of wall tile panels.

.10 Allow minimum 24 hours after installation of tiles, before grouting.

.11 Clean installed tile surfaces after installation and grouting cured.

.12 Make expansion joints at 20’-0” max, both directions and where indicated on drawings.

3.3 WALL & FLOOR TILE

.1 Install in accordance with TTMAC details.

.2 Level substrate with smoothing / ramping mortar specified if required prior to tile installation.

.3 Ensure cement board is securely fastened so that no deflection is present.

.4 All mortars to be applied in a unidirectional manner.

.5 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.6 Clean installed tile surfaces after installation and grouting cured.

.7 Install divider strips at junction of tile flooring and dissimilar materials.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11- Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 ASTM International

.1 ASTM C635/C635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.3 ASTM E1477-98a(2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

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

.1 Material Safety Data Sheets (MSDS).

.4 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S102-2007, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS.

.3 Shop Drawings:

.1 Submit reflected ceiling plans for special grid patterns as indicated.

.2 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, change in level details, and acoustical unit support at ceiling fixture, lateral bracing and accessories.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate full size samples of each type acoustical units.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.

.3 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.

.4 Store and protect acoustic ceiling materials from nicks, scratches, and blemishes.

.5 Replace defective or damaged materials with new.

Part 2 Products

2.1 COMPONENTS

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.

.1 ACT:

.1 Type 4, Form 2.

.2 Pattern E. Class A.

.3 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.

.4 Smoke developed 50 or less in accordance with CAN/ULC-S102.

.5 Noise Reduction Coefficient (NRC) designation of 70.

.6 Edge type: narrow reveal edge, bevelled.

.7 Colour bright white.

.8 Size 610mm (2’-0”) x 1220mm (4’-0”) x 19mm (7/8”) thick.

.9 Acceptable Product: CertainTeed Symphony m 1220BF-80-1

.2 Acoustical Suspension:

.1 Intermediate duty system to ASTM C635.

.2 All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

.1 **Acceptable Product:** Certainteed 15/16” Classic Stab System, Trim Edge, complete with perimeter shadow mold SM1020.

.3 Hanger wire: galvanized soft annealed steel wire, 3.6 mm diameter for access tile ceilings.

.4 Hanger inserts: purpose made.

.5 Accessories: splices, clips, wire ties, retainers and wall shadow molding reveal, to complement suspension system components, as recommended by system manufacturer.

.3 Performance/Design Criteria:

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

2.2 ACCESSORIES

.1 Touch-up paint: in accordance with manufacturer's recommendations for surface conditions:

.1 Paint: VOC limit 250 g/L maximum to GS-11.

.2 Ceiling Bulkhead Trim: provide purpose made aluminum ceiling trim to form bulkhead as detailed on drawings. Depth to suit installation.

.1 Cloud perimeter trim by CertainTeed. Colour: white

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions prior to acoustical ceiling installation.

.1 Visually inspect substrate in presence of Contract Administrator.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.

.2 Suspension System:

.1 Erect ceiling suspension system after work above ceiling has been inspected by Contract Administrator.

.2 Secure hangers to overhead structure using attachment methods as indicated.

.3 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.4 Lay out system as indicated on Reflected Ceiling Plan.

.5 Install wall moulding to provide correct ceiling height.

.6 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, microphones and speakers.

.7 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.8 Interlock cross member to main runner to provide rigid assembly.

.9 Ensure finished ceiling system is square with adjoining walls and level within 1:1000.

.3 Acoustic Panels:

.1 Install acoustical panels and tiles in ceiling suspension system.

.2 Co-ordinate ceiling work with work of other sections such as interior lighting, fire protection communication, and intrusion and detection systems.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by acoustical ceiling installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 ASTM E84-09c - Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM F1861-08 - Resilient Wall Base.

.3 ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.4 ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

.5 ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.

.6 ASTM D2047 - 04 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

.7 ASTM F2034-08 - Sheet Linoleum Floor Covering.

.8 CAN/ULC-S102.2-07 - Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colours available.

.3 Shop Drawings: Indicate seaming plan.

.4 Samples:

.1 Submit two (2) 600 mm (24 inch) long samples of base material for each colour specified.

1.4 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's special installation requirements including special procedures, perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

.2 Extra Stock Materials: Provide 10% of base of each material specified.

1.7 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 14000 certification requirements.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented.

1.8 REGULATORY REQUIREMENTS

.1 Rubber Base:

.1 Conform to applicable code for flame/smoke rating requirements of Class A to ASTM E84.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Protect roll materials from damage by storing on end.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Store materials for three days prior to installation in area of installation to achieve temperature stability.

.2 Maintain ambient temperature required by adhesive manufacturer three (3) days prior to, during, and twenty-four (24) hours after installation of materials.

Part 2 Products

2.1 MATERIALS - BASE

.1 Manufacturers:

.1 Johnsonite; Product: Traditional Rubber Wall Base.

.2 Substitutions: Not permitted.

.2 Base (RB): ASTM F1861, Type TP thermoplastic rubber; top set coved; premoulded external corners:

.1 Hardness: To ASTM D2240 Rubber – 85 Shore A.

.2 Height: 100 mm (4 inch).

.3 Thickness: 3 mm (1/8 inch) thick.

.4 Length: Installers choice.

.5 Colour: to be selected from manufacturers full range.

.3 Base Accessories: Premoulded end stops and external corners, of same material, size, and colour as base.

2.2 ACCESSORIES

.1 Primers and Adhesives: Types recommended by flooring manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 70 00: Verify existing conditions before starting work.

.2 Verify concrete floors are dry to a maximum moisture content of 7%, and exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

.1 Prepare site and substrate to manufacturer's written instructions.

.2 Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

.3 Prohibit traffic until filler is cured.

.4 Vacuum clean substrate.

.5 Apply primer to surfaces.

.6 Area shall be clean, fully enclosed, weathertight and maintained at a uniform temperature of at least 68°F for 7 days before, during and after installation.

.7 Products to be installed, including adhesives shall be maintained at a uniform temperature of at least 68°F for 48hrs before installation.

.8 Coiled wall base shall lay flat temperature specified above for at least 24hrs prior to installation.

3.3 APPLICATION - BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Use toeless type base where floor finish will be carpet, coved type elsewhere.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.4 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Remove access adhesive from floor, base, and wall surfaces without damage and in accordance with manufacturer's written instructions.

.3 Clean, seal, and wax floor and base surfaces in accordance with manufacturer's written instructions.

3.5 PROTECTION OF FINISHED WORK

.1 Section 01 78 40: Protecting installed work.

3.6 SCHEDULES

.1 Refer to Room Finish Schedule.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 05 50 00 - Metal Fabrications

.2 Section 07 46 23 – Wood Siding

1.2 REFERENCE STANDARDS

.1 Environmental Protection Agency (EPA)

.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.

.2 SW-846, Test Method for Evaluating Solid Waste, Physical/Chemical Methods.

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

.1 Material Safety Data Sheets (MSDS).

.3 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - [current edition] .

.2 Standard GPS-1-12 , MPI Green Performance Standard.

.3 Standard GPS-2-12 , MPI Green Performance Standard.

.4 National Research Council Canada (NRC)

.1 National Fire Code of Canada 2015 (NFC).

.5 Society for Protective Coatings (SSPC)

.1 Systems and Specifications, SSPC Painting Manual 2011.

.2 Paint Application Guide No. 11.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling

.1 Provide work schedule for various stages of painting to Contract Administrator for approval. Provide schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Contract Administrator for changes in work schedule.

.3 Schedule new additions to existing building coordinate painting operations with other trades.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide in accordance with 00700 General Conditions.

.2 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers .

.4 Manufacturer's Material Safety Data Sheets (MSDS).

.3 Samples:

.1 Provide duplicate 200 x 300 mm sample panels of each special finish, clear coating and paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 19mm Arbor Wood Ash 190 wood siding for finishes over wood surfaces.

.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

.3 Provide full range of available colours where colour availability is restricted.

1.5 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.2 Include :

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour number[s] .

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Submit 1- four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Contractor: to have a minimum of 15 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.

.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work

.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Contract Administrator.

.7 Standard of Acceptance:

.1 Columns: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Roof Deck and Beams: no defects visible from floor level at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

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

.1 Labels: to indicate:

.1 Type of paint or coating.

.2 Compliance with applicable standard.

.3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:

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

.2 Observe manufacturer's recommendations for storage and handling.

.3 Store materials and supplies away from heat generating devices.

.4 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.5 Replace defective or damaged materials with new.

1.9 SITE CONDITIONS (Applies to On-Site Painting Only)

.1 Ambient Conditions:

.1 Heating, Ventilation and Lighting:

.1 Do not perform on-site painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds:

.1 15 % for hard wood.

.2 17 % for soft wood.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter.

.3 Application Requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

Part 2 Products

2.1 MATERIALS

.1 Paint materials for paint systems: to be products of single manufacturer.

2.2 COLOURS

.1 Submit proposed Colour Schedule to Contract Administrator for approval after Contract award.

.2 Colour schedule will be based upon selection of no more than 5 colours for the entire project.

.3 Selection of colours will be from manufacturers' full range of colours.

.4 Where specific products are available in restricted range of colours, selection will be based on limited range.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Contract Administrator 's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Contract Administrator.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 EXTERIOR PAINTING SYSTEMS

.1 Metal Fabrications Shop Painted using airless Spraying (Exterior Metal Fins, Overhead Door Jamb & Headers):

.1 Provide abrasive blast to SSPC-6.

.2 Prime Coat with Zinc Primer at 2-3 mils dry film thickness.

.1 Standard of Acceptance: Sherwin Williams Zinc Clad IV (85) Organic Zinc Rich Coating or approved equal by Devoe High Performance Coatings.

.3 Mid Coat with Epoxy at 5-7 mils dry film thickness.

.1 Standard of Acceptance: Sherwin Williams Dura-Plate 235 Multi-Purpose Epoxy or approved equal by Devoe High Performance Coatings.

.4 Top Coat with Polyurethane at 2-3 mils dry film thickness

.1 Standard of Acceptance: Sherwin Williams Hi-Solids Polyurethane (Semi Gloss) or approved equal by Devoe High Performance Coatings.

.5 Prior to each coat provide hand stripe coating to SSPC-11 on all edges, angles etc. that cannot be sprayed effectively.

.6 Colours

.1 Metal Fin Cladding (Colour 1)

.1 Black (exact colour to be determined).

.2 Metal Fabrications Site Painted (Hollow Metal Doors, Metal Bollards)

1. Sand for sandblasting: to SSPC (Steel Structures Painting Council).
2. Primer: epoxy, exterior; first coat. G4 finish, 3-4mil DFT.

.1 Standard of Acceptance**:**

.1 Macropoxy 646 Fast Cure Epoxy Part , by Sherwin Williams or approved equal in accordance with B7.

3. Finish Coat: aliphatic urethane, final coat. G4 finish. 3-4mil DFT.

.1 Standard of Acceptance:

.1 Corothane II Low VOC Polyurethane, by Sherwin Williams or approved equal.

.3 Wood Siding and Soffit (Arbor Wood Ash 190):

.1 Exterior Wood Base Finish (1 coat)

.1 Standard of Acceptance: SDF as manufactured by Sansin Corporation.

.2 Colour: Tint to be determined.

.2 Exterior Wood Top Coat (2 coats)

.1 Standard of Acceptance: SDF Topcoat as manufactured by Sansin Corporation.

.2 Colour: Tint to be determined.

.3 End Grain Treatment for Sawn Lumber (2 coats)

.1 Standard of Acceptance: End Seal as manufactured by Sansin Corporation.

.2 Apply after application of base finish and top coat. Mask adjacent edges to prevent drips. Where end grain won't be accessible after installation of wood install prior.

.3 Colour: Tint to be determined.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer’s written instructions:

.1 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.4 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements

.4 Clean metal surfaces to be painted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm .

3.5 EXISTING CONDITIONS

.1 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.2 Maximum moisture content as follows:

.1 Hard Wood: 15 %.

.2 Soft Wood: 17 %

3.6 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Contract Administrator.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations.Store items and re-install after painting is completed.

.5 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.6 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Contract Administrator and Park Representative .

3.7 APPLICATION

.1 Method of application for all metal including structural steel and metal fabrications is to be shop painted. Apply paint by airless sprayer. Brush and Roller application is acceptable for wood surfaces including Vertical Wood slat wall, Wood Beam and Column Cladding and for touch up of metal surfaces as required and approved by Contract Administrator. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application –Wood Siding and Soffit, Hollow Metal Doors, Bollards:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces to be free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray Application (Metal Wall Fins, Overhead Door Header and Jambs):

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Contract Administrator.

.5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

3.8 ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits and other electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Do not paint outdoor transformers and substation equipment.

3.9 FIELD QUALITY CONTROL

.1 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer to provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Contract Administrator or City of Winnipeg .

.2 Standard of Acceptance:

.1 Columns: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.3 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Contract Administrator.

3.10 CLEANING

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

.1 Leave Work area clean at end of each day.

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

3.11 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 40 00- Architectural Woodwork

.2 Section 07 46 23 – Wood Siding

.3 Section 08 11 00 – Metal Doors and Frames

.4 Section 09 21 16- Gypsum Board Assemblies

.5 Section 09 91 13 – Exterior Painting

1.2 REFERENCE STANDARDS

.1 Environmental Protection Agency (EPA)

.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.

.2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

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

.1 Material Safety Data Sheets (MSDS).

.3 Master Painters Institute (MPI)

.1 The Master Painters Institute (MPI)/Architectural Painting Specification Manual (ASM) - [current edition] .

.2 Standard GPS-1-12 , MPI Green Performance Standard.

.3 Standard GPS-2-12 , MPI Green Performance Standard.

.4 National Research Council Canada (NRC)

.1 National Fire Code of Canada 2015 (NFC).

.5 Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Coordinate painting operations with other trades.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Confirm products to be used are in MPI's approved product list.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 MPI Environmentally Friendly classification system rating.

.5 Manufacturer's Material Safety Data Sheets (MSDS).

.6 MPI #

.4 Samples:

.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.2 Submit duplicate 12" x 12" (300 x 300 mm) sample panels of each paint and special finish or stain with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

.1 5/8" (16 mm) gypsum board for finishes over gypsum board and other smooth surfaces.

.2 ½" (13 mm) douglas fir plywood for finishes over plywood.

.3 ¾" (19 mm) Arbor Wood Ash 190 Siding for finishes over interior wood siding.

.4 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.5 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.

.6 Manufacturer's Instructions:

.1 Provide manufacturer's installation and application instructions.

1.5 CLOSEOUT SUBMITTALS

.1 Provide in accordance with Section 01 78 00- Closeout Submittals.

.2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.

.3 Include:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 MPI Environmentally Friendly classification system rating.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Submit one (1) four litre can of each type, colour, and surface finish to City of Winnipeg.

.3 Label each container with colour, type, texture, room locations, in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Contractor: to have a minimum of 5 years proven satisfactory experience. When requested, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.

.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.

.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Contract Administrator.

.7 Standard of Acceptance:

.1 Walls: no defects visible from a distance of 1000 mm (39 inches) at 90 degrees to surface.

.2 Soffits and Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.1 Labels: to indicate:

.1 Type of paint or coating.

.2 Compliance with applicable standard.

.3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:

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

.2 Observe manufacturer's recommendations for storage and handling.

.3 Store materials and supplies away from heat generating devices.

.4 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Keep areas used for storage, cleaning and preparation, clean and orderly.

.6 Remove paint materials from storage only in quantities required for same day use.

.7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.8 Fire Safety Requirements:

.1 Provide one 9 kg dry chemical Type ABC fire extinguisher adjacent to storage area.

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

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada (NFC).

1.9 SITE CONDITIONS

.1 Ambient Conditions:

.1 Heating, Ventilation and Lighting:

.1 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Provide continuous ventilation for 7 days after completion of application of paint.

.3 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.4 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.5 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85 % or when the dew point is more than 3 degrees C variance between the

air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 15 % for hard wood.

.2 17 % for soft wood.

.3 12 % for plaster and gypsum board.

.4 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.2 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.3 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

Part 2 Products

2.1 MATERIALS

.1 Only Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Stain and varnish materials to be as specificied.

.3 Provide paint materials for paint systems from single manufacturer.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogenous coating; good flow and brushing properties; capable of curing free of streaks or sags.

.6 Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

.7 Patching Materials: Latex filler

.8 Fastener Head Cover Materials: Latex Filler

2.2 COLOURS

.1 Contract Administrator to provide colour schedule.

.2 Paint Colour schedule will be based upon selection of (3) base colours and (2) accent colours. No more than (5) paint colours will be selected for entire project.

.3 Stain Colour schedule will be based upon the selction of (2) base colours.

.4 Selection of paint and stain colours will be from manufacturers full range of colours.

.5 Where specific products are available in restricted range of colours, selection based on limited range.

.6 For deep and ultra deep colours; 4 coats may be required.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Contract Administrator for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity. Strain as necessary.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss @ 60 degrees	Sheen @ 85 degrees	
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35

Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated herein and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

.1 All interior painting systems to be MPI Premium Grade

.2 Refer to Finish Schedule for locations where Epoxy paint systems are to be utilized.

.3 Wood Siding and Soffit (Arbor Wood Ash 190):

.1 Interior Wood Base Finish (1 coat)

.1 Standard of Acceptance: SDF as manufactured by Sansin Corporation.

.2 Colour: Tint to be determined.

.2 Interior Wood Top Coat (2 coats)

.1 Standard of Acceptance: SDF Topcoat as manufactured by Sansin Corporation.

.2 Colour: Tint to be determined.

.4 Structural steel and metal fabrications: exposed columns, beams and metal fabrications:

.1 INT 5.1E Alkyd – level 5 finish (over alkyd primer).

.5 Galvanized metal: doors, frames, misc. steel, pipes, and exposed ducts.

.1 INT 5.3C - Alkyd Level 5 finish (over cementitious primer).

.6 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

.1 INT 9.2A - Latex Level 2 finish (over latex primer/sealer) for ceilings.

.2 INT 9.2A - Latex Level 4 finish (over latex primer/sealer) for walls.

.3 INT 9.2CC – Alkyd, W.B.

.4 INT 9.2E - Epoxy Finish Premium Grade (Satin) finish.

.7 Concrete masonry units: interior surfaces of exposed, smooth block:

.1 INT 4.2A – High Build Acrylic Topcoat, Gloss Level 1 finish.

.1 Standard of Acceptance:

.1 PPG Perma-Crete High Build 100% Acrylic Topcoat 4-22C or approved equal.

2.6 SPECIAL FINISHES

.1 Refer to Finish Schedule for locations where Epoxy paint systems are to be utilized.

.2 Staff Room Metal Bar counter support legs to be spray applied shop painted.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

.1 Plaster and gypsum board: 12 %.

.2 Hard Wood: 15 %.

.3 Soft Wood: 17%.

3.4 PREPARATION

.1 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.

.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.4 Allow surfaces to drain completely and allow to dry thoroughly.

.5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.

.6 Use trigger operated spray nozzles for water hoses.

.7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.3 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.

.1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.3 Tint filler to match stains for stained woodwork.

.4 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.5 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by blowing with clean dry compressed air, vacuum cleaning, or brushing with clean brushes.

.6 Touch up of shop primers with primer as specified.

3.5 PROTECTION

.1 Protect building surface and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Contract Administrator.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants, and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover any furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place “WET PAINT” signs in pedestrian and vehicle traffic areas.

3.6 APPLICATION

.1 Apply paint to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.10 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Do not paint over nameplates.

.5 Keep sprinkler heads free of paint.

.6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.7 Paint fire protection piping red.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint natural gas piping yellow.

.10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.11 Do not paint interior transformers and substation equipment.

3.8 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.9 FIELD QUALITY CONTROL

.1 In accordance with Section 01 45 00.

3.10 CLEANING

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

.1 Leave Work area clean at end of each day.

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

3.11 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Contract Administrator.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes the following:

.1 Interior Signage

.2 For plastic film applied to glazing refer to Section 08 80 00 Glass & Glazing

1.2 SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00.

.2 Submit shop drawings, catalogue sheets and full-size templates.

.3 Indicate materials, thicknesses, sizes, finishes, colours, construction details, mounting methods.

.4 Submit full size templates, drawn-to-scale details for individually fabricated or incised lettering indicating word and letter spacing.

.5 Submit duplicate representative sample of each type sign and mounting method.

1.3 QUALITY ASSURANCE

.1 Installer Qualifications: Workers sufficiently trained to undertake the required installations.

.2 Product Options: Drawings indicate locations of all installations.

.3 Each supplier shall be responsible for adjustments to place equipment to the satisfaction of the Contract Administrator, and the City of Winnipeg. The supplier shall co-operate with other trades concerned in this matter. The manufacturer and supplier assume responsibility for the equipment to meet all applicable regulatory standards for the installation intended.

1.4 PROJECT CONDITIONS

.1 Field Measurements: Indicate measurements on Shop Drawings.

Part 2 Products

2.1 INTERIOR SIGNAGE

.1 2 ply - 3mm thick plastic “limacoid” black engraving sheet with white core. Provide suitable adhesive backing for substrate. Sign graphics to be well defined, arranged for balanced appearance, and properly word and letter spaced per drawings.

.2 Braille; Clear plastic “Raster” type. Braille text to conform with the latest edition of the City of Winnipeg CWADS.

.3 Refer to Drawings for sizes, wording, braille, symbols, and mounting heights.

2.2 FABRICATION

.1 Fabricate signs in accordance with details, specifications and approved shop drawings.

.2 Build units square, true, accurate to size, free from visual or performance defects.

.3 Accurately fit and securely join sections to obtain tight, closed joints.

.4 Allow for thermal movement without distortion of components.

.5 Exposed fasteners permitted only where indicated or approved by Contract Administrator and to be inconspicuous and same finish and colour as base material, or as noted.

.6 Manufacturer's nameplates on sign surface locations visible in completed work not acceptable.

Part 3 Execution

3.1 INSTALLATION

.1 Erect and secure signs plumb and level at elevations indicated on drawings and as directed by Contract Administrator.

.2 Comply with sign manufacturer's installation instructions and approved shop drawings.

3.2 ADJUSTING AND CLEANING

.1 Clean signs in accordance with Section 01 74 11 – Cleaning.

.2 Repair damaged finishes so no evidence remains of corrective work. Use only materials and procedures recommended by manufacturer. Replace units that cannot be restored to their factory-finished appearance.

3.3 SCHEDULE

.1 Refer to Drawings for locations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Toilet and washroom accessories.

.2 Grab bars.

.3 Attachment hardware.

1.2 RELATED SECTIONS

.1 Section 05 50 00 – Metal Fabrications

.2 Section 06 10 13 – Wood Blocking and Curbing.

.3 Section 06 20 00 – Finish Carpentry.

.4 Section 07 92 00 – Joint Sealants.

.5 Section 09 30 13 - Ceramic Tiling.

.6 Section 09 91 13 – Interior Painting

.7 Section 10 14 00 – Building Signage

.8 Electrical Divisions and Drawings.

1.3 REFERENCES

.1 ASTM A123/A123M-08 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A167-99(2004) - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.3 ASTM A269-08 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.4 ASTM B456-03 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.5 CAN/CSA-B651-04 - Accessible Design for the Built Environment.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 31 00: Project management and coordination procedures.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on accessories describing base material, finish, size, finish, details of function, hardware and locks, attachment methods, description of rough-in-frame, and building-in details of anchor for grab bars.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Closeout Submittals.

1.7 REGULATORY REQUIREMENTS

.1 Conform to applicable code and CAN/CSA-B651 for accessibility requirements for the handicapped.

Part 2 Products

2.1 MANUFACTURERS

.1 Substitutions: Refer to Bid Opportunity.

2.2 MATERIALS

.1 Sheet Steel: ASTM A1008/A1008M.

.2 Stainless Steel Sheet: ASTM A167, Type 304.

.3 Stainless steel tubing: Type 304 mm wall thickness: 3/64” (1.2 mm)

.4 Adhesive: Two component epoxy type, waterproof.

.5 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit.

.6 Expansion Shields: Fibre, lead, or rubber as recommended by accessory manufacturer for component and substrate.

.7 Primer: Refer to Section 09 91 13.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components, smooth.

.2 Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

.3 Shop assemble components and package complete with anchors and fittings.

.4 Provide steel anchor plates, adapters, and anchor components for installation.

2.4 KEYING

.1 Supply two (2) keys for each accessory to City of Winnipeg.

.2 Master key all accessories.

2.5 FINISHES

.1 Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.

.2 Stainless Steel: No. 4 satin luster finish.

.3 Back paint components where contact is made with building finishes to prevent electrolysis.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that field measurements are as indicated.

.2 Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

.3 Verify exact location of accessories for installation and that blocking has been provided.

3.2 PREPARATION

.1 Deliver inserts and rough-in frames to site for timely installation.

.2 Provide templates and rough-in measurements as required.

3.3 INSTALLATION

.1 Install accessories to manufacturer instructions and CAN/CSA-B651.

.2 Install plumb and level, securely and rigidly anchored to substrate.

.3 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Toilet and shower compartments: use male to female through bolts.

.4 Install grab bars on built-in anchors provided by bar manufacturer.

.5 Use tamper proof screws/bolts for fasteners.

.6 Fill units with necessary supplies shortly before final acceptance of building.

.7 Install mirrors in accordance with Section 08 80 00- Glazing.

3.4 WASHROOM ACCESSORY MOUNTING HEIGHTS

.1 Install washroom accessories using dimensions shown on Drawings. Confirm all locations with Contract Administrator prior to installation. Janitor room accessories to be installed at the following height:

Janitor Shelf	1525mm (60")
Janitor Mop Holder	1525mm (60")

3.5 WASHROOM ACCESSORIES

.1 All components to be Bobrick Contoured line commercial grade unless otherwise indicated (or equal by Frost or ASI Watrous). Refer to drawings for quantity and locations.

.1	Toilet Paper Holder (TP)	Contura Series, Bobrick B-4288
.2	Sanitary Napkin Disposal (SND)	Bobrick B-254
.3	Shelf (SH)	Bobrick
.4	Liquid Soap Dispenser (LSD)	Contura Series, Bobrick B-818615
.5	Shower Curtain Rod (heavy duty)	Bobrick B-207
.6	Shower Curtain	Bobrick 204-3
.7	Shower Curtain Hooks (12 per curtain)	Bobrick 204-1
.8	Folding Shower Seat:	Frost 975 or Bobrick B-5181
.9	Grab Bars (GB1,GB2,GB3,GB4)	Frost or Bobrick 32mm (1 ¼")
.10	Framed mirror (FM):	Bobrick B-165
.11	Robe Hooks (CH):	Frost 1150
.12	Hand/Hair Dryer (HD):	Refer to Electrical
.13	Janitor Rack/Mop/Broom Holder (JMH)	Frost 1115
.14	Toilet Backrest:	Frost 1028
.15	Mirror (Washroom Vanity)	Refer to 08 80 00 Glass & Glazing

3.6 WASHROOM/MECHANICAL ROOM ACCESSORY SCHEDULE

(It is the Supplier's responsibility to confirm the quantities listed below with the contract drawings)

.2 **Universal Washroom # 108**:
1 - toilet paper holder
1- sanitary napkin dispenser
1 - liquid soap dispenser
1 – toilet backrest
2 - robe hooks
1 - 600 lg. grab bar (GB-1)
1 - 900 lg. grab bar (GB-2)
1 - 760 lg. grab bar (GB-3)
1 – framed mirror
1 - hand dryer (see elect.)
1 - Shelf
1 – washroom sign (refer to drawings and Section 10 14 00 Interior Signage)

.3 **Washroom #106:**
1 - toilet paper holder
1 - sanitary napkin disposal
1 – toilet backrest
1 - robe hook
1 – washroom sign (refer to drawings and Section 10 14 00 Interior Signage)

.4 **Washroom #107:**
1 - toilet paper holder
1 - sanitary napkin disposal
1 – toilet backrest
1 - robe hook
1 – washroom sign (refer to drawings and Section 10 14 00 Interior Signage)

.5 **Shower #109:**
1 - shower seat
1 - liquid soap dispenser
2 - robe hooks
1 - shower curtain, rod and hooks
1 – 760mm H x 900mm L grab bar (GB-4)
1 – shower sign (refer to drawings and Section 10 14 00 Interior Signage)

.6 **Mechanical Room #110:**
1 – Janitor rack and mop/broom holder (Locate over mop sink)

3.7 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.8 CLEANING

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

.1 Leave Work area clean at end of each day.

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

3.9 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fire extinguishers where indicated on Drawings.

.2 Cabinets.

.3 Accessories.

1.2 RELATED SECTIONS

.1 Section 06 10 13 - Wood Blocking and Curbing.

.2 Section 09 91 23 – Interior Painting.

1.3 REFERENCES

.1 NFPA 10-2007 - Portable Fire Extinguishers.

.2 CAN/ULC-S504-02 - Dry Chemical Fire Extinguishers.

.3 CAN/ULC-S508-02 - Rating and Fire Testing of Fire Extinguishers.

.4 National Fire Code.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide extinguisher operational features, colour and finish, anchorage details.

.3 Shop Drawings: Indicate cabinet, physical dimensions, rough-in measurements for surface-mounted cabinets, wall bracket mounted measurements location and mounting heights.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Operation and Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

.3 Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

1.6 QUALITY ASSURANCE

.1 Products of This Section: Manufactured to ISO 9000 certification requirements.

.1 Provide units conforming with CAN/ULC-S508.

1.7 REGULATORY REQUIREMENTS

.1 Conform to NFPA 10 for requirements for extinguishers.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

Part 2 Products

2.1 MANUFACTURERS

.1 National Fire Equipment Ltd.; Product: Strike First (Diamond) Steel Cylinder Dry Chemical.

.2 National Fire Equipment Ltd.; Product: Fire Extinguisher Cabinet.

.3 Substitutions: Refer to Section 01 62 00.

2.2 EXTINGUISHERS

.1 Cartridge operated type or stored pressure rechargeable type with hose and shut off nozzle, ULC labelled for Class ABC protection, Size 1.5kg mininum.

.2 Extinguisher Finish:

.1 Enamel, colour Red.

2.3 CABINETS

.1 Surface mounted (all locations U.N.O.) (FE-1)

.1 Provide and install N.F.E. Model ECS-999-3 (10 1/2" x 24 1/4" x 6 1/2") recessed fire extinguisher cabinet constructed of 18 ga. steel tub and steel door & trim, a full length semi-concealed piano hinge and flush stainless steel door latch. Entire cabinet finished in baked enamel paint and glazed with $^{3}/_{16}$" (5mm) clear glass.

.2 Standard of Acceptance: National Fire Equipment Ltd. Model ECS-999 or approved equal.

.2 Recessed mounted (Staff Area)(FE-2):

.1 Provide and install N.F.E. Model CE-950-3 (9" x 24" x 6") recessed fire extinguisher cabinet constructed of 22 ga. (.76mm) steel tub and 16 ga. (1.57mm) steel door & trim with 1/4" (6mm) return frame, a full length semi-concealed piano hinge and flush stainless steel door latch. Entire cabinet finished in baked enamel paint and glazed with $^{3}/_{16}$" (5mm) clear glass.

.2 Standard of Acceptance: National Fire Equipment Ltd. Model Ce950-3 or approved equal.

2.4 ACCESSORIES

.1 Extinguisher Brackets: Formed steel, chromed finish.

.2 Cabinet Signage: As required by Authorities Having Jurisdiction.

.3 Graphic Identification: As required by Authorities Having Jurisdiction.

Part 3 Execution

3.1 EXAMINATION

.1 Section 01 70 00: Verify existing conditions before starting work.

.2 Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

.1 Install to manufacturer's instructions.

.2 Install cabinets plumb and level in wall openings, 1200mm (48 inches) from finished floor to inside bottom of cabinet where indicated on Drawings.

.3 Install plumb and level, 1200mm (48 inches) from finished floor to bracket where indicated on Drawings.

.4 Secure rigidly in place.

.5 Place extinguishers and accessories in cabinets or on wall brackets – refer to Drawings.

.6 Position cabinet signage as required by Authorities Having Jurisdiction.

.7 Confirm locations with Consult prior to installation.

3.3 SCHEDULES

.1 Refer to Drawings for locations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 – Gypsum Board Assemblies

.2 Section 09 30 13 - Ceramic Tiling

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-44.40-01, Steel Clothing Locker.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for metal lockers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate on drawings: type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, tops, rods, hooks, shelves, bases, trim, numbering, filler panels, end/back panels, doors, handles, locking method, ventilation method, and finishes.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

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

.2 Store and protect metal lockers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Lockers: to CAN/CGSB-44.40. Refer to Drawing Elevations for lockers types and arrangement, complete with filler panels with matching finish required.

- .1 Size: combination of single and double tier lockers. 381mm (15") wide x 381mm (15") deep x 1829 mm high. Refer to Drawings.
- .2 Frame: Horizontal and vertical components: 16 gauge cold rolled steel.
- .3 Top: sloping.
- .4 Doors: one-piece double-wall envelope construction. Thickness: 16 gauge (outer panel), 22 gauge (inner panel)
- .5 Locker Body: side, back and top panel: 16 gauge cold rolled steel flanged on all sides with a formed under return at the front of the shelves. Locker bodies shall be painted in 223 light reflecting Oyster Grey. Top, shelf and bottom: 24-gauge min.
- .6 Ventilation: Incorporated into the top and bottom frame members.
- .7 Hardware:
  - .1 Handle: stainless steel
  - .2 Hinges: 16 gauge, continuous one-piece integral right hand hinge and frame.
  - .3 Pull: Single piece 20 gauge deep-drawn Nickel chrome plated recessed pocket c/w 12 gauge channel formed hasp welded to frame member.
  - .4 Number Plate: aluminum number plates.
  - .5 Hooks: 3 - 6mm diameter, zinc plated steel coat hooks in each locker.
  - .6 Rubber Grommets: Provide two rubber door grommets on the lock side of the frame
- .8 Finish: Powder coated 2 mil dry film thickness (colour to be selected from manufacturer's standard range)
- .9 Filler End Panels: 16 gauge (min). Painted to match locker colour.

.2 Standard of Acceptance:

- .1 Allmar - Décor Tri-Lock Titan Locker.

2.2 ACCESSORIES

.1 Locking system: padlock (locks by others).

.2 Three (3) coat hooks per compartment.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive metal lockers previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal locker installation.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied have been approved by the Contract Administrator.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Securely fasten lockers to grounds and nailing strips.

.3 Install wall trim around recessed locker banks.

.4 Install filler panels (false fronts) where indicated and where obstructions occur.

.5 Install locker numbers and locks.

3.3 ADJUSTING

.1 Adjust metal lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

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

.3 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by metal locker installation.

END OF SECTION

Part 1 GENERAL

1.1 WORK INCLUDED

.1 Custom fabrication of specialty items.

.2 Supply of standard products.

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00 Submittals.

.2 Product Data:

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

.3 Shop drawings:

.1 Provide shop drawings clearly indicating all sizes, connections, anchorage, shapes and accessories.

.2 Shop drawings must be submitted prior to ordering materials.

1.3 FABRICATION

.1 Verify all dimensions on site prior to fabrication.

.2 Fabricate items in accordance with sizes, profiles, and finishes required.

1.4 MAINTENANCE DATA

.1 Provide maintenance data on all miscellaneous specialty items, including cleaning instructions, and incorporate into The City's maintenance manuals.

Part 2 PRODUCTS

2.3 WASH BAY CURTAIN

.1 Supply one (1) sliding wash bay curtain as shown on Drawings. Wash curtain system to be supplied complete with all accessories required for complete, suspended track installation, using galvanized metal or stainless steel components. Curtain must be able to be slide to one side.
Submit shop drawings for review.

.2 Provide diagonal bracing as required to stabilize track

.3 Curtain to be 3050 (10') high x length of building.

.4 Fabric to be 18 oz (min.) coated vinyl with 1200 high clear 20mil (min.) vinyl vision panel.

.5 Track to be suspended using threaded rod from steel roof joists.

.6 Curtain roller hooks to be steel, ball bearing type with 25mm (1") hooks.

.1 Standard of Acceptance:

.1 Akon Curtain and Divider or approved equal.

Part 3 EXECUTION

3.1 ERECTION

.1 Install specialties square, plumb, straight, and true, at proper elevations and alignment with other Work, accurately fitted and adjusted by experienced workmen, in accordance with the manufacturer's instructions.

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

.3 Supply items to be built-in by others, to appropriate trades in adequate time for incorporation into the Work.

.4 Touch-up fastenings and scratched or otherwise damaged surfaces, after completion of installation, to match finish.

3.2 CLEANING

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

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

3.3 PROTECTION

.1 Protect installed products and components from damage during construction. Repair damage to adjacent materials caused by site furnishings installation.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on the common work pertaining to plumbing.

.2 All plumbing work shall be completed in conformance with, and subject to, the latest manufacturer, supplier and the contract administrator documentation available (printed, electronic, or website), including installation and cautionary notes.

.3 Refer to specific plumbing sections for further guidance.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 74 00 – Cleaning and Waste Management

.3 Section 01 78 00 – Closeout Submittals

1.3 CONTRACTOR RESPONSIBILITY

.1 It is the plumbing contractor's responsibility to provide and install the necessary components for a complete and functional plumbing system.

.2 The plumbing contractor is responsible for paying for and obtaining all necessary permits and authorizations for work.

.3 The plumbing contractor is responsible for providing suitable submittals pertaining to this work.

.4 Engineered drawings and specifications are designed based on particular, specified products that the engineer has chosen. If the plumbing contractor wishes to use a different product than was specified, then…

.1 It is the plumbing contractor's responsibility to ensure the supplier of the different product has obtained approval for the product to be used as either an equal or an alternate from the engineer. Contractors should be aware that a product is granted equal status based on quality, capacity, and electrical load only. Alternates may be approved if there are deviations and modifications required that could still result in the intended design function.

.2 It is the plumbing contractor's responsibility to modify any associated work if using the different product at no cost to the City of Winnipeg in such a way as it works as intended by the engineered drawings and specifications. This may include coordinating with other trades such as electrical to capture all the modifications required. It is at the discretion of the engineer if the design intent is maintained.

.1 Example: Aparticular make and model of domestic hot water tank was specified. Another manufacturer's hot water tank with different dimensions

was granted an equal status based on its quality, capacity, and electrical load being similar to the one specified. A contractor who wants to use the equal product is responsible for ensuring the equal product fits in the space and is expected to modify the piping if required to accommodate the different tank.

.5 It is the responsibility of the plumbing contractor to coordinate with other trades such that all work can be accomplished in a suitable manner.

.6 All coring, rough openings and penetrations greater than 6" (150 mm) diameter, and all patching, flashing and sealing shall be the responsibility of the general contractor.

.7 The plumbing contractor shall coordinate with the general contractor in arranging for, and being available during, inspections by the authority having jurisdiction and professional engineer at

.1 Rough work completion and prior to wall boarding, and

.2 Substantial completion for the purpose of obtaining final certification.

1.4 SUBMITTALS

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

.2 Refer to specific sections for any additional submittal requirements.

.3 Shop Drawings:

.1 The intent of shop drawings is to give confidence to the engineer that the contractor is using the proper products and will be installed properly so the work is done as intended by the engineer. Generic catalog or sales information shall not be part of a shop drawing unless it specifically meets the intent.

.2 Shall clearly indicate job-specific products. If the manufacturer's cut sheet shows multiple products, indicate which one coincides with the appropriate tag on the drawing.

.3 Shall include a performance curve, sound data, a dimensioned drawing with required clearances and connection points, power requirements, and specified capacity required as applicable for each product.

.4 Shall indicate the supplier's name and contact information.

.5 Shall indicate compliance to applicable codes and standards.

.6 Contractor shall submit a shop drawing for unique mounting arrangements or supports if required at the discretion of the engineer.

.4 Closeout Submittals:

.1 Provide operation and maintenance data and incorporate into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Approvals:

.1 Submit two (2) copies of draft Operation and Maintenance Manual to City of Winnipeg Representative for approval. Submission of individual data will not be accepted unless directed by the City of Winnipeg Representative.

.2 Submit a copy of the As-Built drawings.

.3 Make changes as required and re-submit as directed by the City of Winnipeg Representative.

.3 Operation and maintenance manual approved by, and final copies deposited with the City of Winnipeg Representative before final inspection.

.4 Operation and Maintenance (O&M) Manual:

.1 Operation data to include:

.1 Control and or piping schematics for systems.

.2 Description of systems and their controls.

.3 Operation instruction for systems and components.

.4 Description of actions to be taken in event of equipment failure.

.2 Maintenance data to include:

.1 Servicing, maintenance, operation and troubleshooting instructions for each item of equipment. Instructions to include maintenance schedule and tools required.

.2 A parts list.

.3 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete

.2 Site reports (i.e. water test results)

.3 Equipment performance verification test results (i.e. balancing report)

.4 Authority Having Jurisdiction (AHJ) signed and approved inspection reports.

.5 Additional data:

.1 Prepare and insert into the O&M manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.6 Site records:

.1 The Contract Administrator will provide one(1) set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur.

.2 Use different color for each service.

.3 Make available for reference purposes and inspection.

.7 As-built drawings:

.1 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.2 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.5 DELIVERY, STORAGE AND DISPOSAL

.1 Per Section 01 74 00 – Cleaning and Waste Management

.2 Packing, shipping, handling and unloading:

.1 Deliver and handle in accordance with manufacturer's written instructions.

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.3 Storage and Protection:

.1 Protect from weather and physical damage.

.2 Protect plastics from UV light.

.3 Store at temperatures and conditions required by manufacturer.

.4 Waste Management and Disposal:

.1 Verify with the City of Winnipeg on storage or disposal of existing City of Winnipeg equipment. Handle accordingly.

.2 Separate waste materials for reuse and recycling.

.3 Place excess or unused materials in designated containers.

.4 Divert unused metal materials from landfill to metal recycling facility approved by the City of Winnipeg Representative.

.5 Dispose of unused adhesive material at official hazardous material collections site approved by the City of Winnipeg Representative.

PART 2 - PRODUCTS

2.1 QUALITY ASSURANCE

.1 Specific sections may have additional requirements, or modifications to these requirements. In the case of contradiction, the requirement in the specific section is to be adhered to. In cases of no clear contradiction, these requirements shall be adhered to.

.2 If any specification section includes the words “prior approval” or “unless otherwise approved”, this is to mean a request must be made to the stamping engineer responsible for this design component of the project prior to any product being considered as acceptable. Upon acceptance by written confirmation, the contractor may use it. Upon denial by written confirmation, the contractor shall not use it. No other entity shall grant approval to the contractor.

.3 All products to be manufactured by companies with qualifications including...

.1 Ten (10) years of history providing this product (or applicably similar product) to the Canadian market. Reduction of this requirement is possible at the discretion of the engineer only.

.2 Engineering, design and application support available in a timely manner. This includes acknowledgement of an inquiry within 24 hours, and a suitable response to an inquiry within five (5) working days.

.3 Documented case studies of three (3) similar applications of the product showing similar usage and acceptable longevity of the product. Contact information for the building owner/maintenance provider of each case study shall be available upon request.

.4 Wholly owned test facilities with access available upon request.

.5 Provision of products meeting all applicable testing standards, ratings, and certifications for the Canadian market.

.4 All products to be supplied by suppliers with qualifications including...

.1 Five (5) years of history providing this product (or applicably similar product) to the Canadian market.

.2 Manufacturer support including, being the manufacturer's designated representative of the product, being factory trained on the product, and having access to current engineering support from the manufacturer.

.3 Human on site availability (with any required security clearances or specific entry requirements up to date prior to visit) within 48 hours of initial contact for the purpose of commissioning the product or investigation of problems potentially involving the product. Suppliers shall provide a phone number that will be answered during regular working hours.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 All products to be installed by workers with qualifications including...

.1 Five (5) years of experience installing the product (or applicably similar product).

.2 A comprehensive knowledge of the product manufacturer's installation requirements.

.3 An understanding as to the reasons why proper installation is required, and what problems occur with an improper installation.

.2 Installation shall be the responsibility of a qualified journeyman licensed to perform the work required.

.3 Installation shall be in accordance with the National Plumbing Code (NPC) and local codes.

.4 Installation of service items (example: isolation valves, cleanouts, etc...) shall be coordinated with the general contractor and other trades (example: wall boarding contractor) so access to service items is easy and unencumbered. Ultimately, this is the responsibility of the plumbing contractor.

3.2 PERFORMANCE VERIFICATION

.1 Ensure fixtures are properly anchored, connected to system, effectively vented and tested.

.2 The plumbing contractor shall be available to accompany the authority having jurisdiction and the engineer on site inspections. The plumbing contractor shall have the ability to test all items during inspections.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section provides guidance on handling thermal expansion of plumbing piping systems.

.2 This section does not include sprinkler piping.

1.2 RELATED SECTIONS

.1 Section 22 05 00 – Common Work Results for Plumbing

.2 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.3 Section 22 11 16 – Domestic Water Piping

.4 Section 22 13 16 – Sanitary Waste and Vent Piping

1.3 BASIC INFORMATION

.1 Contractor shall be aware that piping changes length when undergoing changes in temperature. Plastic piping like Polyethylene, PVC and CPVC change much more than copper or steel.

.2 Physical allowances shall be made to handle pipe length changes due to thermal expansion/contraction in all cases, but special consideration shall be given to...

.1 Initial installation of piping systems in cold weather where the finished environment will be warmer, or vice-versa

.2 Piping that is located outdoors

.3 Piping that continues from one thermal zone to another (i.e. from conditioned space to an unconditioned attic space or garage)

.4 Piping that transfers fluids of different temperatures (i.e. hot water and cold water combination drains)

.3 Common pipe materials and their respective changes in length [per 100 feet (30 m) of pipe] are listed for reference purposes:

.1 ABS:

.1 2.0” (50 mm) length change for every 40 F (22 C) temperature change

.2 4.9” (125 mm) length change for every 100 F (56 C) temperature change

.2 CPVC:

.1 1.8” (46 mm) length change for every 40 F (22 C) temperature change

.2 4.6” (117 mm) length change for every 100 F (56 C) temperature change

.3 PVC:

.1 1.4” (36 mm) length change for every 40 F (22 C) temperature change

.2 3.6” (91 mm) length change for every 100 F (56 C) temperature change

.4 Polyethylene:

.1 5.3” (135 mm) length change for every 40 F (22 C) temperature change

.2 13.3” (338 mm) length change for every 100 F (56 C) temperature change

.5 Copper:

.1 0.4” (10 mm) length change for every 40 F (22 C) temperature change

.2 1.1” (28 mm) length change for every 100 F (56 C) temperature change

.6 Steel:

.1 0.3” (8 mm) length change for every 40 F (22 C) temperature change

.2 0.7” (18 mm) length change for every 100 F (56 C) temperature change

.7 Aluminum:

.1 0.6” (15 mm) length change for every 40 F (22 C) temperature change

.2 1.4” (36 mm) length change for every 100 F (56 C) temperature change

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

.1 For steel pipe:

.1 Inner hose: carbon steel

.2 Outer sleeve: double braided stainless steel

.3 Pressure rating: 200 psi (13.8 bar)

.4 Temperature rating: 250 F (121 C)

.5 Connections: flanged

.6 Size: same as pipe

.2 For copper pipe:

.1 Inner hose: bronze

.2 Outer sleeve: braided bronze

.3 Pressure rating: 125 psi (8.6 bar)

.4 Temperature rating: 250 F (121 C)

.5 Connections: flanged

.6 Size: same as pipe

2.2 EXPANSION JOINTS

.1 For CPVC:

.1 Bellows type

.2 For PVC drain, waste, and vent pipe (DWV):

.1 Telescoping tube-in-tube

.2 EPDM seals

.3 Useable in vertical or horizontal applications

.3 For ABS:

.1 Telescoping tube-in-tube

.2 EPDM seals

.3 Vertical applications only

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

.1 The intent is to allow the contractor some flexibility to implement appropriate expansion compensation techniques for piping systems. The contractor shall review the proposed piping layouts on site and install either a suitable expansion product or utilize a multi-elbow piping offset to allow for linear movement due to temperature changes.

.2 Contractor shall be aware of the temperature of the pipe and environment during installation, and account for thermal expansion/contraction that will occur before the work is complete and functioning as designed.

.3 Telescoping tube-in-tube expansion joints require good linear alignment. Install an anchor at one end and an axial guideat the other end of the expansion joint, or otherwise ensure linear alignment during operation.

.4 Utilize points of fixed movement where required to control expansion in a particular direction.

3.2 SPECIFIC APPLICATIONS

.1 For plastic vertical supply risers, movement shall be restricted vertically by pipe clamps attached to structure at each floor level. At each floor level, install an unrestricted ‘vee’ offset using two 45 degree fittings and a 90 degree fitting with 12” (300 mm) legs in the bottom third of the riser, or install a bellows type expansion device just above each pipe clamp, or install per manufacturers instructions.

.2 In the absence of other thermal expansion/contraction methods, provide the following for every 100 feet (30 m) of piping…

.1 For any application where potential temperature changes are <40 F (22 C):

.1 CPVC: 4-elbow ‘U’ joint with 4 foot (1220 mm) legs and 2 foot (610 mm) base

.2 PVC: 4-elbow ‘U’ joint with 4 foot (1220 mm) legs and 2 foot (610 mm) base

.3 ABS:4-elbow ‘U’ joint with 4 foot (1220 mm) legs and 2 foot (610 mm) base

.4 Copper: 4-elbow ‘U’ joint with 12” (300 mm) legs and 12” (300 mm) base

.5 Aluminum:4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.6 Steel:4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.7 Polyethylene: flexible bends between anchor points

.2 For all outdoor piping, unconditioned attic piping, unconditioned crawlspace piping, all domestic hot water piping, or any application where potential temperature changes are <100 F (<56 C):

.1 CPVC: 4-elbow ‘U’ joint with 6 foot (1830 mm) legs and 3 foot (914 mm) base

.2 PVC:4-elbow ‘U’ joint with 6 foot (1830 mm) legs and 3 foot (914 mm) base

.3 ABS:4-elbow ‘U’ joint with 6 foot (1830 mm) legs and 3 foot (914 mm) base

.4 Copper: 4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.5 Aluminum:4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.6 Steel:4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.7 Polyethylene: flexible bends between anchor points

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on meters and gauges used in plumbing piping and includes:

.1 Pressure gauges

.2 Thermometers

.3 Water meters

.2 This section does not include guidance on:

.1 Compressed air meters or gauges

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 01 91 13 – General Commissioning Requirements

.4 Section 22 05 00 – Common Work Results for Plumbing

1.3 REFERENCES

.1 American Society of Mechanical Engineers International (ASME)

.1 ASME B40.100 Pressure Gauges and Gauge Attachments

.2 ASME B40.200 Thermometers, Direct Reading and Remote Reading

.2 American Water Works Association (AWWA)

.1 AWWA C700 Standard for Cold Water Meters-Displacement Type, Bronze Main Case

1.4 SUBMITTALS

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

.2 Product Data:

.1 Upon request, provide manufacturer's printed product datasheets, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. AWWA).

.3 Closeout submittals in accordance with Section 01 78 00 – Closeout Submittals

.4 Operation and Maintenance (O&M) Manual Data:

PART 2 - PRODUCTS

2.1 PRESSURE GAUGES

.1 Meets ASME B40.100

.2 Gauge shall have a bottom entry, lead free brass NPT connection.

.3 Gauge shall be in dual units and range from 0 to 11 bar (160 psi).

.4 Gauge shall have a minimum 63 mm (2.5") diameter display.

2.2 THERMOMETERS

.1 Meets ASME B40.200

.2 Thermowell shall be lead free brass.

.3 Thermometer shall be a scale type with red liquid in glass.

.4 Readout shall be in dual units and range shall be at least from 4 C (40 F) to 100 C (212 F).

2.3 WATER METERS (IF NOT SUPPLIED BY THE REGULATING AGENCY / UTILITY COMPANY)

.1 Incoming Main Service Meters:

- .1 Standard: AWWA C700.
- .2 Pressure Rating: 150-psig (1035-kPa) working pressure.
- .3 Temperature Rating: 80 F (27 C).
- .4 Measuring Chamber: Nutating synthetic disc measuring positive displacement.
- .5 Registration: In gallons (liters) or cubic feet (cubic meters) as required by utility company.
- .6 Case: Lead-free and corrosion resistant.
- .7 Connections:
  - .1 1" (25 mm) or less meter size: Threaded.
  - .2 Over 1" (25mm) meter size: Flanged.

.2 Tenant Sub-Meters:

- .1 Standard: AWWA C700.
- .2 Pressure Rating:150-psig (1035-kPa) working pressure.
- .3 Temperature Rating: 80 F (27 C).
- .4 Measuring Chamber: 5/8" (16 mm) Nutating synthetic disc measuring positive displacement.

.5 Registration:In gallons (liters) or cubic feet (cubic meters) as required by utility company.

.6 Case: Lead-free and corrosion resistant.

.7 Connections: 3/4” (19 mm) threaded.

.8 Accessories:

.1 Battery-less encoder

.2 Remote readout panel

PART 3 - EXECUTION

3.1 INSTALLATION– GENERAL

.1 Meters and gauges shall be installed such that they can be read from a reasonable and logical location within the room without the need for ladders, or bending or twisting.

3.2 INSTALLATION – PRESSURE GAUGES

.1 Install where indicated on the design documents and downstream of every pressure reducing valve.

3.3 INSTALLATION – THERMOMETERS

.1 Install where indicated on the design documents and downstream of every mixing valve.

3.4 INSTALLATION – WATER METERS

.1 Meter shall be protected against hot water [>80 F (27 C)] intrusion.

.2 Coordinate with local utility on encoder setup and readout location.

.3 For incoming service meters, no branch or connection shall be upstream of the meter within the building.

.1 Exception: for 2” (50 mm) or greater incoming water services, a meter isolation by-pass branch shall be installed. The by-pass branch shall be normally closed and sealed.

3.5 FIELD QUALITY CONTROL

.1 Perform the following tests and inspections:

.1 Fill each tank with containing a level gauge from empty to alarm/cut-out level to verify correct operation. Empty tank and repeat.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on general duty plumbing valves and includes:

.1 Isolation valves

.2 Single check valves

.2 This section does not include:

.1 Compressed air valves

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 22 05 00 – Common Work Results for Plumbing

.4 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.5 Section 22 05 53 – Identification for Plumbing Piping and Equipment

.6 Section 22 11 16 – Domestic Water Piping

1.3 REFERENCES

.1 American Water Works Association (AWWA)

.1 AWWA C508 Swing-Check Valves for Waterworks Service

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

.1 ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

.2 ASTM A536 Standard Specification for Ductile Iron Castings

1.4 SUBMITTALS

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

.2 Product Data:

.1 Upon request, provide manufacturer's printed product datasheets for valves, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. AWWA or ASTM).

.3 Closeout Submittals:

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide valve information per the requirements of Section 22 05 53 – Identification for Plumbing Piping and Equipment.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

.1 Minimum Working Pressure: 125 psig (860 kPa) unless otherwise indicated.

.2 Choose “lead-free” products (<0.25% lead by weight on wetted surfaces).

2.2 ISOLATION VALVES

.1 Up to, and including, 2” (50 mm) diameter:

.1 Ball Valves:

.1 Full port

.2 Pressure Rating: 150 psi (10.3 bar)

.3 Body and Ball: Brass (may be chrome plated), or Stainless steel

.4 Packing and Seats: PTFE

.5 Handle: Zinc plated steel (fixture isolation valves may be other metal)

.6 End Connections: Threaded

.2 Over 2” (50 mm) diameter:

.1 Gate Valves:

.1 Body: Manufacturer applied epoxy coated iron inside and out

.2 Pressure Rating: 200 psi (13.8 bar)

.3 Disc: Cast iron and Buna-N rubber (wedge type)

.4 End Connections: Flanged to ASTM A126, or Grooved to ASTM A536

.2 Ball Valves:

.1 Full port, two piece construction

.2 Pressure Rating: 400 psi (27.5 bar)

.3 Body and Ball: Brass (may be chrome plated), or Stainless steel

.4 Packing and Seats: PTFE

.5 Handle: Zinc plated steel

.6 End Connections: Threaded

2.3 SINGLE CHECK VALVES

.1 Up to, and including, 2" (50 mm) diameter:

- .1 'Tee' or "Wye" pattern
- .2 Pressure Rating: 200 psi (13.8 bar)
- .3 Body: Bronze
- .4 Disc: Bronze
- .5 End Connections: Threaded

.2 Over 2" (50 mm) diameter:

- .1 Meets requirements of AWWA C508
- .2 Pressure Rating: 250 psi (17.2 bar)
- .3 Body: Manufacturer applied epoxy coated iron inside and out
- .4 Disc: Buna-N or EPDM encapsulated steel
- .5 End Connections: Flanged

PART 3 - EXECUTION

3.1 INSTALLATION– GENERAL

.1 Valves shall be compatible with the plumbing piping connected.

.2 Valves attached in plumbing piping shall be supported such that the installation does not cause excessive force or torque on the piping.

.3 Coordinate with other trades including wall and ceiling finisher to allow for access doors to be located in a suitable location adjacent to each valve.

3.2 INSTALLATION – ISOLATION VALVES

.1 Install isolation valves on water piping to every fixture.

.2 Install isolation valves at every branch off a vertical water-filled riser.

.3 Do not install a valve within 30" (760 mm) of a heat generating source (i.e. hot water tank).

3.3 INSTALLATION – SINGLE CHECK VALVES

.1 Ensure valve is installed in proper orientation.

.2 Clean and ensure the valve disc moves freely and seals completely before and after installation.

3.4 QUALITY CONTROL

.1 Valves shall be labeled and set to their working position.

.2 Valves shall be operated opened and closed after the system is filled with liquid and water hammer effect shall be noted. Install water hammer arrestors upstream of valves that cause water hammer as per Section 22 11 19 – Domestic Water Piping Specialties.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes (as applicable) guidance on hanging or supporting domestic water supply piping, sanitary waste piping, rain water leaders, sump pump discharge piping, vent piping, compressed air piping, and plumbing equipment.

.2 This section does not include sprinkler piping.

.3 This section gives guidance on hanging and supporting plumbing piping and equipment and includes:

- .1 Pipe Hangers and Supports
- .2 Hanger Rods
- .3 Inserts
- .4 Flashing
- .5 Sleeves and Seals
- .6 Formed Steel Channel
- .7 Equipment Bases and Supports
- .8 Metal Framing Systems
- .9 Fasteners
- .10 Pipe Positioning Systems

.4 The contractor responsible for the work of this section shall be familiar with MSS SP-58, industry recognized installation guides and have a minimum of five (5) years experience installing as per such guides.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 05 50 00 – Metal Fabrications

.3 Section 07 84 00 – Firestopping

.4 Section 09 91 23–Interior Painting

.5 Section 22 05 00 – Common Work Results for Plumbing

.6 Section 22 05 16 – Expansion Fittings and Loops for Plumbing Piping

.7 Section 22 07 19 – Plumbing Piping Insulation

.8 Section 22 11 16 – Domestic Water Piping

.9 Section 22 13 16 – Sanitary Waste and Vent Piping

.10 Section 22 15 00 – General Service Compressed-Air Systems

1.3 REFERENCES

.1 International Association of Plumbing and Mechanical Officials (IAPMO)

.1 IAPMO PS 42 Pipe Alignment and Secondary Support Systems

.2 Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

.1 MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation

.2 MSS SP-127 Bracing for Piping Systems: Seismic – Wind – Dynamic Design, Selection and Application

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 All trapeze pipe hangers, metal framing systems, and fabricated equipment support designs require a detailed, job-specific drawing submittal labeled with equipment weights to the Structural Engineer for approval.

1.5 SEISMIC DESIGN

.1 Where work is performed in seismic regions requiring special design as determined by the local authority having jurisdiction, a seismic engineer shall be hired by the mechanical contractor performing work of this section to take professional responsibility for all work in this section. Work shall be performed to the seismic engineer's requirements.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

.1 All hangers and supports must meet MSS SP-58. Refer to Part 3, "Hanger and Support Applications" for pipe hanger and support suitability.

.2 Insulated pipe shall be supported with a hanger or support with a supporting diameter the same as the fully insulated pipe diameter with an included rigid insulation shield. The insulation shall not be compressed or otherwise have a reduction in insulating ability as a result of hanging or supporting the pipe.

.3 Pipe containing steam or liquid greater than 160 F (71 C) that is supported from below the pipe shall be on roller supports.

.4 Pipe located in areas or adjacent to areas where noise and vibration are concerns shall

use PVC coated hanger and support products.

.5 Copper pipe shall be hung or supported with PVC coated or felt lined products to prevent electrolysis between the pipe and the hanger or support.

2.2 HANGER RODS

.1 Unless otherwise indicated, hanger rods shall be zinc-plated steel, fully threaded rod.

2.3 CONCRETE INSERTS

.1 Inserts shall be malleable iron case with a galvanized steel shell and expander plug for threaded connection. Inserts shall have capability for lateral adjustment, a top slot for reinforcing rods, and lugs for attaching to forms. Insert internal threads to match hanger rod threads.

2.4 FLASHING

.1 Metal flashing shall be 26 gage galvanized steel.

.2 Metal counterflashing shall be 22 gage galvanized steel.

.3 Caps shall be 22 gage steel for non-fire resistance rated separations and 16 gage steel for fire resistance rated separations.

2.5 SLEEVES AND SEALS

.1 Exterior, underground wall penetrations:

.1 Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined.

.2 Hydrostatic pipe closure, “Link-Seal” or approved equal.

.2 Exterior, aboveground wall penetrations:

.1 Concrete wall: Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined. Wall attached pipe clamp attached to interior face of exterior wall. Expanding foam between pipe and sleeve. Thermally broken and caulked escutcheons on exterior and interior face.

.2 Framed wall: 18 gage galvanized steel. Wall attached pipe clamp attached to interior face of exterior wall. Expanding foam between pipe and sleeve. Thermally broken and caulked escutcheons on exterior and interior face.

.3 Interior, fire rated wall penetration:

.1 Concrete wall: Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined.Firestoppingmaterial as per section 07 84 00 between pipe and sleeve. 16 gage steel escutcheons on exposed faces of wall.

.2 Framed wall: 18 gage galvanized steel. Firestopping material as per section 07 84 00 between pipe and sleeve. 16 gage steel escutcheons on exposed faces of wall.

.4 Interior, non-rated wall penetration:

.1 Concrete wall: Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined. Closed cell foam spray between pipe and sleeve. 16 gage steel escutcheons on exposed faces of wall.

.2 Framed wall: No sleeve required. 16 gage steel escutcheons on exposed faces of wall.

.5 Floor penetration:

.1 Cored or drilled hole to be coordinated with structural engineer for reinforcement requirements. Firestopping material as per section 07 84 00. 2” (50 mm) high oversized schedule 40 steel pipe curb secured and caulked on finished floor. Riser clamp rests on curb. Material deviations may be accepted upon prior approval from the mechanical engineer. Submit in accordance with Section 01 33 00 – Submittal Procedures.

2.6 FORMED STEEL CHANNEL

.1 Shall be manufactured by a member company of the Metal Framing Manufacturers Association.

2.7 EQUIPMENT BASES AND SUPPORTS

.1 Structural carbon steel shapes, coated with corrosion prevention primer.

.2 Material deviations may be accepted upon prior approval from the mechanical engineer. Submit in accordance with Section 01 33 00 – Submittal Procedures.

2.8 METAL FRAMING SYSTEMS

.1 Shall be manufactured by a member company of the Metal Framing Manufacturers Association.

2.9 FASTENERS

.1 Powder Actuated Fasteners:

.1 Threaded steel stud with pull out, tension and shear capacities appropriate for supported load and building structure material.

.2 Mechanical Expansion Anchors:

.1 Insert wedge type, stainless steel anchors with pull out, tension and shear capacities appropriate for supported load and building structure material.

.2 Underwriters Laboratory (UL) listed

2.10 PIPE POSITIONING SYSTEMS

.1 Shall be manufactured to IAPMO PS 42.

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

.1 Installer qualified in performing work in this section shall have at least five (5) years successful experience in similar installations.

.2 Fabricated trapeze hangers, metal framing systems, and equipment support designs are to be submitted to the Structural Engineer for approval.

3.2 GENERAL INSTALLATION

.1 Refer to Part 2 – Products for additional guidance on installing a product or an assembly of products for a particular application.

.2 All hangers and supports must meet MSS SP-58. Refer to Part 3, “Hanger and Support Applications” for pipe hanger and support suitability.

.3 Install supports to secure equipment in place, prevent vibration, maintain grade and allow for expansion and contraction.

.4 Wire or perforated strap is not acceptable to use for hanging pipes or equipment.

.5 Include expansion fittings and offsets as per Section 22 05 16 – Expansion Fittings and Loops for Plumbing Piping.

.6 Vertical risers shall be supported at every floor level and every 12’ (3.6 M) by riser clamps.

.7 Vertical piping (other than cast iron) may be affixed in position by formed steel channel clamps. For plastic and copper piping, use a PVC or rubber isolator between the clamp and bare pipe. For cast iron piping, use pipe clamps attached to building structure.

.8 Fasten supports to building structural steel system or to cast-in-place inserts in concrete construction for new construction. Concrete fasteners are acceptable when holding strength of finished concrete has been established.

.9 Insulated pipe shall be supported with a hanger or support with a supporting diameter the same as the fully insulated pipe diameter with an included rigid insulation shield. The insulation shall not be compressed or otherwise have a reduction in insulating ability as a result of hanging or supporting the pipe.

.10 Locate support adjacent to equipment. Prevent excessive stresses on piping and equipment connections.

.11 Do not support piping or equipment from other piping or from equipment.

.12 For horizontally hung multiple pipe runs, use a trapeze support assembly.

.13 On multiple pipe runs, allow minimum 1” (25 mm) clearance between finished (including insulation) pipes.

.14 Install hangers within 12” (300 mm)on either side of a horizontal fitting.

3.3 SPECIFIC INSTALLATION – PLASTIC PIPE

.1 When hanging horizontal plastic pipe sized 4" (100 mm) diameter and under, and that conveys liquid greater than 80 F (27 C), supports shall be...

.1 Continuous support channel under pipe to prevent sagging, or

.2 Vee bottom clevis type hangers that shall include 18 gage channel support to prevent sagging.

.2 Plastic pipe sized 2" (50 mm) diameter and under may be supported using rigid PVC or PVC coated steel conduit fittings.

.3 Ensure pipe will not be subject to abrasion by supports during expansion and contraction.

3.4 HORIZONTAL PIPE SUPPORT SPACING

.1 Support horizontal straight sections of piping as follows:

Nominal Pipe Size	***Maximum Distance Between Supports***					
Pipe Material&Service -----→	*Steel (liquid)*	*Steel (steam or comp.air)*	*Copper (liquid or vent)*	*Plastic (liquid)*	*Plastic (vent)*	*Aluminum (comp.air)*
½" (12mm)	7' (2.1m)	8' (2.4m)	5' (1.5m)	4' (1.2m)	-	5' (1.5m)
¾" (19mm)	7' (2.1m)	8' (2.4m)	6' (1.8m)	4' (1.2m)	-	5' (1.5m)
1" (25mm)	7' (2.1m)	9' (2.7m)	8' (2.4m)	4' (1.2m)	6' (1.8m)	5' (1.5m)
1¼" (32mm)	7' (2.1m)	9' (2.7m)	10' (3.0m)	4' (1.2m)	6' (1.8m)	5' (1.5m)
1½" (39mm)	9' (2.7m)	12' (3.6m)	10' (3.0m)	5' (1.5m)	6' (1.8m)	5' (1.5m)
2" (50mm)	10' (3.0m)	13' (4.0m)	10' (3.0m)	5' (1.5m)	6' (1.8m)	8' (2.4m)
2½" (64mm)	10' (3.0m)	14' (4.3m)	10' (3.0m)	5' (1.5m)	6' (1.8m)	8' (2.4m)
3" (75mm)	10' (3.0m)	15' (4.6m)	10' (3.0m)	6' (1.8m)	8' (2.4m)	8' (2.4m)
4" (100mm)	10' (3.0m)	16' (4.9m)	10' (3.0m)	6' (1.8m)	8' (2.4m)	8' (2.4m)
6" (150mm)	10' (3.0m)	16' (4.9m)	10' (3.0m)	7' (2.1m)	8' (2.4m)	5' (1.5m)
8" (200mm)	10' (3.0m)	-	10' (3.0m)	7' (2.1m)	-	-

.2 Provide additional supports for concentrated loads such as valves, specialties and pipe fittings and every change in direction.

3.5 EQUIPMENT SUPPORTS

.1 Generally, install as per manufacturer's requirements.

.2 Generally, mount equipment such that movement during start and stop is less than ¼" (6mm). The intent is to reduce stresses applied to the equipment attachments (i.e. piping) to within a safe working range thereby eliminating potential damage.

.3 Equipment support springs shall be statically loaded to 50% compression by weight of equipment. Include a ¼" (6 mm) neoprene acoustic pad under each spring support.

.4 Coordinate concrete base or inertia concrete block requirements for each piece of equipment with general contractor prior to installation. Concrete work and any

associated structural reinforcement is by general contractor; vibration and acoustic isolation of equipment support is by mechanical contractor.

3.6 PERFORMANCE VERIFICATION

.1 Upon completion of piping installation, and before system operation, examine all fasteners, inserts and attachments for looseness, movement, or other factors that would reduce their ability to act at their rated capacity.

.2 Examine all pipe hangers for movement before and after system operation. Reinforce any area of hanger movement.

.3 Prior to system operation, examine spring supports for available movement. Loaded springs shall rest in a 50% compressed state.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on identifying plumbing related piping systems and equipment.

.2 This section does not include identification of HVAC piping and equipment.

.3 If an existing identification system with color codes are already in place and this work is being added to the existing systems, use the existing identification system. Otherwise, use the color codes and materials specified in this section.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 09 91 23 – Interior Painting

.4 Section 22 05 00 – Common Work Results for Plumbing

.5 Section 22 05 23 – General Duty Valves for Plumbing Piping

.6 Section 22 07 19 – Plumbing Piping Insulation

.7 Section 22 11 16 – Domestic Water Piping

.8 Section 22 11 19 – Domestic Water Piping Specialties

.9 Section 22 13 16 – Sanitary Waste and Vent Piping

.10 Section 22 13 19 – Sanitary Waste Piping Specialties

.11 Section 22 15 00 – General Service Compressed-Air Systems

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME A13.1 Scheme for the Identification of Piping Systems

1.4 SUBMITTALS

.1 Compile a list of labelled items (equipment, valves, piping specialties) listed in PART-2 PRODUCTS with the following information

.1 Tag (i.e. V-1)

.2 Description (i.e. Domestic Cold Water Isolation Valve)

.3 Location (i.e. Room 305 Ceiling Space)

.4 Manufacturer of item

.5 Model number of item

.2 Include a copy of this compiled list in the Operations and Maintenance (O&M) Manual required in the close-out submittal package. Also, include a laminated copy for permanent mounting in the appropriate maintenance room.

.3 Mark labelled items on the as-built drawings.

.4 For items located within a mechanical room, create a laminated, schematic drawingwith items labelled for permanent mounting in the mechanical room.

PART 2 - PRODUCTS

2.1 PIPING IDENTIFICATION – GENERAL SIZING OF LABELS

.1 For ¾" to 1¼" (19 mm to 32 mm) outer diameter pipe or insulation

.1 Color coding shall be 8" (200 mm) long

.2 Lettering shall be ½" (13 mm) high

.2 For 1½" to 2" (32 mm to 50 mm) outer diameter pipe or insulation

.1 Color coding shall be 8" (200 mm) long

.2 Lettering shall be ¾" (19 mm) high

.3 For 2½" to 6" (64 mm to 150 mm) outer diameter pipe or insulation

.1 Color coding shall be 12" (300 mm) long

.2 Lettering shall be 1¼" (32 mm) high

.4 For 8" to 10" (200 mm to 250 mm) outer diameter pipe or insulation

.1 Color coding shall be 24" (600 mm) long

.2 Lettering shall be 2½" (64 mm) high

.5 For over 10" (250 mm) outer diameter pipe or insulation

.1 Color coding shall be 32" (813 mm) long

.2 Lettering shall be 3½" (90 mm) high

2.2 PIPING IDENTIFICATION – GENERAL COLOR CODING

.1 Refer to the table in this section for specific fluid/gas service piping. If a particular fluid/gas is not listed…

.1 For fire quenching fluid/gas, use white lettering on a red background

.2 For toxic or corrosive fluid/gas, use black lettering on an orange background

.3 For flammable fluid/gas with a flash point under 37.8 C (100 F), use black lettering on a yellow background

.4 For combustible fluid/gas with a flash point between 37.8 C (100 F) and 93.3 C (200 F), use white lettering on a brown background

.5 For chemicals or mixtures with a flash point above 93.3 C (200 F), use white lettering on an purple background unless otherwise specified

.6 For compressed air, use white lettering on a blue background

.7 For gray water applications, use white lettering on a gray background

.8 For sanitary waste water, use white lettering on a black background

2.3 PIPING IDENTIFICATION – GENERAL LABELLING CONTENT

.1 Include...

.1 Descriptive name of fluid/gas in pipe

.2 Direction of flow arrow

.3 Temperature (required for different temperatures for same named fluid/gas)

.4 Pressure (required for different pressures for same named fluid/gas)

.5 Any unique identifier within same named fluid/gas (i.e. Breathing Compressed Air versus Non-Breathing Compressed Air)

2.4 PIPING IDENTIFICATION – SPECIFIC FLUID/GAS

Fluid/Gas	*Background Color*	*Lettering Color*	*Unique Identifier*
DOMESTIC COLD WATER	Green	White	
DOMESTIC HOT WATER	Green	White	Add temperature if multiple
DOMESTIC HW RECIRC	Green	White	
TEMPERED WATER	Green	White	
COMPRESSED AIR	Blue	White	BREATHING or NON-BREATHING
SANITARY	Black	White	
VENT	White	Black	

2.5 EQUIPMENT, VALVES AND PIPING SPECIALTIES LABELLING

.1 The intent is for any item that is required to be maintained, or be used in the course of maintenance, adjustment or repair in the system, shall be labelled in such a way that it is useful and visible.

.2 The following plumbing equipment shall be labelled

.1 Pumps and their respective controller

.3 The following plumbing valves and specialties shall be labelled

.1 Backflow preventers

.2 Pressure reducing valves

.3 Isolation valves for mains and branch lines

.4 Balancing valves

.5 Strainers

.6 Trap primer systems

.7 Backwater valves

.4 Suitable labelling material shall be…

.1 For equipment...

.1 Lamacoids with minimum 1/16” (2 mm) thick plastic and engraved lettering. Sizes shall be determined based of each piece of equipment with the intent that the lamacoidcan be easily read from up to 3 m (10 feet) away. Color shall generally be white background and black lettering unless otherwise indicated.

.2 For valves and specialties…

.1 Brass tags shall be 1½”(38 mm) diameter with stamped identification data filled with black paint.

.2 Plastic tags shall be 1¾”(44 mm) diameter with recessed identification data. Background and lettering colors to match associated piping labels.

2.6 MANUFACTURERS NAMEPLATES

.1 Nameplates stamped or installed permanently by the manufacturer shall at least designate the make, model number, and applicable standards it adheres to (i.eULc, CSA). Additional information is acceptable.

2.7 LANGUAGE

.1 Identification to be in English.

PART 3 - EXECUTION

3.1 INTENT

.1 The intent is to label items and leave behind suitably detailed information for future maintenance staff. Installation shall be done with this in mind.

3.2 INSTALLATION

.1 Install per manufacturer's written installation instructions.

.2 For piping labels, install one label...

.1 At every valve and flange connection

.2 On either side of a wall or floor penetration

.3 At every access panel if piping is concealed

.4 At every change of direction

.5 Every 15 M (50 feet) of straight pipe

.3 For lamacoids, install with supplier applied adhesive.

.4 For tags, install with a closing chain so the tag cannot come off the item and it does not hamper the normal operation of the item.

.5 All labelling shall be visible from the floor and the most logical direction of approach to the item.

3.3 TIMING

.1 Provide identification only after all painting specified in Section 09 91 23 - Interior Painting has been completed.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on thermal insulation for plumbing equipment

.2 This section does not include thermal insulation for hydronic or HVAC equipment

1.2 RELATED SECTIONS

.1 Section 01 33 00 –Submittal Procedures

.2 Section 22 05 00 – Common Work Results for Plumbing

.3 Section 22 05 29– Hangers and Supports for Plumbing Piping and Equipment

.4 Section 22 05 53 – Identification for Plumbing Piping and Equipment

1.3 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings

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

.1 ASTM B209M Specification for Aluminum and Aluminum Alloy Sheet and Plate

.2 ASTM C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation

.3 ASTM C449/C449M Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement

.4 ASTM C553 Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

.5 ASTM C612 Specification for Mineral Fiber Block and Board Thermal Insulation

.6 ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

.7 ASTM C921 Practice for Determining the Properties of Jacketing Materials for Thermal Insulation

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma Vapor Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation

.2 CGSB 51-GP-53M Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

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

.1 Material Safety Data Sheets

.5 Thermal Insulation Association of Canada (TIAC)

.1 Best Practices Guide

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102 Surface Burning Characteristics of Building Materials and Assemblies

.7 National Energy Code of Canada for Buildings (NECB)

1.4 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 “MINERAL FIBER” - includes glass fiber, rock wool, or slag wool.

1.5 SUBMITTALS

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

.2 Product Data:

.1 Upon request, submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.3 Shop Drawings:

.1 Upon request, submit manufacturer's printed product datasheet. Clearly identify products used on this job. Include product characteristics, performance criteria, and limitations.

.4 Quality Assurance:

.1 Upon request, submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Has currentcertifications required in performing work of this Section

.2 Has at least five(5) years successful experience in this size and type of project

.3 Is qualified to understand, and experienced with, the TIAC Best Practices Guide.

.2 Supplier:

.1 Has at least five(5) years successful experience in this size and type of project

.2 Must be a company specializing in work of this Section.

.3 Must be available and competent to give installation support to the installer.

.3 Manufacturer:

.1 Must be a company specializing in work of this Section.

.2 Must be listed in the relevant section of the TIAC Best Practices Guide.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 In accordance with ASTM standards

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C335.

.3 Hot tanks and equipment [60 F – 220 F (15 C - 105 C)]:

.1 Mineral fiber with or without factory applied jacket, or

.2 Closed cell elastomeric insulation (Not allowed for outdoor applications)

.3 Insulation thickness: 2” (50 mm)

.4 Cold tanks and equipment [32 F – 60 F (0 C - 15 C)]:

.1 Glass fiber with factory applied jacket, or

.2 Closed cell elastomeric insulation (Not allowed for outdoor applications)

.3 Insulation thickness: 1½” (38 mm)

2.3 INSULATION SECUREMENTS

.1 “Peel and stick” integral insulation adhesive

.2 Contact adhesive: Quick setting.

.3 Bands: Stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finish

.1 To: ASTM C449/C449M.

.2 Hydraulic setting or air drying on mineral wool, to ASTM C449.

2.5 JACKETS

.1 For mineral fiber insulation, it is recommended to use the insulation manufacturer's factory applied jacket with their approved mastic vapor retarder or weather shield as applicable. However, TIAC allows PVC and canvas as components of a system to provide similar results.

.2 The only "jacket" or finish required when using closed cell elastomeric insulation is a UV resistant coating as provided by the insulation manufacturer.

.3 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CGSB 51-GP-53M with pre-formed shapes as required.

.2 Colours: to match adjacent finish paint. Confirm with the City of Winnipeg Representative.

.3 Minimum service temperatures: -20°C.

.4 Moisture vapour transmission: 0.02 perm.

.5 Thickness: 0.56 mm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Pressure sensitive vinyl tape of matching colour.

.7 Covering adhesive: Compatible with insulation.

.4 Canvas:

.1 6.5 oz/sq.yd. (220 gm/m^2) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: Compatible with insulation.

2.6 INSULATION JOINT / JACKET TAPE

.1 Self-adhesive, reinforced, 50 mm wide minimum. Provided by insulation manufacturer.

2.7 INDOOR VAPOR RETARDER FINISH

.1 For mineral fiber insulation, it is recommended to use the insulation manufacturer's factory applied jacket with their approved mastic vapor retarder. However, TIAC allows PVC or canvas with a reinforcing fabric as components of a system to provide similar results.

.2 The only finish required when using closed cell elastomeric insulation is a UV resistant coating as provided by the insulation manufacturer.

.3 All components shall be compatible with insulation.

.4 Water vapor permeance: < 0.08 Perms

.5 Reinforcing fabric: Fibrous glass, untreated 9 oz/sq.yd. (305 g/m^2).

.1 Reinforcing fabric not required with factory applied jacket.

2.8 OUTDOOR WEATHER RETARDER (ALL TANKS AND EQUIPMENT)

.1 For mineral fiber insulation, it is recommended to use the insulation manufacturer's factory applied jacket with their approved mastic vapor retarder weather shield as applicable. However, TIAC allows canvas and reinforcing fabric as components of a system to provide similar results.

.2 Vinyl acrylic mastic, compatible with insulation.

.3 Reinforcing fabric: Fibrous glass, untreated 9 oz/sq.yd. (305 g/m^2).

.1 Reinforcing fabric not required with factory applied jacket.

2.9 REMOVABLE INSULATION COVERS

.1 General:

.1 Covers shall conform to the configuration of the items being insulated.

.2 Covers shall include openings for all protrusions such as pipes, packing glands on valves and expansion joints, hangers, supports, instrument lines, and other appurtenances.

.3 Minimum 50mm wide flaps at terminal ends are to be provided to overlap adjacent covers to ensure a good heat seal.

.4 Parting seams shall be at the installed low points (gravitational bottom) of the cover to allow drainage without the use of weep tubes or grommets.

.5 Optional removable insulation cover designs can be submitted to the engineer for approval as a shop drawing in accordance with 01 33 00 – Submittal Procedures.

.2 Insulation Core:

.1 The insulation core shall be fabricated in one piece, wherever possible.

.2 To prevent insulation settlement, the insulation core shall be secured within the jacket through the weather barrier (outer jacketing), the insulation, and the liner (inner jacketing).

.3 Insulating cores with more than one piece shall have staggered joints to prevent hot spots and heat loss. The joint edges shall be butted together and extra securement provided at those edges.

.3 Jacket:

.1 The jacket shall be fabricated in one piece, wherever possible.

.2 Gusset walls shall be required for covers with core insulation thickness in excess of 1” (25mm).

.3 All seams, except the final closing seam, shall be inside seams. The jackets are to be sewn inside out, then turned correct side out before inserting the insulation core. The final closing seam shall be sewn on the exterior of the jacket. Seams shall be sewn with Teflon® coated fiberglass thread or Kevlar® coated stainless steel thread.

.4 Machine stitching shall be used for all sewing. Sewing shall be 6-8 stitches per centimeter.

.5 Draw cords are to be placed along the outer edge of the flap and the outer edge of the flap then rolled back inside and double stitched.

.6 Draw cords are to be of sufficient length to allow 6” (150mm) of cord to protrude from each side of the flap.

.7 The inner and outer jacket shall be comprised of a fiberglass fabric impregnated with silicone rubber. The silicone rubber shall be flame retardant and suitable for high temperature usage. Outer jacket density shall be 17.5oz/sq.yd.(595 gms/m²).

PART 3 - EXECUTION

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of equipment and adjacent piping systems complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC Best Practices Guide

.2 Finishes requiring canvas according to TIAC may be modified to use the insulation manufacturer’s finish product on the factory applied jacket without the requirement for canvas.

.1 Hot tanks and equipment [60 F – 220 F (15 C - 105 C)]:

.1 Insulation to TIAC code 1503-H

.2 Finished for indoor applications: TIAC code CEF/2

.3 Finished for outdoor applications: TIAC code CEF/3

.2 Coldtanks and equipment [32 F – 60 F (0 C - 15 C)]:

.1 Insulation to TIAC code 1503-C

.2 Finished for indoor applications: TIAC code CEF/2

.3 Finished for outdoor applications: TIAC code CEF/3

.3 Pumps: Not insulated unless indicated.

.4 Water meters: Not insulated unless indicated

.5 Backflow assemblies: Not insulated unless indicated

.6 Hot water heater and tank combination units: Not insulated under this section if already factory insulated to meet NECB.

.3 Elastomeric Insulation: to remain dry. Overlaps to manufacturer's instructions. Joints tight and sealed properly.

.4 Apply materials in accordance with insulation and equipment manufacturer's instructions and this specification.

.5 Maintain uninterrupted continuity and integrity of vapor retarder jacket and finishes.

.1 Hangers, supports outside vapor retarder jacket.

3.3 REMOVABLE INSULATION COVERS

.1 Installation to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.2 If required to be insulated, removable insulation covers shall be provided for the following:

.1 Domestic water service entrance backflow preventer.

.2 Domestic water service entrance pressure reducing valve assembly.

.3 Domestic water service entrance O.S. & Y gate valve.

.4 Domestic water service entrance copper connection butterfly valves NPS 2½ and larger.

.5 Domestic water service entrance wye–strainer.

.6 Balancing valves NPS 2½ and above.

.7 Two-Way Control valves NPS 2½ and larger.

.8 Three-Way Control valves NPS 2½ and larger.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on thermal insulation for plumbing piping and piping accessories.

.2 This section does not include sprinkler piping or HVAC equipment piping.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 07 84 00 – Firestopping

.3 Section 22 05 00 – Common Work Results for Plumbing

.4 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.5 Section 22 05 53 – Identification of Plumbing Piping and Equipment

.6 Section 22 11 16 – Domestic Water Piping

.7 Section 22 13 16 – Sanitary Waste and Vent Piping

1.3 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1 Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including all Addenda)

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C335 Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation

.2 ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation

.3 ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

.4 ASTM C921 Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation

.2 CAN/CGSB-51.53 Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

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

.1 Material Safety Data Sheets

.5 Thermal Insulation Association of Canada (TIAC)

.1 Best Practices Guide

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S102Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 CAN/ULC S102.2Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

.3 CAN/ULC S701 Thermal Insulation, Polystyrene, Boards and Pipe Covering

.7 National Energy Code of Canada for Buildings (NECB)

1.4 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

1.5 SUBMITTALS

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

.2 Product Data:

.1 Upon request, submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.3 Shop Drawings:

.1 Upon request, submit manufacturer's printed product datasheet. Clearly identify products used on this job. Include product characteristics, performance criteria, and limitations.

.4 Quality Assurance:

.1 Upon request, submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Has currentcertifications required in performing work of this Section

.2 Has at least five(5) years successful experience in this size and type of project

.3 Is qualified to understand, and experienced with, the TIAC Best Practices Guide.

.2 Supplier:

.1 Has at least five(5) years successful experience in this size and type of project

.2 Must be a company specializing in work of this Section.

.3 Must be available and competent to give installation support to the installer.

.3 Manufacturer:

.1 Must be a company specializing in work of this Section.

.2 Must be listed in the relevant section of the TIAC Best Practices Guide.

PART 2 - PRODUCTS

2.1 FOR HOT WATER [60 F – 220 F (15 C – 105 C)]

.1 Flame spread / smoke developed rating: 25/50 as per CAN/ULC S102 or CAN/ULC S102.2

.2 For conditioned space

.1 Thermal conductivity factor ‘k’: 0.035-0.040 W/m*C @ 38 C

.2 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket.

.3 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.4 Insulation thickness

.1 Up to 2 NPS: 1” (25 mm)

.2 2½ NPS and up: 1½” (38 mm)

.3 For unconditioned space

.1 Thermal conductivity factor ‘k’: 0.046-0.049 W/m*C @ 38 C

.2 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket.

.3 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.4 Insulation thickness

.1 Up to 2 NPS: 2½" (64 mm)

.2 2½ NPS to 4 NPS: 3" (76 mm)

.3 5 NPS and up: 3½" (89 mm)

.4 For outdoor applications

.1 Thermal conductivity factor 'k': 0.046-0.049 W/m*C @ 38 C

.2 Preformed mineral fiber (low and medium temperature) pipe insulation with stainless steel jacket, or

.3 Preformed glass fiber pipe insulation with a factory applied jacket with stainless steel jacket

.4 Insulation thickness

.1 Up to 2 NPS: 2½" (64 mm)

.2 2½ NPS to 4 NPS: 3" (76 mm)

.3 5 NPS and up: 3½" (89 mm)

2.2 FOR COLD WATER [32 F – 60 F (0 C – 15 C)]

.1 Flame spread / smoke developed rating: 25/50 as per CAN/ULC S102 or CAN/ULC S102.2

.2 Vapor retarder permeance: 0.02 Perms or less

.3 For conditioned space

.1 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket, or

.3 Cellular glass pipe insulation

.2 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.3 Insulation thickness

.1 Up to 2 NPS: 1” (25 mm)

.2 2½ NPS and up: 1½” (38 mm)

.4 For unconditioned space (pipe heat trace required)

.1 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket, or

.3 Cellular glass pipe insulation

.2 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.3 Insulation thickness

.1 Up to 2 NPS: 2½” (64 mm)

.2 2½ NPS to 4 NPS: 3” (76 mm)

.3 5 NPS and up: 3½” (89 mm)

2.3 FOR VENT, RAIN WATER LEADER, AND SANITARY PIPING

.1 Flame spread / smoke developed rating: 25/50 as per CAN/ULC S102 or CAN/ULC S102.2

.2 Vapor retarder permeance: 0.02 Perms or less

.3 For conditioned space

.1 Insulate a minimum 10 feet (3 m) prior to exterior (unconditioned) penetration point (or more if additional is indicated on the drawings).

.2 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket, or

.3 Cellular glass pipe insulation

.3 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.4 Insulation thickness

.1 All pipe sizes: 1” (25 mm)

.4 For unconditioned space (heat trace required in traps and locations completely filled with liquid)

.1 Insulate pipe completely

.2 For concealed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with a factory applied jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket, or

.3 Cellular glass pipe insulation

.3 For exposed space

.1 Preformed mineral fiber (low and medium temperature) pipe insulation with PVC jacket, or

.2 Preformed glass fiber pipe insulation with a factory applied jacket with PVC jacket

.4 Insulation thickness

.1 All pipe sizes: 1” (25 mm)

2.4 INSULATION SECUREMENT

.1 Joint connections, vapor retarder completion, jacket attachment and associated materials otherwise required for installation to the insulation manufacturer’s instructions shall be provided by the insulation manufacturer.

2.5 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 Moulded type to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Minimum service temperatures: -4 F (-20^{o}C).

.3 Moisture vapour transmission: 0.02 perm.

.4 Labels: As per Section 22 05 53 – Identification of Plumbing Piping and Equipment

.2 Stainless steel:

.1 Type: 304 or type 316.

.2 Thickness: 0.25 mm.

.3 Finish: Smooth.

.4 Joining: Longitudinal and circumferential slip joints with 2” (50 mm) laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, ¾” (19 mm) wide, 0.5 mm thick at 12” (300 mm) spacing.

.7 Labels: As per Section 22 05 53 – Identification of Plumbing Piping and Equipment

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE- INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.3 INSTALLATION - GENERAL

.1 Install in accordance with TIAC Best Practices Guide.

.2 Apply materials in accordance with manufacturer's instructions.

.3 Maintain uninterrupted continuity and integrity of vapor retarder jacket and finishes.

.1 Install hangers, supports outside vapor retarder jacket.

3.4 RUNOUTS

.1 Run-outs to individual units and equipment not exceeding 13' (4000 mm) long.

.2 Do not insulate exposed runouts to plumbing fixtures, fixture risers, valves, or fittings located within the same room as the fixture.

.1 Exception: Barrier-free fixtures may require insulation and PVC jacketing for burn protection.

3.5 INSTALLATION - FOR HOT WATER [60 F – 220 F (15 C – 105 C)]

.1 TIAC Code: 1501-H.

.1 Insulation and jackets shall be attached as per manufacturer's installation documentation.

.2 Valves, bonnets, strainers, P-T ports, and gauges are not to be insulated unless in unconditioned or outdoor spaces.

.2 For concealed spaces

.1 Finish shall be TIAC code: CPF/2

.2 Valves, bonnets, strainers, P-T ports, and gauges are not to be finished unless in unconditioned or outdoor spaces.

.3 For exposed spaces (not outdoors)

.1 Finish shall be TIAC code: CPF/4

.2 Valves, bonnets, strainers, P-T ports, and gauges are not to be finished unless in unconditioned or outdoor spaces.

.4 For outdoor applications

.1 Finish shall be TIAC code: CPF/3

3.6 INSTALLATION - FOR COLD WATER [32 F – 60 F (0 C – 15 C)]

.1 TIAC Code: 1501-C.

.1 Insulation and jackets shall be attached as per manufacturer's installation documentation.

.2 For concealed spaces

.1 Finish shall be TIAC code: CPF/2

.2 P-T ports, and gauges are not to be finished unless in unconditioned or outdoor spaces.

.3 For exposed spaces (not outdoors)

.1 Finish shall be TIAC code: CPF/4

.2 P-T ports, and gauges are not to be finished unless in unconditioned or outdoor spaces.

.4 For outdoor applications

.1 Finish shall be TIAC code: CPF/3

3.7 INSTALLATION - FOR VENT, RAIN WATER LEADER, AND SANITARY PIPING

.1 TIAC Code: 1501-C.

.1 Insulation and jackets shall be attached as per manufacturer's installation documentation.

.2 For concealed spaces

.1 Finish shall be TIAC code: CPF/2

.2 Backwater valves and other accessories shall not be insulated unlesswithin 10 feet (3 m) of an exterior (unconditioned) penetration point.

.3 For exposed spaces (not outdoors)

.1 Finish shall be TIAC code: CPF/4

.2 Backwater valves and other accessories shall not be insulated unlesswithin 10 feet (3 m) of an exterior (unconditioned) penetration point.

.4 For outdoor applications

.1 Finish shall be TIAC code: CPF/3

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives the required operational sequences pertaining to plumbing equipment.

1.2 RELATED SECTIONS

.1 Section 01 91 13 – General Commissioning Requirements

.2 Section 22 05 00 – Common Work Results for Plumbing

1.3 CONTRACTOR RESPONSIBILITY

.1 It is the plumbing contractor's responsibility to ensure thesupply and installation of all necessary components for a complete and functional plumbing system per the sequence of operations. Coordinate with other sub-contractors as required for ensuring the sequence of operations can occur as intended.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Provide accessories as needed to accomplish the intended sequence of operations.

.2 All control wiring shall be plenum rated with a developed smoke / flame spread rating of 25/50.

PART 3 - EXECUTION

3.1 GENERAL

.1 Line voltage requirements work shall be by a licensed electrician.

3.2 DOMESTIC HOT WATER TANKS

.1 Tank heater shall start and heat water until the internal tank water temperature is 140 F (60 C) unless otherwise specified.

.2 For power venting units, flue venting fan shall run per an output signal from the water tank internal controls. Follow manufacturers documented requirements.

.3 There is no requirement for any input or output signal to a building management system (BMS).

3.3 DOMESTIC HOT WATER RECIRCULATION PUMPS

.1 Unless specifically indicated on the pump schedule, the pump shall run on based on…

.1 A time clock with a user-adjustable schedule.

.2 There is no requirement for any input or output signal to a building management system (BMS).

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes the requirements for domestic potable water piping.

.2 The intent of the design is to have a complete, working domestic potable water system that will function under all reasonable conditions. Installation shall meet this intent.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 07 85 00 – Firestopping

.4 Section 22 05 00 – Common Work Results for Plumbing

.5 Section 22 05 16 – Expansion Fittings and Loops for Plumbing Piping

.6 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.7 Section 22 05 53 – Identification for Plumbing Piping and Equipment

.8 Section 22 07 19 – Plumbing Piping Insulation

1.3 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

.1 ANSI/ASME B16.15 Cast Bronze Threaded Fittings, Classes 125 and 250

.2 ANSI/ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings

.3 ANSI/ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

.2 American National Standards Institute/National Sanitation Foundation (ANSI/NSF)

.1 ANSI/NSF 61, Drinking Water System Components

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

.1 ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric)

.2 ASTM F493 Standard Specification for Solvent Cements for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe and Fittings

.3 ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems

.4 ASTM F2080 Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe

.4 American Water Works Association (AWWA)

.1 AWWAC904-06 - Crosslinked Polyethylene (PEX) Pressure Pipe, 1/2 In.(12 mm) Through 3 In. (76 mm), for Water Service

.5 Canadian Standards Association (CSA International).

.1 CSA B137.5Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications

.2 CSA B137.6Chlorinated Polyvinylchhloride (CPVC) Pipe, Tubing, and Fittings for Hot and Cold Water Distribution Systems

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULcS101PEX Pipe through Fire Rated Assemblies

.2 CAN/ULcS102.2Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials

.7 National Research Council (NRC)/Institute for Research in Construction

.1 National Plumbing Code of Canada (NPC)

1.4 SUBMITTALS

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

.2 Product Data:

.1 Upon request, provide manufacturer's printed product datasheets for piping and adhesives, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. CSA, ASTM, ULc, etc...).

.3 Include in Operation and Maintenance (O&M) Manual per 01 78 00 – Closeout Submittals:

.1 Reports:

.1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

.2 Include water quality sample analysis.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Must be a company specializing in the Work of this Section with a minimum of ten (10) years documented experience.

.2 All piping and fittings of a particular material shall be supplied by one manufacturer.

.3 Supplier: Must be a company specializing in the Work of this Section with a minimum of five (5) years documented experience.

PART 2 - PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Copper:

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

.2 Pex:

.1 All pipe shall be high-density crosslinked polyethylene manufactured using the high-pressure peroxide method of crosslinking (PEXa). Pipe shall conform to ASTM F877, CSA B137.5 and NSF/ANSI 61.

.2 Pipe shall be rated for continuous operation of 100 psi gauge pressure at 180°F temperature (690 kPa @ 82°C), and 80 psi gauge pressure at 200°F temperature (550 kPa @ 93°C).

.3 PEX pipe in exposed locations shall be rigid (not coil).

.4 Pipe shall be resistant to hot chlorinated water. Pipe to have a minimum extrapolated time-to-failure of 50 years.

.5 PEX pipe to have a co-extruded colored UV Shield made from UV-Resistant polyethylene providing UV resistance.

.6 Pipe to have a Flame Spread Index of less than 25, and a Smoke Developed Index of less than 50 when tested in accordance with CAN/ULcS102.2. In any case where the pipe does not conform to these standards, appropriate piping insulation shall be installed in order to meet the standard.

.3 CPVC:

.1 Above ground use only: to CSA B137.6

.2 Pipe shall be rated for continuous operation of 100 psi gauge pressure at 180°F temperature (690 kPa @ 82°C).

.3 Pipe to have a Flame Spread Index of less than 25, and a Smoke Developed Index of less than 50 when tested in accordance with CAN/ULcS102.2.

2.2 FITTINGS

.1 Copper:

.1 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.

.2 Cast copper, solder type: to ANSI/ASME B16.18.

.3 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.4 NPS 1½ and under: Cast copper, ANSI/ASME B16.18 or wrought copper, ANSI/ASME B16.22; with 301 stainless steel internal components, EPDM seal, and push-to-connect joints.

.2 Pex:

.1 All Fittings used with crosslinked polyethylene (PEX) water distribution pipe intended for plumbing applications shall be of the cold-expansion compression-sleeve design.

.2 All Fittings shall be third-party certified to applicable standards ASTM F877, ASTM F2080, NSF/ANSI 61 and CSA B137.5 and approved by the manufacturer's PEX piping system, with applicable plumbing and mechanical code certifications.

.3 Compression-sleeve fittings shall be manufactured of brass and shall be supplied by the piping manufacturer as part of a proven cataloged system.

.4 Where fittings are encased in concrete or buried underground, fittings shall be wrapped as per manufacturer's recommendation to protect the material.

.3 CPVC:

.1 Fittings are to be the same material as the pipe and provided by the pipe manufacturer.

2.3 JOINTS

.1 Copper:

.1 Solder: 95/5 tin copper alloy lead free.

.2 Push-to-connect: EPDM gasket, UL classified in accordance with ANSI/NSF61 for potable water service.

.3 Teflon tape: for threaded joints.

.4 Dielectric connections between dissimilar metals.

.2 CPVC:

.1 Solvent cement to CSA B137.6, ASTM F493 and ANSI/NSF 61.

.2 Two part CPVC cement with primer (Low VOC).

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

.1 The responsible installer shall be licensed in the jurisdiction of the installation.

.2 For Pex:

.1 Installation shall be performed by qualified laborers trained by the manufacturer in the procedures of proper installations of PEX systems.

.2 Under direct supervision of, or conducted by a qualified journeyman.

.3 For Copper:

.1 Installation by qualified journeyman with at least five (5) years experience in copper joining work.

.4 For CPVC:

.1 Under direct supervision of, or conducted by a qualified journeyman.

3.2 PREPARATION

.1 Coordinate installation with trades whose installations are close by, or in potential conflict.

.2 Prepare the layout based on manufacturer's recommendations for proper installation.

3.3 INSTALLATION (GENERAL)

.1 Install in accordance with...

.1 Canadian National Plumbing Code (NPC)

.2 Local Authority Having Jurisdiction (AHJ).

.3 Manufacturer's Instructions

.2 For Copper:

.1 Solder connections: Clean and score, de-burr and apply flux. Protect against flame damage. Remove excess solder and flux after joining.

.2 Push-to Connect Piping: Prepare copper tube and install in strict accordance with installation instructions. Pipe ends to be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool to clean and make installation mark. Push copper tube into fittings to installation depth mark, per installation instructions. Keep fittings free of dirt and oil.

.3 For Pex:

.1 Install in accordance with manufacturer's published installation manual and/or published guidelines and final shop drawings.

.2 Install isolation valves at changes of material type (Pex to other). Pex pipe must be isolated from chlorine disinfection process.

.3 Manifolds shall be mounted as level as possible.

.4 Route piping in an orderly manner, according to layout and spacing shown in final shop drawings. All installation notes shown on the drawings shall be followed.

.5 At connections and fittings, use a plastic pipe cutter to ensure square (90°) and clean cuts, and join pipes immediately or cap ends of pipe to seal from contaminants.

.6 Pipe shall be dispensed using a suitable uncoiling device. Remove twists prior to securing pipe. Pipe shall lie flat on an even plane.

.7 Piping that passes through structural expansion joints, floors or walls shall be covered in protective polyethylene convoluted sleeving (flexible conduit) extending 15 inches (38 cm) on each side of the joint. Sleeving shall be secured on pipe to prevent movement during installation.

.8 Use nail/screw guards where pipe could be subject to penetration.

.4 For CPVC:

.1 Straight cut, de-burr and clean. Apply primer and two part cement as per manufacturer's requirements.

.5 Maintain 6" (150 mm) between cold water and hot water piping.

.6 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.4 INSTALLATION (SPECIFIC AREAS)

.1 For vertical shafts that do not have fire separations at each floor level, only copper pipe is acceptable. Copper shall be used for pipe entering and leaving the shaft and entirely in the shaft.

3.5 PRE-STARTUP INSPECTION

.1 Verify that system can be completely drained.

.2 Ensure that pressure booster systems (if applicable) are installed properly.

.3 Ensure that air chambers, expansion compensators are installed properly.

.4 Ensure Pex piping can be isolated from piping of other material.

3.6 STARTUP PROCESS

.1 Consult local authority having jurisdiction (AHJ) inspector prior to startup process regarding process deviation, inspection and witnessing requirements.

.2 Disconnect/isolate any water treatment and softening devices.

.3 Disconnect/isolate gas or power to water heaters. Maintain water flow through units.

.4 Pressure Test System

.1 Pressurize system with air prior to covering with drywall. Maintain pressure for 24 hours.

.2 Test pressure: greater of 1½ times maximum system operating pressure or 125 psi (860 kPa).

.3 Submit pressure test report upon request.

.5 Flush all piping with water for three (3) hours.

.6 Isolate Pex lines.

.7 Disinfect copper and CPVC pipes.

.1 Disinfection process may be modified by the authority having jurisdiction (AHJ) at their discretion. Contractor shall follow AHJ direction.

.2 Coordinate disinfection process with incoming water service work done by site services contractor.

.3 Drain water from system.

.4 Fill system with water containing 50 ppm (50mg/L) of chlorine.

.5 Let stand in piping system for 24 hours.

.6 Drain piping.

.8 Flush copper and CPVC pipes for three (3) hours, or until chlorine smell is gone, whichever is longer.

.9 Connect/open valves to Pex piping, water treatment devices.

.10 Connect/open valve for gas or electricity for water heating devices. Bring temperature up slowly.

.11 Monitor pipe expansion.

.12 Purge air from system.

3.7 POST-STARTUP INSPECTION

.1 Inspect air vents, pressure reducing valves and pressure relief valves for leaks.

.2 Inspect pipe expansion compensation locations for leaks.

.3 Clean faucet diffusers/strainers.

.4 Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

.1 Record incoming water pressure and flow rate.

.2 Take water sample from faucet at high point in system. Submit to an accredited laboratory to produce a water quality report.

.3 Verify performance of temperature controls. Adjust as required.

.4 Verify compliance with safety and health requirements.

.5 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds then, shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.6 Reports:

.1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

.2 Include water quality sample analysis.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on domestic water piping specialties and includes:

- .1 General Requirements
- .2 Vacuum breakers
- .3 Backflow preventers
- .4 Water pressure-reducing valves
- .5 Balancing valves
- .6 Temperature control water mixing valves
- .7 Strainers
- .8 Hose bibbs (Interior)
- .9 Wall hydrants (Exterior)
- .10 Drain valves
- .11 Water-hammer arresters
- .12 Trap primer systems
- .13 Flexible connectors

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures
.2 Section 01 78 00 – Closeout Submittals
.3 Section 01 91 13 – General Commissioning Requirements
.4 Section 22 05 00 – Common Work Results for Plumbing
.5 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment
.6 Section 22 05 53 – Identification for Plumbing Piping and Equipment
.7 Section 22 07 19 – Plumbing Piping Insulation
.8 Section 22 11 16 – Domestic Water Piping

1.3 REFERENCES

.1 Listed under individual specialties

1.4 SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product datasheets for each specialty, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. CSA, ASTM, ULc, etc...).

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Provide Performance Verification Reports.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

.1 Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

.2 Choose “lead-free” products (<0.25% lead by weight on wetted surfaces).

.3 Include isolation valves before and after every specialty or group of specialties requiring maintenance.

2.2 VACUUM BREAKERS

.1 Pipe-Applied, Atmospheric-Type Vacuum Breakers (AVB)

.1 Construction Standard: ASSE 1001.

.2 Application Standard: CAN/CSA B64.1.1

.3 Size: As required to match connected piping.

.4 Inlet and Outlet Connections: Threaded.

.2 Hose-Connection Vacuum Breakers (HVB or HCVB)

.1 Standard: ASSE 1011.

.2 Application Standard: CAN/CSA B64.2

.3 Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.

.3 Pressure Vacuum Breakers (PVB)

.1 Standard: ASSE 1020.

.2 Application Standard: CAN/CSA B64.1.2

.3 Size: As required to match connected piping.

.4 Accessories:

.1 Valves: Ball type, on inlet and outlet.

2.3 BACKFLOW PREVENTION

.1 Intermediate Atmospheric-Vent Backflow Preventers (DuCV or DC with vent)

.1 Standard: ASSE 1012.

.2 Application Standard: CAN/CSA B64.8

.3 Size: As required to match connected piping.

.4 End Connections: Union joint.

.2 Reduced-Pressure-Principle Backflow Preventers (RP or RPZ)

.1 Standard: ASSE 1013.

.2 Application Standard: CAN/CSA B64.4

.3 Body: Bronze for NPS 2 (DN 50) and smaller; Cast iron with interior lining that complies with AWWA C550 for NPS 2 1/2 (DN 65) and larger.

.4 End Connections: Threaded for NPS 2 (DN 50)and smaller; flanged for NPS 2 1/2 (DN 65) and larger.

.5 Accessories:

.1 Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.

.2 Valves NPS 2 1/2 (DN 65) and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

.3 Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

.3 Double-Check, Backflow-Prevention Assemblies (DCVA)

.1 Standard: ASSE 1015.

.2 Application Standard: CAN/CSA B64.5

.3 Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approvedfor NPS 2 1/2 (DN 65) and larger.

.4 End Connections: Threaded for NPS 2 (DN 50)and smaller; flanged for NPS 2 1/2 (DN 65) and larger.

.5 Configuration: Designed for horizontal, straight-through flow.

.6 Accessories:

.1 Valves NPS 2 (DN 50) and smaller: Ball type with threaded ends on inlet and outlet.

.2 Valves NPS 2 1/2 (DN 65) and larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

.4 Dual-Check-Valve Backflow Preventers (DC or DuC)

.1 Standard: ASSE 1024.

.2 Application Standard: CAN/CSA B64.6

.3 Body: Bronze with union inlet.

.5 Double-Check, Detector-Assembly , Fire Protection, Backflow Preventers (DCDA or DCVAF)

.1 Standard: ASSE 1048 and is FM Global approved or UL listed.

.2 Application Standard: CAN/CSA B64.5.1

.3 Body: Cast iron with interior lining that complies with AWWA C550.

.4 End Connections: Flanged.

.5 Accessories:

.1 Valves: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.4 BALANCING VALVES

.1 Memory-Stop Balancing Valves

.1 Pressure Rating: 125 psig (862 kPa) minimum.

.2 Size: NPS 2 (DN 50) or smaller.

.3 Material:

.1 Body: Brass

.2 Port: Brass

.3 Ball: Chrome-plated brass

.4 Seats: PTFE

.4 Accessories: Checked metering ports

2.5 TEMPERATURE CONTROL WATER MIXING VALVES

.1 “Point-of-Use”Water Temperature Limiting Devices: 3/8” (10 mm) to 1” (25 mm) connections

.1 Standard: ASSE 1070.

.2 Pressure Rating: 150 psig (10.3 bar) minimum.

.3 Flow Rating: Accurate at 0.5 gpm (2.2 l/min) and higher

.4 Leaving Temperature: 80 - 120 F (27 - 49 C) – Manually adjustable.

.5 Material:

.1 Body: Brass or Copper-silicon alloy

.2 Disc: Buna-N or Stainless steel

.3 Thermostat: Copper

.4 Spring: Stainless steel

.6 Accessories:

.1 Check valves to prevent temperature migration

.2 40 mesh stainless steel screens on hot and cold water supplies to valve.

.2 Primary, Thermostatic Water Mixing Valves: 3/4” (19 mm) to 2” (50 mm) connections

.1 Standard: ASSE 1017.

.2 Pressure Rating: 125 psig (860 kPa) minimum.

.3 Flow Rating: As per ASSE 1017

.4 Leaving Temperature: 90 - 180 F (32 - 82 C) – Manually adjustable.

.5 Material:

.1 Body: Brass

.2 Thermostat actuator: Paraffin based

.6 Accessories:

.1 Check valves to prevent temperature migration

2.6 STRAINERS

.1 Wye-Pattern Strainers: 1/4” (8 mm) to 4” (100 mm)

.1 Pressure Rating: 300 psig (20.7 bar) minimum at 210 F (99 C).

.2 Material:

.1 Body: Copper-silicon alloy

.2 Strainer: 304 Stainless steel

.1 #20 mesh for 1/4” (8 mm) to 2½” (65 mm) pipe

.2 3/64” mesh for 3” (75 mm) pipe

.3 1/8” mesh for 4” (100 mm) pipe

2.7 HOSE BIBBS (INTERIOR)

.1 Hose Bibbs (Exposed)

.1 Standards:

.1 Hose Outlet: ASME B1.20.7

.2 Vacuum Breaker: ASSE 1011

.2 Material:

.1 Body: Bronze.

.2 Seat: Bronze, replaceable.

.3 Pressure Rating: 125 psig (860 kPa).

.4 Accessories:

.1 Vacuum Breaker: non-removable, tamper-proof.

2.8 WALL HYDRANTS (EXTERIOR)

.1 Non-freeze Wall Hydrants

.1 Standard: ASSE 1053

.2 Pressure Rating: 125 psig (860 kPa).

.3 Material:

.1 Body and Pipe: Brass

.2 Box: Brass

.4 Operation: Quarter-turn key.

.5 Pipe to be length required to match wall thickness including box. Include wall clamp.

.6 Must be automatic draining.

.7 Inlet size: NPS 3/4 (DN 20).

.8 Outlet: Integral dual check valve and garden-hose thread.

.9 Accessories:

.1 Dual check valve

.2 Flush mount box with weep hole to enclose hydrant

2.9 DRAIN VALVES

.1 Ball-Valve-Type, Hose-End Drain Valves

.1 Standard: MSS SP-110 for standard-port, two-piece ball valves.

.2 Pressure Rating: Class 125.

.3 Size: NPS 3/4 (DN 20).

.4 Body: Copper alloy.

.5 Ball: Chrome-plated brass.

.6 Seats and Seals: Replaceable.

.7 Handle: Vinyl-covered steel.

.8 Inlet: Threaded or solder joint.

.9 Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

.2 Gate-Valve-Type, Hose-End Drain Valves

.1 Standard: MSS SP-80 for gate valves.

.2 Pressure Rating: Class 125.

.3 Size: NPS 3/4 (DN 20).

.4 Body: ASTM B 62 bronze.

.5 Inlet: NPS 3/4 (DN 20) threaded or solder joint.

.6 Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

.3 Stop-and-Waste Drain Valves

.1 Combination stop and drain valves are not permitted unless specifically authorized. Use separate isolation and drain valves.

2.10 WATER HAMMER ARRESTERS

.1 Water-Hammer Arresters

.1 Standard: ASSE 1010 and ANSI A112.26.1M.

.2 Pressure Rating:

.1 Working range up to 350 psig (24 bar)

.2 Surge protection to 1500 psig (103.4 bar)

.3 Temperature Rating: Up to 250 F (121 C)

.4 Size: A through F, as required by number of fixtures.

2.11 TRAP PRIMER DEVICES

.1 Pressure Drop Primer Device

.1 Standard: ASSE 1018.

.2 Pressure Rating:

.1 20 psig (138 kPa) to 125 psig (860 kPa) supply water pressure.

.2 3 psi (21 kPa) pressure drop activation.

.3 Body: Bronze or Brass

.4 Inlet and Outlet Connections: NPS 1/2 (DN 15)threaded.

.5 Accessories: Air gap fitting.

.2 Electronic Trap Primer Systems (Single Manufacturer Package)

.1 Standard: ASSE 1044.

.2 Pressure Rating:to 100 psig (690kPa) supply water pressure.

.3 Inlet and Outlet Connections: NPS 1/2 (DN 15).

.4 Cabinet: 16 gage epoxy coated steel.

.5 Power connection: Single point 120 VAC or 24 VDC

.6 Electric Controls: 24-hour timer, solenoid valve, and manual override switch.

.7 Accessories:

.1 Manifold to serve up to five (5) traps.

.2 Air gap fitting

2.12 FLEXIBLE CONNECTORS

.1 Braided Stainless Steel Flexible Connectors

.1 Material:

.1 Hose: PVC

.2 Jacket: Braided stainless steel

.3 Connections: Lead-free brass

.2 Working Pressure Rating: Minimum 125 psig (860 kPa)

.3 Working Temperature Rating: 180 F (82 C)

PART 3 - EXECUTION

3.1 INSTALLATION– GENERAL

.1 Specialty items shall be compatible with the plumbing piping connected.

.2 Specialty items attached in plumbing piping shall be supported such that the installation does not cause excessive force or torque on the piping.

.3 Coordinate with other trades including wall and ceiling finisher to allow for access doors to be located in a suitable location adjacent to the specialty device.

.4 Attached piping shall be clean of oil, cutting fluid and burrs prior to installation of specialty device. Many piping specialties will not function properly if oil or debris is allowed to enter.

3.2 INSTALLATION – VACUUM BREAKERS AND BACKFLOW PREVENTERS

.1 Install air gaps, vacuum breakers, or backflow preventers as required by the particular application in each water supply that serves fixtures, tanks, devices or other systems that may be sources of contamination. Comply with...

.1 Authorities Having Jurisdiction (AHJ)

.2 CAN/CSA B64.10-11 - Selection and Installation of Backflow Preventers

.3 Canadian National Plumbing Code 2010 (NPC)

.2 If a specific type of contamination or backflow prevention is specified on the drawings or elsewhere in the specification, that type must be used, even if an optional type is allowed when complying with 3.2.1 above.

.3 Locate backflow preventers in same room as connected equipment or system.

.4 Backflow preventers with atmospheric-vent or port drain connection shall terminate above a floor hub drain with an air gap.

.5 Do not install bypass piping around backflow preventers.

3.3 INSTALLATION – BALANCING VALVES

.1 Install balancing valves in locations where they can easily be adjusted.

3.4 INSTALLATION – TEMPERATURE CONTROL WATER MIXING VALVES

.1 Install “point-of-use” water temperature control devices at each fixture, or closely grouped fixtures, as indicated on the drawings or designated as requiring anti-scald protection.

.2 Primary water temperature control devices are not to be used to provide anti-scald protection to fixtures.

.3 Install temperature control water mixing valves in locations where they can easily be adjusted.

.4 Install so valves are independently attached to structure. Do not rely on connected piping for support.

3.5 INSTALLATION - STRAINERS

.1 Unless integral to the valve, install a wye-pattern strainer for water on each supply side connection to each pressure-reducing valve, balancing valve, or temperature control mixing valve.

.2 Install a wye-pattern strainer for water on each supply side connection to each pump.

3.6 INSTALLATION –HOSE BIBBS (INTERIOR)

.1 Install hose bibbs rigidly to structure with wood blocking as required.

3.7 INSTALLATION – WALL HYDRANTS (EXTERIOR)

.1 Coordinate with exterior wall finishing contractor and wall structural contractor to accept hydrant mounting.

.2 Use spray foam insulation to fill voids after installation. Maintain thermal and vapor barriers.

3.8 INSTALLATION – DRAIN VALVES

.1 Drain valve to be located at low point of systems to allow for complete drainage.

.2 For incoming domestic water service to a building, the order of installation shall be point of entry, water meter, backflow preventer, stop cock, then drain valve. All fixtures and branches shall be downstream of the drain valve.

.3 Drain valves for hot water applications shall be a gate valve type.

3.9 INSTALLATION – WATER HAMMER ARRESTERS

.1 Locate as close as possible to quick closing valves.

.2 Generally for groups of fixtures, install on both cold and hot water supply lines between last and second last fixture; sized for total connected fixture units.

.3 Refer to manufacturer's documents for sizing and placement data.

3.10 INSTALLATION – TRAP PRIMERS

.1 For pressure drop primers:

.1 Primer branch pipe shall tee off the top of supply water piping. Install union prior to primer device.

.2 Clean and flush supply water piping prior to installation. Debris will hamper proper primer operation.

.3 Connect rigid pipe from outlet of air gap fitting to trap connection with a minimum 1% slope towards the trap.

.4 Mount the primer device 12" (300 mm) above the trap for every 20 feet (6 m) of outlet pipe.

.5 Use only Teflon tape for threaded pipe connections.

.2 For electronic primers:

.1 Coordinate with electrical contractor to provide line voltage (120 VAC units only).

.2 Provide 24 VDC power to the unit (24 VDC units only). Mechanical contractor is responsible for line to low voltage transformer if required.

.3 Primer system to be mounted within a cabinet.

.4 Primer branch pipe shall tee off the top of supply water piping.

.5 Clean and flush supply water piping prior to installation. Debris will hamper proper primer operation.

.6 Connect rigid pipe(s) from outlet of manifold to each trap connection with a minimum 1% slope towards the trap.

3.11 INSTALLATION – FLEXIBLE CONNECTORS

.1 Use when connecting domestic water supply to sinks, lavatories, toilet tanks, and any equipment or fixture that may not be rigidly attached to structure or may move relative to the attached piping.

.2 Flexible connectors shall not be excessively long or short. The intent is to allow for reasonable fixture, equipment or piping movement relative to each other while maintaining a good connection and flow.

.3 Do not install flexible connectors within 3 feet (1 m) of a hot water generator, hot water tank, or associated flue venting. When flexible connectors are required for these

applications, flexible connectors shall be attached only to the horizontal sections of branch piping to the unit.

3.12 FIELD QUALITY CONTROL

.1 Perform the following tests and inspections:

.1 Test each backflow preventeraccording to authorities having jurisdiction and the device's reference standard.

.2 Inspect and clean strainers after initial water flushing and again just prior to project completion.

.2 Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

.3 Prepare test and inspection reports.

3.13 ADJUSTING

.1 Set field-adjustable pressure set points of water pressure-reducing valves.

.2 Set field-adjustable flow set points of balancing valves.

.3 Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes the requirements of drainage, waste, and vent (DWV) piping for a sanitary application.

.2 The intent of the design is to have a complete, working sanitary waste and vent system that will function under all reasonable conditions. Installation shall meet this intent.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 07 84 00 –Firestopping

.3 Section 22 05 00 – Common Work Results for Plumbing

.4 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.5 Section 22 05 53 – Identification of Plumbing Piping and Equipment

.6 Section 22 07 19 – Plumbing Piping Insulation

1.3 REFERENCES

.1 American Society of Mechanical Engineers(ASME)

.1 ASME A112.3.1 Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above- and Below-Ground.

.2 ASME B16.12 Cast Iron Threaded Drainage Fittings

.3 ASME/ANSI B16.23 Cast Copper Alloy Solder Joint Drainage Fittings (DWV)

.4 ASME/ANSI B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV)

.2 American Society for Testing and Materials (ASTM)

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

.2 ASTM A312 Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

.3 ASTM A536 Standard Specification for Ductile Iron Castings

.4 ASTM B32 Specification for Solder Metal

.5 ASTM B88 Specification for Seamless Copper Water Tube

.6 ASTM B306 Specification for Copper Drainage Tube (DWV)

.7 ASTM D2235 Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

.8 ASTM D2564 Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems

.9 ASTM F628 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core

.3 Canadian Standards Association (CSA)

.1 CSA B70 Cast Iron Soil Pipe, Fittings and Means of Joining

.2 CSA B181.1 Acrylonitrile-Butadiene-Styrene (ABS) Drain, Waste and Vent Pipe and Pipe Fittings

.3 CSA B181.2 PVC Drain, Waste and Vent Pipe and Pipe Fittings

.4 CSA B182.1 Plastic Drain and Sewer Pipe and Pipe Fittings

.4 Underwriters Laboratory of Canada (ULC)

.1 CAN/ULCS102.2 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

.5 National Research Council (NRC)/Institute for Research in Construction

.1 National Plumbing Code of Canada (NPC)

1.4 SUBMITTALS

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

.2 Product Data:

.1 Upon request, provide manufacturer's printed product datasheets for piping and adhesives, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. CSA, ASTM, ULc, etc...).

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

.1 For undergroundDWV applications:

.1 PVC meeting CSA B181.2

.2 Cast iron meeting CSA B70

.1 Hub and Spigot connections, thrust blocks at turns

.2 For aboveground DWV applications (in combustible construction):

.1 PVC meeting CSA B181.2

.2 Copper tube: ‘K’ or ‘L’ hard temper meeting ASTM B88, or ‘DWV’ meeting ASTM B306

.1 EXCEPTION: Copper tube is not allowed for the fixture drain or vent located below the flood level of urinals.

.2 Fittings:

.1 Wrought copper alloy meeting ASME B16.29

.2 Cast copper alloy meeting ASME B16.23

.3 Cast iron meeting CSA B70

.3 For aboveground DWV applications (in non-combustible construction):

.1 Flame spread rating less than 25.

.2 PVC meeting CSA B181.2 and CAN/ULC S102.2

.3 Copper tube: ‘K’ or ‘L’ hard temper meeting ASTM B88, or ‘DWV’ meeting ASTM B306

.1 EXCEPTION: Copper tube is not allowed for the fixture drain or vent located below the flood level of urinals.

.2 Fittings:

.1 Wrought copper alloy meeting ASME B16.29

.2 Cast copper alloy meeting ASME B16.23

.4 Cast iron meeting CSA B70

.4 For DWV applications within air plenums:

.1 Flame spread rating less than 25 and smoke developed classification less than 50.

.2 PVC meeting CSA B181.2 and CAN/ULC S102.2

.3 Copper tube: ‘K’ or ‘L’ hard temper meeting ASTM B88, or ‘DWV’ meeting ASTM B306

.1 Fittings:

.1 Wrought copper alloy meeting ASME B16.29

.2 Cast copper alloy meeting ASME B16.23

.4 Cast iron meeting CSA B70

2.2 JOINTS

.1 ‘MJ’ Mechanical joints/couplings (clamped sleeves) are not acceptable joints for any piping.

.2 PVC solvent weld: to ASTM D2564

.1 Sizes 1½ to 6: one step cement (Low VOC)

.2 Sizes 8 and above: two step cement, plus low VOC primer

.3 Copper solder: to ASTM B32

.4 Cast iron: threaded to ASME B16.12 (except underground), or hub and spigot to CSA B70

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Installation by a qualified journeyperson.

.2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

.3 Cleanouts and other service items must be accessible.

.4 Penetrations through structure shall be such that structural loads are not transferred to pipes.

.5 For pumped discharge piping, ensure piping is braced to structure to avoid excessive movement.

3.2 TESTING

.1 Pressure test underground systems before backfilling in accordance with Canadian Plumbing Code.

.1 As per piping manufacturer's instructions.

.2 Air test: Maintain 35 kPa (5 Psi) for 15 minutes.

.2 Pressure test above ground systemsin accordance with Canadian Plumbing Code.

.1 As per piping manufacturer's instructions.

.2 Air test: Maintain 35 kPa (5 Psi) for 15 minutes.

.3 Water test: Maintain 3m (10 feet) of water column for 15 minutes.

3.3 PERFORMANCE VERIFICATION

.1 Open cleanouts, apply linseed oil to threads and re-seal.

.2 Ensure traps are fully and permanently primed.

.3 Ensure fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (sanitary or vent) with directional arrows in accordance with Section 22 05 53 – Identification for Plumbing Piping and Equipment.

.5 Provide copies of test reports for Commissioning Manuals.

.6 Provide copies of Inspection Reports from the local authority having jurisdiction.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on sanitary waste piping specialties and includes:

- .1 Trap Seals
- .2 Trap Primer Connections
- .3 Cleanouts
- .4 Backwater Valves
- .5 Air Admittance Valves

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 22 05 00 – Common Work Results for Plumbing

.4 Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

.5 Section 22 05 53 – Identification for Plumbing Piping and Equipment

.6 Section 22 07 19 – Plumbing Piping Insulation

.7 Section 22 13 16 – Sanitary Waste and Vent Piping

1.3 REFERENCES

.1 Listed under individual specialties

1.4 SUBMITTALS

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

.2 Product Data:

- .1 Upon request, provide manufacturer's printed product datasheets for specialties, indicating models and options specific to this work. Datasheets submitted shall include designations of rating compliance (i.e. CSA, ASTM, ULc, etc...).

.3 Closeout Submittals:

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Provide chemical supplier’s printed data sheet for condensate neutralization media.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

.1 Specialties shall be suitable for the environment they are placed in.

.2 Specialties shall be constructed of similar material as the attached piping.

.3 Do not reduce or increase piping at specialties unless specifically designed by the mechanical engineer.

.4 If any sanitary waste piping specialty is not easily accessible, the contractor is responsible for supplying and installing a suitably sized metal access panel, and coordinating installation with other trades so the specialty can be easily accessed.

2.2 TRAP SEALS

.1 Floor Drain Push-to-Fit Seal

- .1 Material: ABS plastic with elastomeric EPDM
- .2 Sizes: 2” (50 mm) to 4” (100 mm)

2.3 TRAP PRIMER CONNECTIONS

.1 For cast iron:

- .1 Epoxy coated cast iron adapter piece.
- .2 1/2” (13 mm) IPS tapping within extra material part of adapter.

.2 For PVC:

- .1 Schedule 40 adapter piece.
- .2 1/2” (13 mm) FIPT tapping within extra material part of adapter.

2.4 CLEANOUTS

.1 Floor locations:

- .1 Cast iron or PVC body (same material and ratings as pipe).
- .2 Plug diameter to be 3” (75 mm) or greater.
- .3 Adjustable to floor height.
- .4 Top exposed cover:
  - .1 Nickel bronze material.
  - .2 Square for straight line floor patterns (tile, wood).
  - .3 Round for other (carpet, vinyl, concrete).
- .5 Include flashing clamp and flange for sealed floor applications.

.6 'Heavy-duty' rated when potentially subject to vehicle traffic.

.2 Wall locations:

.1 Cast iron, PVC, ABS, or copper alloy body (same material and ratings as pipe).

.2 Tapered thread plug with machine screw center tapping

.3 Stainless steel access cover with center machine screw.

.3 Exposed locations:

.1 PVC or ABS body (same material and ratings as pipe).

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL

.1 Install in locations that are accessible for maintenance.

3.2 INSTALLATION – TRAP SEALS

.1 For floor drain applications, remove strainer and insert at drain outlet before trap.

.2 Ensure traps are filled with water.

3.3 INSTALLATION – TRAP PRIMER CONNECTIONS

.1 Install in vertical pipe immediately upstream of trap.

3.4 INSTALLATION – CLEANOUTS

.1 Install every 50' (15 m) in straight runs of piping.

.2 Install at every 90 degree change of direction.

.3 Install at locations shown elsewhere on the drawings.

.4 Open cleanouts, apply linseed oil to threads and re-seal.

3.5 INSTALLATION – BACKWATER VALVES

.1 Install backwater valves so the flapper can be visually inspected.

.2 All piping downstream of the flapper can be considered a 'high pressure' zone. No mechanical joints are allowed. Use solvent weld or threaded joints within the building envelope downstream of the backwater valve.

.3 Provide thrust block at the backwater valve for the main sanitary leaving the building and all changes of direction between the backwater valve and the building exit point.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance on the common work pertaining to HVAC.

.2 All HVAC work shall be completed in conformance with, and subject to, the latest manufacturer, supplier and Contract Administrator documentation available (printed, electronic, or website), including installation and cautionary notes.

.3 Refer to specific HVAC sections for further guidance.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 74 00 – Cleaning and Waste Management

.3 Section 01 78 00 – Closeout Submittals

1.3 CONTRACTOR RESPONSIBILITY

.1 It is the mechanical contractor's responsibility to provide and install the necessary components for complete and functional systems.

.2 The mechanical contractor is responsible for paying for and obtaining all necessary permits and authorizations required for the work.

.3 The mechanical contractor is responsible for providing suitable submittals pertaining to this work.

.4 Engineered drawings and specifications are designed based on particular, specified products that the engineer has chosen. If the contractor wishes to use a different product than was specified, then…

.1 It is the mechanical contractor's responsibility to ensure the supplier of the different product has obtained approval for the product to be used as either an equal or an alternate from the engineer. Contractors should be aware that a product is granted equal status based on quality, capacity, and electrical load only. Alternates may be approved if there are deviations and modifications required that could still result in the intended design function.

.2 It is the mechanical contractor's responsibility to modify any associated work if using the different product at no cost to the City of Winnipeg in such a way as it works as intended by the engineered drawings and specifications. This may include coordinating with other trades such as electrical to capture all the modifications required. It is at the discretion of the engineer if the design intent is maintained.

.1 Example: A particular make and model of air handling unit was specified. Another manufacturer's air handling unit with different dimensions was

granted an equal status based on its quality, capacity, and electrical load being similar to the one specified. A contractor who wants to use the equal product is responsible for ensuring the equal product fits in the space and is expected to modify the ductwork if required to accommodate different connection points.

.5 It is the responsibility of the mechanical contractor to coordinate with other trades such that all work can be accomplished in a suitable manner.

.6 All coring, rough openings and penetrations greater than 6" (150 mm) diameter, and all patching, flashing and sealing shall be the responsibility of the general contractor.

.7 The mechanical contractor shall coordinate with the general contractor in arranging for, and being available during, inspections by the authority having jurisdiction and professional engineer at

.1 Rough work completion and prior to wall boarding, and

.2 Substantial completion for the purpose of obtaining final certification.

1.4 SUBMITTALS

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

.2 Refer to specific sections for any additional submittal requirements.

.3 Shop Drawings:

.1 The intent of shop drawings is to give confidence to the engineer that the contractor is using the proper products and will be installed properly so the work is done as intended by the engineer. Generic catalog or sales information shall not be part of a shop drawing unless it specifically meets the intent.

.2 Shall clearly indicate job-specific products. If the manufacturer's cut sheet shows multiple products, indicate which one coincides with the appropriate tag on the drawing.

.3 Shall include a performance curve, sound data, a dimensioned drawing with required clearances and connection points, power requirements, and specified capacity required as applicable for each product.

.4 Shall indicate the supplier's name and contact information.

.5 Shall indicate compliance to applicable codes and standards.

.6 Contractor shall submit a shop drawing for unique mounting arrangements or supports if required at the discretion of the engineer.

.4 Closeout Submittals:

.1 Provide operation and maintenance data and incorporate into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Approvals:

.1 Submit two (2) copies of draft Operation and Maintenance Manual to the City of Winnipeg Representative for approval. Submission of individual data will not be accepted unless directed by City of Winnipeg Representative.

.2 Submit a copy of the As-Built drawings.

.3 Make changes as required and re-submit as directed by City of Winnipeg Representative.

.3 Operation and maintenance manual approved by, and final copies deposited with, the City of Winnipeg Representative before final inspection.

.4 Operation and Maintenance (O&M) Manual:

.1 Operation data to include:

.1 Control wiring and piping/ducting schematics for systems.

.2 Description of systems and their controls.

.3 Operation instruction for systems and components.

.4 Description of actions to be taken in event of equipment failure.

.2 Maintenance data to include:

.1 Servicing, maintenance, operation and troubleshooting instructions for each item of equipment. Instructions to include maintenance schedule and tools required.

.2 A parts list.

.3 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete

.2 Site reports (i.e. hydronic system water quality results)

.3 Equipment performance verification test results (i.e. air balance report)

.4 Authority Having Jurisdiction (AHJ) signed and approved inspection reports.

.5 Additional data:

.1 Prepare and insert into the O&M manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.6 Site records:

.1 Contract Administrator will provide one (1) set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur.

.2 Use different color for each service.

.3 Make available for reference purposes and inspection.

.7 As-built drawings:

.1 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.2 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver and handle in accordance with manufacturer's written instructions.

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather and physical damage.

.2 Protect plastics from UV light.

.3 Store at temperatures and conditions required by manufacturer.

.3 Waste Management and Disposal:

.1 Verify with the City of Winnipeg on storage or disposal of existing City of Winnipeg equipment. Handle accordingly.

.2 Separate waste materials for reuse and recycling.

.3 Place excess or unused materials in designated containers.

.4 Divert unused metal materials from landfill to metal recycling facility approved by the City of Winnipeg Representative.

.5 Dispose of unused adhesive material at official hazardous material collections site approved by the City of Winnipeg Representative.

PART 2 - PRODUCTS

2.1 QUALITY ASSURANCE

.1 Specific sections may have additional requirements, or modifications to these requirements. In the case of contradiction, the requirement in the specific section is to be adhered to. In cases of no clear contradiction, these requirements shall be adhered to.

.2 If any specification section includes the words “prior approval” or “unless otherwise approved”, this is to mean a request must be made to the stamping engineer responsible for this design component of the project prior to any product being considered as acceptable. Upon acceptance by written confirmation, the contractor may use it. Upon denial by written confirmation, the contractor shall not use it. No other entity shall grant approval to the contractor.

.3 All products to be manufactured by companies with qualifications including...

.1 Ten (10) years of history providing this product (or applicably similar product) to the Canadian market. Reduction of this requirement is possible at the discretion of the engineer only.

.2 Engineering, design and application support available in a timely manner. This includes acknowledgement of an inquiry within 24 hours, and a suitable response to an inquiry within five (5) working days.

.3 Documented case studies of three (3) similar applications of the product showing similar usage and acceptable longevity of the product. Contact information for the building owner/maintenance provider of each case study shall be available upon request.

.4 Wholly owned test facilities with access available upon request.

.5 Provision of products meeting all applicable testing standards, ratings, and certifications for the Canadian market.

.4 All products to be supplied by suppliers with qualifications including...

.1 Five (5) years of history providing this product (or applicably similar product) to the Canadian market.

.2 Manufacturer support including, being the manufacturer's designated representative of the product, being factory trained on the product, and having access to current engineering support from the manufacturer.

.3 Human on site availability (with any required security clearances or specific entry requirements up to date prior to visit) within 48 hours of initial contact for the purpose of commissioning the product or investigation of problems potentially involving the product. Suppliers shall provide a phone number that will be answered during regular working hours.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 All products to be installed by workers with qualifications including...

.1 Five (5) years of experience installing the product (or applicably similar product).

.2 A comprehensive knowledge of the product manufacturer's installation requirements.

.3 An understanding as to the reasons why proper installation is required, and what problems occur with an improper installation.

.2 Installation shall be the responsibility of a qualified journeyman licensed to perform the work required.

.3 Installation shall be in accordance with the National Building Code (NBC), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), and local codes.

.4 Installation of service items (example: balancing valves, dampers, etc...) shall be coordinated with the general contractor and other trades (example: wall boarding contractor) so access to service items is easy and unencumbered. Ultimately, this is the responsibility of the mechanical contractor.

3.2 PERFORMANCE VERIFICATION

.1 Retain a certified air balancer to balance the HVAC systems and if applicable, the hydronic systems. Work with the balancer to remediate any differences between design expectations and as-constructed installations (i.e. changing pulleys, modifying frequency drive settings, etc...). Ensure ventilation air dampers are set correctly.

.2 Operate systems and remediate areas of excessive noise and vibration.

.3 Install new air filters after all construction is complete and just prior to turning over the building to the City of Winnipeg.

.4 The mechanical contractor shall be available to accompany the authority having jurisdiction and the engineer on site inspections and tests. The mechanical contractor shall have the ability to test all items during inspections.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes common requirements for mechanical HVAC electric motors.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 23 05 00 – Common Work Results for HVAC

1.3 REFERENCES

.1 Canadian Standards Association (CAN/CSA)

.1 CAN/CSA C22.1 Canadian Electrical Code Part 1

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA MG 1 Motors and Generators

1.4 CONTRACTOR RESPONSIBILITY

.1 The mechanical contractor is ultimately responsibility for complete and functional HVAC systems. As required, components of this work shall be directed by the mechanical contractor but undertaken by qualified subtrades as follows...

.1 All power conductor wiring and grounding:

.1 A certified electrical contractor

.2 Supply and installation of magnetic starters:

.1 A certified electrical contractor

.3 Supply and programming of variable frequency drives:

.1 A mechanical contractor, or

.2 A controls contractor

.4 Low voltage wiring (including supply of line-to-low voltage transformers):

.1 A mechanical contractor, or

.2 A controls contractor

1.5 SUBMITTALS

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

.2 Shop Drawings:

.1 Motor information may be included within the shop drawing for mechanical equipment.

.2 Include motor type, voltage, full load current rating (FLA), power consumption, and rpm.

.3 Upon request, provide any information found on the motor nameplate per NEMA MG-1.

.4 Contractor shall submit a shop drawing for unique mounting arrangements or supports if required at the discretion of the engineer.

.3 Closeout Submittals:

.1 Provide operation and maintenance data and incorporate into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance (O&M) Manual:

.1 Operation data to include:

.1 Tag #, function description, and nameplate information.

PART 2 - PRODUCTS

2.1 AC INDUCTION MOTORS

.1 Unless otherwise specified, or explicitly allowed by the engineer via a written document, all AC motors used for HVAC applications shall be...

.1 In accordance with NEMA MG 1

.2 “Premium” efficiency rated

.3 Class B temperature tolerance

.4 1800 rpm

.5 Continuous duty

.6 Open Drip-Proof (ODP), or Totally-Enclosed Fan Cooled (TEFC)

.7 Constructed with phase insulation paper

.2 Any AC motor controlled via a variable-frequency drive (VFD) shall meet NEMA MG 1 Part 31, and include a shaft grounding ring.

2.2 ECM MOTORS

.1 Unless otherwise specified, or explicitly allowed by the engineer via a written document, all ECM motors used for HVAC applications shall be...

.1 AC input, electronically commutated to DC motor drive

.2 On board potentiometer dial, and 0-10V analog input for remote speed control

.3 Internal overload protection

.4 Internal locked rotor protection

.5 Internal thermal protection

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Motors that are factory installed in mechanical units shall be checked for mounting bolt tightness and proper vibration isolation.

.2 Field installed motors shall be installed per manufacturer's documentation.

.3 Electrical connection and grounding shall be by an electrical contractor and conform to CAN/CSA C22.1.

.4 Conductors shall be flexible and allow for motor movement.

3.2 PERFORMANCE VERIFICATION

.1 Verify mounting tightness and suitable vibration isolation.

.2 Verify correct shaft rotation.

.3 Check running load on motor to ensure it is operating within its design range.

.4 Operate systems and remediate areas of excessive noise and vibration.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section provides guidance on handling thermal expansion of HVAC, hydronic, refrigerant, natural gas, and fuel oil piping systems.

.2 This section does not include sprinkler or plumbing piping.

1.2 RELATED SECTIONS

.1 Section 23 05 00 – Common Work Results for HVAC

.2 Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment

.3 Section 23 11 13 – Facility Fuel-Oil Piping

.4 Section 23 11 23 – Facility Natural-Gas Piping

.5 Section 23 11 26 – Liquefied-Petroleum Gas Piping

.6 Section 23 21 13 – Hydronic Piping

.7 Section 23 23 00 – Refrigerant Piping

1.3 BASIC INFORMATION

.1 Contractor shall be aware that piping changes length when undergoing changes in temperature. Plastic piping like Polyethylene, PVC and CPVC change much more than copper or steel.

.2 Physical allowances shall be made to handle pipe length changes due to thermal expansion/contraction in all cases, but special consideration shall be given to...

.1 Initial installation of piping systems in cold weather where the finished environment will be warmer, or vice-versa

.2 Piping that is located outdoors

.3 Piping that continues from one thermal zone to another (i.e. from conditioned space to an unconditioned attic space or garage)

.4 Piping that transfers fluids of different temperatures (i.e. seasonal changes in hydronic heat pump loops)

.3 Common pipe materials and their respective changes in length [per 100 feet (30 m) of pipe] are listed for reference purposes:

.1 CPVC:

.1 1.8” (46 mm) length change for every 40 F (22 C) temperature change

.2 4.6” (117 mm) length change for every 100 F (56 C) temperature change

.2 PVC:

.1 1.4” (36 mm) length change for every 40 F (22 C) temperature change

.2 3.6” (91 mm) length change for every 100 F (56 C) temperature change

.3 Polyethylene:

.1 5.3” (135 mm) length change for every 40 F (22 C) temperature change

.2 13.3” (338 mm) length change for every 100 F (56 C) temperature change

.4 Copper:

.1 0.4” (10 mm) length change for every 40 F (22 C) temperature change

.2 1.1” (28 mm) length change for every 100 F (56 C) temperature change

.5 Steel:

.1 0.3” (8 mm) length change for every 40 F (22 C) temperature change

.2 0.7” (18 mm) length change for every 100 F (56 C) temperature change

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS (NOT FOR GAS OR REFRIGERANT PIPING)

.1 For steel pipe:

.1 Inner hose: carbon steel

.2 Outer sleeve: double braided stainless steel

.3 Pressure rating: 200 psi (13.8 bar)

.4 Temperature rating: 250 F (121 C)

.5 Connections: flanged

.6 Size: same as pipe

.2 For copper pipe:

.1 Inner hose: bronze

.2 Outer sleeve: braided bronze

.3 Pressure rating: 125 psi (8.6 bar)

.4 Temperature rating: 250 F (121 C)

.5 Connections: flanged

.6 Size: same as pipe

2.2 EXPANSION JOINTS

.1 For CPVC:

.1 Bellows type

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

.1 The intent is to allow the contractor some flexibility to implement appropriate expansion compensation techniques for piping systems. The contractor shall review the proposed piping layouts on site and install either a suitable expansion product or utilize a multi-elbow piping offset to allow for linear movement due to temperature changes.

.2 Contractor shall be aware of the temperature of the pipe and environment during installation, and account for thermal expansion/contraction that will occur before the work is complete and functioning as designed.

.3 Utilize points of fixed movement where required to control expansion in a particular direction.

3.2 SPECIFIC APPLICATIONS

.1 For plastic vertical supply risers, movement shall be restricted vertically by pipe clamps attached to structure at each floor level. At each floor level, install an unrestricted ‘vee’ offset using two 45 degree fittings and a 90 degree fitting with 12” (300 mm) legs in the bottom third of the riser, or install a bellows type expansion device just above each pipe clamp, or install per manufacturers instructions.

.2 In the absence of other thermal expansion/contraction methods, provide the following for every 100 feet (30 m) of piping…

.1 For any application where potential temperature changes are <40 F (22 C):

.1 CPVC: 4-elbow ‘U’ joint with 4 foot (1220 mm) legs and 2 foot (610 mm) base

.2 PVC: 4-elbow ‘U’ joint with 4 foot (1220 mm) legs and 2 foot (610 mm) base

.3 Copper: 4-elbow ‘U’ joint with 12” (300 mm) legs and 12” (300 mm) base

.4 Steel: 4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.5 Polyethylene: flexible bends between anchor points

.2 For all outdoor piping, unconditioned attic piping, unconditioned crawlspace piping, all domestic hot water piping, or any application where potential temperature changes are <100 F (<56 C):

.1 CPVC: 4-elbow ‘U’ joint with 6 foot (1830 mm) legs and 3 foot (914 mm) base

.2 PVC: 4-elbow ‘U’ joint with 6 foot (1830 mm) legs and 3 foot (914 mm) base

.3 Copper: 4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.4 Steel: 4-elbow ‘U’ joint with 24” (610 mm) legs and 12” (300 mm) base

.5 Polyethylene: flexible bends between anchor points

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes (as applicable) guidance on hanging or supporting hydronic piping, fuel oil piping, natural gas piping, refrigerant piping, HVAC ducting and HVAC equipment.

.2 This section does not include plumbing related piping.

.3 This section gives guidance on hanging and supporting piping, ducting and equipment and includes:

- .1 Pipe Hangers and Supports
- .2 Round Duct Suspension Rings
- .3 Hanger Rods
- .4 Inserts
- .5 Flashing
- .6 Sleeves and Seals
- .7 Formed Steel Channel
- .8 Equipment Bases and Supports
- .9 Metal Framing Systems
- .10 Fasteners
- .11 Pipe Positioning Systems

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 05 50 00 – Metal Fabrications

.3 Section 07 84 00 – Firestopping

.4 Section 09 91 23–Interior Painting

.5 Section 23 05 00 – Common Work Results for HVAC

.6 Section 23 05 16 – Expansion Fittings and Loops for HVAC Piping

.7 Section 23 11 23 – Facility Natural-Gas Piping

.8 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 International Association of Plumbing and Mechanical Officials (IAPMO)

.1 IAPMO PS 42 Pipe Alignment and Secondary Support Systems

.2 Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

.1 MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation

.2 MSS SP-127 Bracing for Piping Systems: Seismic – Wind – Dynamic Design, Selection and Application

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 HVAC Duct Construction Standards – Metal and Flexible

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 All trapeze pipe hangers, metal framing systems, and fabricated equipment support designs require a detailed, job-specific drawing submittal labeled with equipment weights to the Structural Engineer for approval.

1.5 SEISMIC DESIGN

.1 Where work is performed in seismic regions requiring special design as determined by the local authority having jurisdiction, a seismic engineer shall be hired by the mechanical contractor performing work of this section to take professional responsibility for all work in this section. Work shall be performed to the seismic engineer's requirements.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

.1 All hangers and supports must meet MSS SP-58. Refer to Part 3, "Hanger and Support Applications" for pipe hanger and support suitability.

.2 Insulated pipe shall be supported with a hanger or support with a supporting diameter the same as the fully insulated pipe diameter with an included rigid insulation shield. The insulation shall not be compressed or otherwise have a reduction in insulating ability as a result of hanging or supporting the pipe.

.3 Pipe containing steam or liquid greater than 160 F (71 C) that is supported from below the pipe shall be on roller supports.

.4 Pipe located in areas or adjacent to areas where noise and vibration are concerns shall use PVC coated hanger and support products.

.5 Copper pipe shall be hung or supported with PVC coated or felt lined products to prevent electrolysis between the pipe and the hanger or support.

.6 Natural Gas and other similar piping on flat roofs shall use manufactured, UV resistant, rubberized bases for pipe supports. Pipe clamps shall be one pipe size larger to allow for minor movement.

2.2 ROUND DUCT SUSPENSION RINGS

.1 Suspension rings shall be full or half diameter.

.1 Suspension rings shall be 16 ga (1.5 mm) for diameters up to 12” (300 mm)

.2 Suspension rings shall be 12 ga (2.7 mm) for diameters up to 24” (600 mm)

.3 Suspension rings shall be 10 ga (3.4 mm) for diameters up to 48” (1200 mm)

2.3 HANGER RODS

.1 Unless otherwise indicated, hanger rods shall be zinc-plated steel, fully threaded rod.

2.4 CONCRETE INSERTS

.1 Inserts shall be malleable iron case with a galvanized steel shell and expander plug for threaded connection. Inserts shall have capability for lateral adjustment, a top slot for reinforcing rods, and lugs for attaching to forms. Insert internal threads to match hanger rod threads.

2.5 FLASHING

.1 Metal flashing shall be 26 gage galvanized steel.

.2 Metal counterflashing shall be 22 gage galvanized steel.

.3 Caps shall be 22 gage steel for non-fire resistance rated separations and 16 gage steel for fire resistance rated separations.

2.6 SLEEVES AND SEALS

.1 Exterior, underground wall penetrations:

.1 Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined.

.2 Hydrostatic pipe closure, “Link-Seal” or approved equal.

.2 Exterior, aboveground wall penetrations:

.1 Concrete wall: Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined. Wall attached pipe clamp attached to interior face of exterior wall. Expanding foam between pipe and sleeve. Thermally broken and caulked escutcheons on exterior and interior face.

.2 Framed wall: 18 gage galvanized steel. Wall attached pipe clamp attached to interior face of exterior wall. Expanding foam between pipe and sleeve. Thermally broken and caulked escutcheons on exterior and interior face.

.3 Interior, fire rated wall penetration:

.1 No sleeve required. Sealing to be firestoppingmaterial as per section 07 84 00. Installation as per the firestop manufacturer's product guide for the specific type of pipe and wall type applicable.

.4 Interior, non-rated wall penetration:

.1 Concrete wall: Schedule 40 steel pipe with welded wall collar embedded in concrete. Pipe and collar bituminous coated and lined. Closed cell foam spray between pipe and sleeve. 16 gage steel escutcheons on exposed faces of wall.

.2 Framed wall: No sleeve required. 16 gage steel escutcheons on exposed faces of wall.

.5 Floor penetration:

.1 Cored or drilled hole to be coordinated with structural engineer for reinforcement requirements. Firestopping material as per section 07 84 00. 2" (50 mm) high oversized schedule 40 steel pipe curb secured and caulked on finished floor. Riser clamp rests on curb. Material deviations may be accepted upon prior approval from the mechanical engineer. Submit in accordance with Section 01 33 00 – Submittal Procedures.

2.7 FORMED STEEL CHANNEL

.1 Shall be manufactured by a member company of the Metal Framing Manufacturers Association.

2.8 EQUIPMENT BASES AND SUPPORTS

.1 Structural carbon steel shapes, coated with corrosion prevention primer.

.2 Material deviations may be accepted upon prior approval from the mechanical engineer. Submit in accordance with Section 01 33 00 – Submittal Procedures.

2.9 METAL FRAMING SYSTEMS

.1 Shall be manufactured by a member company of the Metal Framing Manufacturers Association, or approved equal.

2.10 FASTENERS

.1 Powder Actuated Fasteners:

.1 Threaded steel stud with pull out, tension and shear capacities appropriate for supported load and building structure material.

.2 Mechanical Expansion Anchors:

.1 Insert wedge type, stainless steel anchors with pull out, tension and shear capacities appropriate for supported load and building structure material.

.2 Underwriters Laboratory (UL) listed

2.11 PIPE POSITIONING SYSTEMS

.1 Shall be manufactured to IAPMO PS 42.

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

.1 Installer qualified in performing work in this section shall have at least five (5) years successful experience in similar installations.

.2 Ductwork installers must be current members of SMACNA, have received adequate training, and are proven competent in understanding the ductwork support methods described in the HVAC Duct Construction Standards: Hangers and Supports (SMACNA).

.3 Fabricated trapeze hangers, metal framing systems, and equipment support designs are to be submitted to the Structural Engineer for approval.

3.2 GENERAL INSTALLATION

.1 Refer to Part 2 – Products for additional guidance on installing a product or an assembly of products for a particular application.

.2 All pipe hangers and supports must meet MSS SP-58. Refer to Part 3, “Hanger and Support Applications” for individual pipe hanger and support suitability.

.3 Install supports to secure equipment in place, prevent vibration, maintain grade and allow for expansion and contraction.

.4 Wire or perforated strap is not acceptable to use for hanging pipes, ducts, or equipment.

.5 Include expansion fittings and offsets as per Section 23 05 16 – Expansion Fittings and Loops for HVAC Piping.

.6 Vertical risers shall be supported at its base, at every floor level, and every 12’ (3.6 M).

.7 Vertical piping (other than steel) may be affixed in position by formed steel channel clamps. For plastic and copper piping, use a PVC or rubber isolator between the clamp and bare pipe. For steel piping, use pipe clamps attached to building structure.

.8 Fasten supports to building structural steel system or to cast-in-place inserts in concrete construction for new construction. Concrete fasteners are acceptable when holding strength of finished concrete has been established.

.9 Insulated pipe shall be supported with a hanger or support with a supporting diameter the same as the fully insulated pipe diameter with an included rigid insulation shield. The insulation shall not be compressed or otherwise have a reduction in insulating ability as a result of hanging or supporting the pipe.

.10 Insulated round ductwork shall be supported with a hanger or support outside the fully insulated duct with rigid insulation supports, or shall be supported with a suspension ring with a supporting diameter the same as the un-insulated duct with appropriate sealing around the hanger penetration point through the insulation. The insulation shall not be

compressed or otherwise have a reduction in insulating ability as a result of hanging or supporting the ductwork.

.11 Locate support adjacent to equipment. Prevent excessive stresses on piping and equipment connections.

.12 Do not support piping or equipment from other piping or from equipment.

.13 For horizontally hung multiple pipe runs, use a trapeze support assembly.

.14 On multiple pipe runs, allow minimum 1" (25 mm) clearance between finished (including insulation) pipes.

.15 Install hangers within 12" (300 mm)on either side of a horizontal fitting.

3.3 HORIZONTAL PIPE SUPPORT SPACING

.1 Support horizontal straight sections of piping as follows:

Nominal Pipe Size	***Maximum Distance Between Supports***				
Pipe Material&Service -----→	*Steel (liquid)*	*Steel (steam or gas)*	*Copper (liquid or air)*	*Plastic (liquid)*	*Plastic (air)*
½" (12mm)	6' (1.8m)	6' (1.8m)	5' (1.5m)	3' (0.9m)	4' (1.2m)
¾" (19mm)	7' (2.1m)	8' (2.4m)	6' (1.8m)	3' (0.9m)	4' (1.2m)
1" (25mm)	7' (2.1m)	8' (2.4m)	8' (2.4m)	3' (0.9m)	4' (1.2m)
1¼" (32mm)	7' (2.1m)	9' (2.7m)	10' (3.0m)	3' (0.9m)	4' (1.2m)
1½" (39mm)	8' (2.4m)	10' (3.0m)	10' (3.0m)	3' (0.9m)	5' (1.5m)
2" (50mm)	8' (2.4m)	10' (3.0m)	10' (3.0m)	3' (0.9m)	5' (1.5m)
2½" (64mm)	8' (2.4m)	10' (3.0m)	10' (3.0m)	3' (0.9m)	5' (1.5m)
3" (75mm)	8' (2.4m)	15' (4.6m)	10' (3.0m)	3' (0.9m)	6' (1.8m)
4" (100mm)	8' (2.4m)	15' (4.6m)	10' (3.0m)	3' (0.9m)	6' (1.8m)
6" (150mm)	8' (2.4m)	16' (4.9m)	10' (3.0m)	3' (0.9m)	7' (2.1m)
8" (200mm)	10' (3.0m)	-	10' (3.0m)	3' (0.9m)	7' (2.1m)

.2 Exception: Natural gas piping less than 1" (25 mm) diameter on a rooftop shall be supported every 4' (1.2 m).

.3 Provide additional supports for concentrated loads such as valves, specialties and pipe fittings and every change in direction.

3.4 DUCTWORK SUPPORT

.1 For rectangular ductwork, installation shall be within the parameters of HVAC Duct Construction Standards: Hangers and Supports (SMACNA).

.2 For round ductwork, use suspension rings, rigid metal supports, or brackets.

.3 Wire, perforated strap, or metal less than 16 ga (1.5 mm) thick is not acceptable to support ducts.

.4 Hangers and supports shall not interfere with the integrity and function of insulation or vapor barrier.

.5 For ducts that convey particulate solids, supports shall be designed to carry the weight of the ductwork half filled with the solid particulate matter.

3.5 EQUIPMENT SUPPORTS

.1 Generally, install as per manufacturer's requirements.

.2 Generally, mount equipment such that movement during start and stop is less than ¼" (6mm). The intent is to reduce stresses applied to the equipment attachments (i.e. piping) to within a safe working range thereby eliminating potential damage.

.3 Equipment support springs shall be statically loaded to 50% compression by weight of equipment. Include a ¼" (6 mm) neoprene acoustic pad under each spring support.

.4 Coordinate concrete base or inertia concrete block requirements for each piece of equipment with general contractor prior to installation. Concrete work and any associated structural reinforcement is by general contractor; vibration and acoustic isolation of equipment support is by mechanical contractor.

3.6 PERFORMANCE VERIFICATION

.1 Upon completion of piping installation, and before system operation, examine all fasteners, inserts and attachments for looseness, movement, or other factors that would reduce their ability to act at their rated capacity.

.2 Examine all pipe hangers for movement before and after system operation. Reinforce any area of hanger movement.

.3 Prior to system operation, examine spring supports for available movement. Loaded springs shall rest in a 50% compressed state.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on identifying HVAC related piping systems and equipment.

.2 This section does not include identification of plumbing piping and equipment.

.3 If an existing identification system with color codes are already in place and this work is being added to the existing systems, use the existing identification system. Otherwise, use the color codes and materials specified in this section.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 09 91 23 – Interior Painting

.4 Section 23 05 00 – Common Work Results for HVAC

.5 Section 23 07 19 – HVAC Piping Insulation

.6 Section 23 11 23 – Facility Natural-Gas Piping

.7 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME A13.1 Scheme for the Identification of Piping Systems

1.4 SUBMITTALS

.1 Compile a list of labelled items (equipment, valves, piping specialties) listed in PART-2 PRODUCTS with the following information

.1 Tag (i.e. V-1)

.2 Description (i.e. Coil #1 Hot Water Balancing Valve)

.3 Location (i.e. Room 305 Ceiling Space)

.4 Manufacturer of item

.5 Model number of item

.2 Include a copy of this compiled list in the Operations and Maintenance Manual required in the close-out submittal package. Also, include a laminated copy for permanent mounting in the appropriate maintenance room.

.3 Mark labelled items on the as-built drawings.

.4 For items located within a mechanical room, create a laminated, schematic drawing with items labelled for permanent mounting in the mechanical room.

PART 2 - PRODUCTS

2.1 DUCTWORK IDENTIFICATION

.1 A label or paint with white background and black lettering at least 3.5” (90 mm) high.

.2 Include arrow indicating direction of air flow.

.3 Include type (i.e. Supply, or Smoke Exhaust).

.4 Include the air moving unit it serves.

2.2 PIPING IDENTIFICATION – GENERAL SIZING OF LABELS

.1 For ¾” to 1¼” (19 mm to 32 mm) outer diameter pipe or insulation

.1 Color coding shall be 8” (200 mm) long

.2 Lettering shall be ½” (13 mm) high

.2 For 1½” to 2” (32 mm to 50 mm) outer diameter pipe or insulation

.1 Color coding shall be 8” (200 mm) long

.2 Lettering shall be ¾” (19 mm) high

.3 For 2½” to 6” (64 mm to 150 mm) outer diameter pipe or insulation

.1 Color coding shall be 12” (300 mm) long

.2 Lettering shall be 1¼” (32 mm) high

.4 For 8” to 10” (200 mm to 250 mm) outer diameter pipe or insulation

.1 Color coding shall be 24” (600 mm) long

.2 Lettering shall be 2½” (64 mm) high

.5 For over 10” (250 mm) outer diameter pipe or insulation

.1 Color coding shall be 32” (813 mm) long

.2 Lettering shall be 3½” (90 mm) high

2.3 PIPING IDENTIFICATION – GENERAL COLOR CODING

.1 Refer to the table in this section for specific fluid/gas service piping. If a particular fluid/gas is not listed…

.1 For fire quenching fluid/gas, use white lettering on a red background

.2 For toxic or corrosive fluid/gas, use black lettering on an orange background

.3 For flammable fluid/gas with a flash point under 37.8 C (100 F), use black lettering on a yellow background

.4 For combustible fluid/gas with a flash point between 37.8 C (100 F) and 93.3 C (200 F), use white lettering on a brown background

.5 For chemicals or mixtures with a flash point above 93.3 C (200 F), use white lettering on an purple background unless otherwise specified

.6 For any hydronic water system, use white lettering on a green background

.7 For glycol/water mixture applications, use white lettering on a purple background

2.4 PIPING IDENTIFICATION – GENERAL LABELLING CONTENT

.1 Include...

.1 Descriptive name of fluid/gas in pipe

.2 Direction of flow arrow

.3 Temperature (required for different temperatures for same named fluid/gas)

.4 Pressure (required for different pressures for same named fluid/gas)

.5 Any unique identifier within same named fluid/gas (i.e. Refrigerant Liquid versus Refrigerant Vapor)

2.5 PIPING IDENTIFICATION – SPECIFIC FLUID/GAS

Fluid/Gas	*Background Color*	*Lettering Color*	*Unique Identifier*
FLUE OR COMBUSTION VENT	White	Black	
NATURAL GAS	Yellow	Black	Add pressure if multiple

2.6 EQUIPMENT, VALVES AND PIPING SPECIALTIES LABELLING

.1 The intent is for any item that is required to be maintained, or be used in the course of maintenance, adjustment or repair in the system, shall be labelled in such a way that it is useful and visible.

.2 The following HVAC equipment shall be labelled

.1 Air handlers and their respective controller

.2 Fans and their respective controller

.3 Heating coils

.4 Motorized dampers

.5 Thermostats (label says what it controls)

.3 The following piping valves and specialties shall be labelled

.1 Isolation valves for mains and branch lines

.4 Suitable labelling material shall be…

.1 For equipment...

.1 Lamacoids with minimum 1/16” (2 mm) thick plastic and engraved lettering. Sizes shall be determined based of each piece of equipment with the intent that the lamacoid can be easily read from up to 3 m (10 feet) away. Color shall generally be white background and black lettering unless otherwise indicated.

.2 For valves and specialties…

.1 Brass tags shall be 1½”(38 mm) diameter with stamped identification data filled with black paint.

.2 Plastic tags shall be 1¾”(44 mm) diameter with recessed identification data. Background and lettering colors to match associated piping labels.

2.7 MANUFACTURERS NAMEPLATES

.1 Nameplates stamped or installed permanently by the manufacturer shall at least designate the make, model number, and applicable standards it adheres to (i.e ULc, CSA). Additional information is acceptable.

2.8 LANGUAGE

.1 Identification to be in English.

PART 3 - EXECUTION

3.1 INTENT

.1 Some of this work is subjective. The intent is label items and leave behind suitably detailed information for future maintenance staff. Installation shall be done with this in mind.

3.2 INSTALLATION

.1 Install per manufacturer’s written installation instructions.

.2 For ductwork, install labels…

.1 On either side of a wall or floor penetration for any non-HVAC ductwork (i.e. smoke exhaust, or fume extraction)

.2 Within six (6) feet (2 meters) of an inline component (i.e. HEPA filter, or duct heater coil)

.3 For piping labels, install one label...

.1 At every valve and unit connection

.2 On either side of a wall or floor penetration

.3 At every access panel if piping is concealed

.4 At every change of direction

.5 Every 15 M (50 feet) of straight pipe

.4 For lamacoids, install with supplier applied adhesive.

.5 For tags, install with a closing chain so the tag cannot come off the item and it does not hamper the normal operation of the item.

.6 All labelling shall be visible from the floor and the most logical direction of approach to the item.

3.3 TIMING

.1 Provide identification only after all painting specified in Section 09 91 23 - Interior Painting has been completed.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes requirements fortesting, adjusting, and balancing (TAB)...

.1 Air systems,

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 01 91 13 – General Commissioning Requirements

.4 Section 23 05 00 – Common Work Results for HVAC

.5 Section 23 09 13 – Instrumentation and Control Devices for HVAC

.6 Section 23 33 13 – Dampers

1.3 REFERENCES

.1 Associated Air Balance Council (AABC)

.1 AABC National Standards for Total System Balance

.2 AABC Test and Balance Procedures

.2 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE 111 Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems

.3 Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

.1 HVAC systems - Testing, Adjusting and Balancing (third edition)

1.4 MECHANICAL CONTRACTOR RESPONSIBILITIES

.1 Provide to the testing and balancing agency and people doing the work of this section, a complete set of contract documents, subsequent changes, and approved submittals for the purpose of their work. Provide subsequent information as required.

.2 Be available, including relevant sub-contractors, to assist during the work of this section. Coordinate with contractors and/or suppliers as required.

.3 Provide additional valves, dampers, sheaves, and belts as required during the work of this section.

.4 Provide indication and access to all dampers, valves, test ports, nameplates, and other appurtenances as required.

.5 Repair or replace any damaged insulation as a result of the work of this section.

.6 Verify and have ready the following items (as applicable) in preparation for the work of this section.

.1 Air:

.1 Ductwork complete with all terminals installed

.2 All volume, smoke and fire dampers are open and functional

.3 Clean filters are installed

.4 All fans are operating free of vibration and rotating in the correct direction

.5 Variable frequency drives (VFDs) have been started and safeties verified

1.5 SUBMITTALS

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

.2 Submissions Prior to Certification:

.1 Submit to the mechanical engineer a Test, Adjust, and Balance (TAB) report for review.

.3 Closeout Submittals:

.1 Provide per Section 01 78 00 - Closeout Submittals.

.2 Include the Test, Adjust, and Balance (TAB) report within the Operation and Maintenance (O&M) Manual upon certification.

1.6 QUALITY ASSURANCE

.1 Agencies and people doing the work of this section shall be certified to do so by AABC, unless specifically allowed otherwise by the mechanical engineer. See the General Requirements in PART 3.

.2 Report to the mechanical engineer and mechanical contractor any deficiencies preventing proper testing, adjusting, and balancing of systems and equipment.

.3 All measuring equipment shall be in calibration. Upon request, submit the calibration report for measuring equipment used.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INTENT

.1 Execute the testing, adjusting, and balancing of systems in accordance with recognized,

suitable procedures; and as described herein.

3.2 PREPARATION

.1 Air balancing precedes hydronic balancing.

.2 Verify the following items prior to testing and balancing:

.1 Air:

.1 Ductwork complete with all terminals installed

.2 All volume, smoke and fire dampers are open and functional

.3 Clean filters are installed

.4 All fans are operating free of vibration and rotating in the correct direction

.5 Variable frequency drives (VFDs) have been started and safeties verified

.6 Automatic temperature control systems are operational

.7 Ceilings, windows, and doors are in place

.8 There is access to all balancing devices and equipment

3.3 GENERAL REQUIREMENTS

.1 Agencies and personnel conducting the work of this section shall have both knowledge (from formal instruction/training in suitable testing and balancing procedures), and experience (at least five (5) years of practical work). Confirmation of qualifications shall be submitted upon request.

.2 Suitable testing and balancing procedures shall be followed as found in...

.1 AABC Test and Balance Procedures,

.2 ASHRAE 111 Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems, and/or

.3 SMACNA HVAC systems - Testing, Adjusting and Balancing (third edition).

.3 Mark final location/setting of balancing devices and dampers with a permanent indicator.

.4 Measuring and reporting shall be in the same units of measurement as the design documents.

3.4 PROCEDURES FOR BALANCING AIR SYSTEMS

.1 General procedures for all air systems:

.1 Prepare test reports for all fans and outlets.

.2 Prepare single line schematics for systems identifying HVAC components.

.3 Choose duct measurement locations suitable for accurate, laminar airflow readings. Generally, a distance of 8.5 duct diameters of straight run is required upstream of a measurement point.

.4 Make holes in ducts required for testing and plug upon completion.

.5 Record outside and duct air conditions (temperature and humidity) during testing.

.6 Locate electrical disconnect switches, interlocks, and motor starters.

.2 For constant-volume air systems:

.1 Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by the fan manufacturer as follows.

.1 Measure total airflow:

.1 Set the outside air, return, and relief damper positions to simulate the minimum ventilation (outdoor air) requirements.

.2 Measure the velocity pressure to two (2) significant figures (inches of water) in each ductlocation via at least sixteen (16) pitot-tube traverse readings. Convert velocity pressure to air velocity for the conditions present. If the duct configuration does not allow for this, it must be presented in the report and the next best measurement method shall be used.

.2 Measure fan static pressures:

.1 Measure directly at the fan outlet (through the flexible connector if required).

.2 Measure directly at the fan inlet (through the flexible connector if required).

.3 Measure directly across each component (filter banks, coils, and fans) in the air handling system.

.3 Ensure fan speed adjustments do not result in motor overload. Refer to manufacturer's information regarding fan speed safety factors. Modulate dampers over full range while testing in all cooling, heating, economizer modes to determine maximum break power (horsepower, watts, etc...).

.2 Measure and adjust volume dampers for main and major branch ducts to design airflows.

.3 Adjust airflows in spaces as follows.

.1 Set diffuser/grille pattern to avoid drafts.

.2 Measure and adjust all inlets and outlets to design airflows.

.4 Verification as follows.

.1 Record minimum ventilation (outdoor air), return and relief airflows and confirm within design.

.2 Test system in full economizer mode.

.3 Record final fan operating data (rpm, volts, amps, static profile).

3.5 ACCEPTABLE RESULTS

.1 The flow rates shall be attempted to be set within the following tolerances...

.1 Supply, Return, and Exhaust fans: +/- 5%

.2 Air outlets and inlets: +/- 10%

.3 Ventilation air: 0% to +10%

.2 Pressure relationships take priority over airflow tolerances (For example, if the differential pressure between two spaces is required to be 0.08”wc, this requirement takes priority over setting airflows in and out of the space to meet the above tolerances).

.3 If unable to set any component within tolerances, it shall be explicitly indicated on the report and brought to the attention of the mechanical engineer. It is the discretion of the mechanical engineer to determine if the particular out-of-tolerance setting is appropriate or not.

3.6 TEST, ADJUST, AND BALANCE (TAB) REPORT

.1 The report shall be a complete record of the HVAC system performance under conditions of operation. The intent is to provide the Contract Administrator, City of Winnipeg, and maintenance personnel information about the HVAC systems in order to verify functional compliance to the original design.

.2 Information that shall be included as a minimum:

.1 The company name, address, and contact information that is responsible for undertaking the work of this section.

.2 The project name, description, and/or location address.

.3 The name and contact information for mechanical contractor responsible for the installation.

.4 The date of the report.

.5 AABC Certification, or equivalent approved by the mechanical engineer.

.6 Testing equipment description, manufacturer, model, and last calibration date.

.7 Manufacturer nameplate information (make, model, voltage, amps, speed) for motors.

.8 Curves for fans and pumps (may be deleted if already included in shop drawings).

.9 List of components set outside of tolerances, and possible reasons why they are such.

.10 Single line schematics of HVAC systems showing components, location and recordings.

.11 Calculations and/or methodology descriptions as needed to determine useable units from accumulated data.

.12 Air conditions (temperature, humidity) during testing.

.13 Individual component operation data (flow, pressure drop, entering and leaving temperatures).

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on externally applied thermal insulation for ductwork and plenums conveying HVAC air between -40 C (-40 F) and 50 C (122 F), and commercial kitchen exhaust ducts.

.2 This section does not include thermal insulation for hydronic or HVAC equipment, nor does it include internally applied acoustic liners.

1.2 RELATED SECTIONS

.1 Section 01 33 00 –Submittal Procedures

.2 Section 07 84 00 – Firestopping

.3 Section 23 05 00 – Common Work Results for HVAC

.4 Section 23 05 29– Hangers and Supports for HVAC Piping and Equipment

.5 Section 23 05 53 – Identification for HVAC Piping and Equipment

.6 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings

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

.1 ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.2 ASTM C612 Specification for Mineral Fiber Block and Board Thermal Insulation

.3 ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

.4 ASTM C921 Practice for Determining the Properties of Jacketing Materials for Thermal Insulation

.5 ASTM C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

.6 ASTM C1290 Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts

.7 ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings

.8 ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials

.9 ASTM E2336 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems

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

.1 Material Safety Data Sheets

.4 National Fire Protection Agency (NFPA)

.1 NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

.5 Thermal Insulation Association of Canada (TIAC)

.1 Best Practices Guide

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S102Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 CAN/ULC S102.2Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

.7 National Building Code (NBC)

.8 National Energy Code of Canada for Buildings (NECB)

1.4 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated ductwork in suspended ceilings, non-accessible chases, or furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 “FACING” – a protective layer around the outside of the insulation, for the purpose of vapour retardation, protecting from physical contact, or both.

.4 “MINERAL FIBER” - includes glass fiber, rock wool, or slag wool.

1.5 SUBMITTALS

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

.2 Manufacturers Datasheet:

.1 Upon request, submit manufacturer's printed product datasheet. Clearly identify products used on this job. Include product characteristics, performance criteria, limitations, and standards met (i.e. CAN/ULC S102).

.3 Quality Assurance:

.1 Upon request, submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Has currentcertifications required in performing work of this Section

.2 Has at least five(5) years successful experience in this size and type of project

.3 Is qualified to understand, and experienced with, the TIAC Best Practices Guide.

.2 Supplier:

.1 Has at least five(5) years successful experience in this size and type of project

.2 Must be a company specializing in work of this Section.

.3 Must be available and competent to give installation support to the installer.

.3 Manufacturer:

.1 Must be a company specializing in work of this Section.

.2 Must be listed in the relevant section of the TIAC Best Practices Guide.

.3 Must be available and dedicated to providing installation support for their product.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING (ALL PRODUCTS)

.1 In accordance with CAN/ULC S102 or CAN/ULC S102.2:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION AND FACINGS (HVAC)

.1 Insulated duct panels (panels that form the entire duct without a metal duct included) are not allowed unless the project mechanical engineer gives formal approval for a specific application area, either through specific indication on the construction documents or upon request by the contractor.

.2 Insulation shall be either…

.1 Inorganic mineral fiber without formaldehyde meeting ASTM C612 or ASTM C1290, or

.2 Closed cell elastomeric foam to ASTM E96.

.3 Facings shall be (depending on application) one of...

.1 Foil-Scrim Kraft (FSK) meeting ASTM E96 (Procedure A),

.2 Polypropylene-Scrim-Kraft (PSK)meeting ASTM E96 (Procedure A)

.3 All-Service Jacket (ASJ) meeting ASTM C 1136, or

.4 Substrate suitable for application of weatherproof coating.

.4 Material used in contact with austenitic stainless steel shall meet ASTM C795.

.5 All materials shall exhibit zero mold growth when tested to ASTM C1338.

.6 When rigid foam insulation is required to aid in duct supports, it shall be extruded polystyrene foam insulation with at least 25 psi (1.72 bar) compressive strength.

2.3 INSULATION SECUREMENTS (HVAC)

.1 “Peel and stick” integral insulation adhesive

.2 Contact adhesive: Quick setting

.3 Bands: Stainless steel, 3/4” (19 mm) wide, 20 mil (0.5 mm) thick

.4 TIAC Best Practices Guide insulation securement devices are acceptable except that no wire or twine is allowed. As a replacement for wire or twine, use bands.

2.4 JACKETS (HVAC)

.1 Aluminum: Embossed sheet to ASTM B209

.2 Canvas:

.1 6.5 oz/sq.yd. (220 gm/m^2) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: Compatible with insulation.

2.5 INSULATION JOINT / JACKET TAPE (HVAC)

.1 Self-adhesive, reinforced, 2” (50 mm) wide minimum. Provided by insulation manufacturer.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Ductwork joints and seams shall be sealed air-tight.

.2 Surfacesshall be clean, dry, and free from foreign material.

3.2 INSTALLATION (ALL HVAC APPLICATIONS)

.1 All mineral fiber insulation, concealed or exposed, shall have a facing on the outer surface.

.2 Vapor retarder must be complete and airtight around entire exterior surface of insulation. If the air conveyed in the supply duct is always warmer than the air outside of the duct, no continuous vapor barrier is required. A facing membrane is still required for all mineral fiber insulation to protect against physical contact.

.3 Refer to the TIAC Best Practices Guide to install to the codes specified.

3.3 INSTALLATION (FOR HVAC DUCTS / PLENUMS LOCATED OUTDOORS)

.1 All insulation assemblies shall have an equivalent thermal resistance rating of R-27 (4.76 m2*C/W), unless otherwise indicated.

.2 For rectangular ducts…

.1 Install multiple layers of unfaced mineral fiber board and an outer layer of faced mineral fiber board per TIAC code CER/3 and finish to TIAC code CRF/3 or CRF/4, or

.2 Install multiple layers of peel-and-stick closed cell elastomeric insulation and an outer layer of closed cell elastomeric insulation finished to TIAC code CRF/3.

.3 For round ducts…

.1 Install multiple layers of peel-and-stick closed cell elastomeric insulation and an outer layer of closed cell elastomeric insulation finished with a jacket to TIAC code CRD/3.

3.4 INSTALLATION (FOR DUCTS PENETRATING A BARRIER BETWEEN CONDITIONED AND NON-CONDITIONED SPACE)

.1 All HVAC ductwork penetrating a barrier between conditioned space and unconditioned space shall be insulated a minimum of 10 feet (3 m) in from the barrier on the conditioned side. Insulation shall have a minimum thermal resistance R-value of 5.0 (0.88 m2*C/W). Outside layer of the insulation shall have a continuous vapor barrier.

.1 Exception: If the duct air damper is located interior of the barrier plane, all ductwork between the barrier and the damper shall be insulated to an equivalent thermal resistance rating of R-27 (4.76 m2*C/W), unless otherwise indicated.

3.5 INSTALLATION (HVAC DUCTS AND PLENUMS IN CONDITIONED SPACE)

.1 All supply air ducts shall be insulated with a minimum thermal resistance R-value of 3.3 (0.58 m2*C/W), with the following exceptions…

.1 If the maximum temperature difference between the air conveyed in the duct and the air outside the duct is <9 F (5 C), no insulation is required.

.2 If the maximum temperature difference between the air conveyed in the duct and the air outside the duct is >40 F (22 C), the minimum thermal resistance R-value shall be increased to 5.0 (0.88 m2*C/W).

.3 If the supply ductwork is contained completely within, and serving only, a single conditioned dwelling unit as defined by the National Building Code (NBC), no insulation is required.

.2 When using closed cell elastomeric insulation…

.1 For supply air ducts conveying air that is always warmer than the air surrounding the duct, install per manufacturer's instructions using a factory applied peel-and-stick adhesive and joint sealer,

.2 Otherwise, install per manufacturer's instructions using a factory applied peel-and-stick adhesive and joint sealer and finish to TIAC code CRD/2.

.3 When using mineral fiber insulation…

.1 For supply air ducts conveying air that is always warmer than the air surrounding the duct, install per TIAC code CER/1 or CEF/1.

.2 For all other rectangular supply air ducts…

.1 For ducts and plenums located less than 8 feet (2.4 m) above the floor, or areas subject to physical contact, install per TIAC code CER/2 and finish to TIAC code CRF/1.

.2 For ducts and plenums located above 8 feet (2.4 m) above the floor or in concealed areas, install per TIAC code CER/2 or TIAC code CEF/2.

.3 For all other round supply air ducts…

.1 For ducts and plenums located less than 8 feet (2.4 m) above the floor, or areas subject to physical contact, install per TIAC code CEF/2 and finish to TIAC code CRD/1.

.2 For ducts and plenums located above 8 feet (2.4 m) above the floor or in concealed areas, install per TIAC code CEF/2.

3.6 INSTALLATION (RECOMMENDATIONS - HVAC)

.1 Maintaining a contiguous vapor barrier is a requirement, but it is sometimes difficult when ductwork is supported. The following technique is not a requirement, rather it is offered as guidance on a possible way to install satisfactorily. A suggested sequence for hanging / supporting insulated, rectangular duct is…

.1 Attach rigid foam insulation strips, equal in thickness to the required duct insulation, with suitable adhesive to the bottom of the duct where under duct hangers will be located.

.2 Hang the un-insulated duct, resting the rigid insulation strips on the hanger bar.

.3 Apply external insulation panels. At each hanger location, raise the duct slightly or lower the hanger bar slightly, butt the insulation up to the rigid strip and seal the vapor barrier across both the wrapped insulation and the rigid foam strip.

.4 Once the insulation and vapor barrier are in place, let the duct and rigid foam insulation strip back down or raise the hanger bar such that the ductwork is

supported, with the vapor barrier located between the foam strip and the hanger bar.

.5 Move on to the next hanger.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section covers electro-mechanical devices.

.2 This section gives requirements for the following general-use devices used to directly or indirectly control HVAC items.

- .1 General Items:
  - .1 Terminal Blocks
  - .2 Control Wiring (Binary)
  - .3 Control Wiring (Analog)
  - .4 Low Voltage Power Wiring
  - .5 Transformers
- .2 For Fluid:
  - .1 Low Water Cut-Offs (LWCO)
  - .2 Aquastats
  - .3 Motorized Valve Actuators
  - .4 Differential Pressure Sensor/Controllers
- .3 For Air:
  - .1 Thermostats / Temperature Sensors
  - .2 Humidistats / Humidity Sensors
  - .3 Motorized Damper Actuators
  - .4 Differential Pressure Sensor/Controllers
  - .5 Air Proving Switches

.3 This section does not include life safety or special equipment devices that may also affect HVAC items (i.e. a gas detector device that causes an exhaust fan to run upon alarm).

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 01 91 13 – General Commissioning Requirements

.4 Section 23 05 00 – CommonWork Results for HVAC

.5 Section 23 09 93 – Sequence of Operations for HVAC Controls

.6 Section 23 33 13 – Dampers

1.3 REFERENCES

.1 Canadian Standards Association (CAN/CSA)

.1 CAN/CSA C22.1 Canadian Electrical Code, Part I

.2 CAN/CSA C22.2 Canadian Electrical Code, Part II

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

.3 Underwriters Laboratory (UL)

.1 UL 5085-3 Low Voltage Transformers Part 3: Class 2 and Class 3 Transformers

1.4 SUBMITTALS

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

.2 Shop Drawings

.1 Provide job-specific manufacturers datasheet including product performance criteria, physical size, connections and any standards met.

.2 For datasheets with multiple models or options, clearly indicate which is proposed to be used.

.3 Closeout submittals in accordance with Section 01 78 00 – Closeout Submittals

.4 Operation and Maintenance (O&M) Manual Data:

.1 List instruments and control devices with their installed and commissioned settings.

1.5 CONTRACTOR RESPONSIBILITY

.1 It is the mechanical contractor’s responsibility to ensure thesupply and installation of all necessary components for a complete and functional HVAC system per the sequence of operations. Coordinate with other sub-contractors as required for ensuring the sequence of operations can occur as intended.

PART 2 - PRODUCTS

2.1 GENERAL INFORMATION

.1 Provide accessories as needed to accomplish the intended sequence of operations.

.2 Absolutely no proprietary devices or systems shall be used. Devices used shall have direct replacements with the same functionality available from at least two competitive manufacturers.

2.2 GENERAL ITEMS

.1 Terminal Blocks

.1 For terminal blocks which are not integral to other equipment, provide terminal blocks which are insulated, modular, feed-through, clamp style with recessed captive screw-type clamping mechanism, suitable for DIN rail mounting, and which have enclosed sides or end plates and partition plates for separation.

.2 Control Wiring (Binary)

.1 All control wiring shall be plenum rated with a developed smoke / flame spread rating of 25/50.

.2 18 AWG copper or thicker wire rated for 300 volt service.

.3 Control Wiring (Analog)

.1 All control wiring shall be plenum rated with a developed smoke / flame spread rating of 25/50.

.2 18 AWG copper or thicker, single or multiple twisted wire with at least 2” (50 mm) lay of twist, 300 volt insulation on each wire, 100% foil shielded pairs with a 20 AWG tinned copper drain wire, insulation on each pair, overall cable insulation

.4 Low Voltage Power Wiring

.1 Low voltage (24 volt circuits) shall be 18 AWG copper or thicker wire rated for 300 volt alternating current service.

.2 Line voltage (120 volts AC or larger) shall be by a certified electrical contractor.

.5 Transformers

.1 Meets UL 5085-3

.2 Connected load to be less than 80% of transformer rated capacity

2.3 AIR / DUCTWORK ITEMS

.1 Thermostat / Temperature Sensors

.1 Thermostat function shall match the HVAC equipment specified (i.e. provide a thermostat with two stage cooling if the air handler has two stage cooling).

.2 Wall:

.1 Thermostats must include…

.1 Local or remote temperature sensing capability,

.2 Accuracy of +/- 0.5 F (0.3 C),

.3 Heating and Cooling capability with automatic switchover,

.4 Fan ON/OFF/AUTO setting

.5 7-day, 24-hour programmable setpoints,

.6 Auxiliary heat output contactors, and

.7 Any other function required to accomplish the work under Section 23 09 93 Sequence of Operations for HVAC Controls

.2 Enclosure: Durable plastic with locking cover where indicated

.3 Duct:

.1 Single probe type: Metal pitot tube with sensing tube located at 1/3 length of duct cross dimension.

.2 Averaging wire type: Supply continuous averaging wire; one foot (0.3 m) length per square foot (0.1 sq. meter) of duct cross section area.

.4 Outdoor Ambient Temperature Sensor:

.1 Type: RTD; requires a suitable resistance-to-temperature translator (i.e. thermostat)

.2 Operating Range: -40 F (-40 C) to 120 F (49 C)

.3 Enclosure: NEMA 4X

.4 Probe Casing: Stainless steel

.2 Humidistat / Humidity Sensors

.1 Sensing elements shall be a non-saturating thin film capacitive type or a bulk polymer resistive type capable of withstanding a saturated condition without damaging or affecting sensor calibration.

.2 Sensing elements shall be protected from dust accumulation.

.3 Outdoor sensors shall be able to withstand freezing temperatures and direct moisture contact without recalibration required.

.4 Relative Sensitivity: +/- 3% RH over a range of 0-100% RH

.5 Sensors and wiring methods suitable for wet environments.

.3 Motorized Damper Actuator

.1 Damper actuators may be combined with the damper as a packaged unit. Specified requirements for both the damper (specified in Section 23 33 13) and the actuator (specified in this section) must be adhered to.

.2 Actuators must be rated for their operating environment.

.3 Actuators shall fail in the position with the lowest risk to problems in the system (i.e. avoid freezing coils). Dampers that serve the following shall fail open, closed, or last position as indicated…

.1 Outside air intake, relief dampers: fail closed

.2 Return air damper: fail open (do not restrict fan flow)

.4 Actuator sound shall not exceed 75 dB(A) at 3 feet (1 meter).

.5 Actuator control input signal shall match its respective controller output signal (i.e. 4-20mA, 0-10vdc, or pulse width modulation) directly, unless signal conversion is through the actuator manufacturer’s manufactured conversion product.

.6 Torque: To meet or exceed 9 in-lbs per square foot (11 N*m per square meter) of damper.

.7 Time for Full Travel: <120 seconds

.8 Actuator to include position control (4-20 mA, internally powered) feedback capability

.9 Actuators shall include a distinct, visible (from a reasonably accessible position) indication of position.

.10 Actuators shall include limit switches, or high torque protection to avoid motor burnout.

.11 MODULATING Type:

.1 Solid state contacts

.2 Capable of stopping at any point, and starting in any direction from any point

.4 Gas detection system GD-1

.1 Acceptable materials:

.1 Honeywell Analytics model E3SASCO/E3SRMNO2, stand-alone monitor.

.2 Honeywell Analytics model ECLAB,NEMA-4X watertight enclosure.

.2 The monitor will be powered by 24 vac or by an external power supply rated at 24 vdc. The monitor will incorporate an electrochemical cell for toxic gas monitoring. Equipment suitable for high humidity locations.

.3 The monitor will be capable of transmitting gas concentrations to a ddc system through its 4-20 ma output. For local activation of fans or damper actuators (or other equipment), two on-board dpdt relays 5 a, 30 Vdc or 250 Vac (resistive load) will be activated at programmable set points (and programmable before and after time delays). An 8 character, 2 line backlit LCDdisplay will provide local gas concentration readings.

.4 Transmitter will be capable of operating within relative humidity ranges of 5-95% non-condensing and temperature ranges of -4° f to 104° f (-20° c to 40° c).

.5 The transmitter will have a plug-in capability for a gas cartridge with a smart sensor technology with self-testing capabilities accuracy of +/- 3%of full scale @ 25 c.

.6 Enclosure will be polycarbonate with rubberized sealed cover and led visual indications for power, alarm & fault conditions.

.7 For local activation of audible alarms, the monitor shall have an on-board device able to generate an audible output of 85 dba @ 10 ft (3m).

.8 Monitor alarm levels are to activate and the unit is to be installed in accordance with the following parameters:

.9 Toxic gas

.1 Carbon monoxide (co)

.1 First alarm setpoint (TLV-TWA) – 25ppm

.2 Second alarm setpoint - 75ppm

.3 Sensor location – 3.5'-0" aff

.4 Radius of coverage – 50'-0"

.2 Diesel (no2):

.1 First alarm setpoint (TLV-TWA) – 0.72ppm

.2 Second alarm setpoint - 2ppm

.3 Sensor location – 1'-0" below ceiling

.4 Radius of coverage – 50'-0"

.10 Provide complete commissioning service with written reports by the manufacturer's authorized representative.

PART 3 - EXECUTION

3.1 GENERAL ITEMS

.1 Line voltage requirements work shall be by a licensed electrician.

.2 Supply and installation of low voltage wiring, transformers, contactors, etc... shall be by the mechanical contractor or controls contractor within the mechanical scope of work. Installers shall be suitably certified in the project jurisdiction to perform such work and meet the applicable requirements of the most recently adopted version of the Canadian Electrical code.

3.2 AIR / DUCTWORK ITEMS

.1 All wall mounted control devices located in, or adjacent to, barrier-free paths of travel shall be mounted so the top of the device housing is 1200 mm (47") maximum above the finished floor surface.

.2 Thermostat / Temperature Sensors

.1 Wall:

.1 The thermostat / temperature sensor shall be located where it accurately registers space temperature and is sheltered from convection (i.e. direct airflow) and radiant (i.e. sun) energy.

.2 Where possible, do not install a thermostat / temperaturesensor on an outside wall. If the device must be located on an outside wall, adequate thermal protection must be included behind the enclosure.

.2 Duct:

.1 The contractor shall recognize conditions where stratification could occur within the ductwork and utilize an averaging wire type if necessary. If the duct thermostat is acting as a freezestat signal, the averaging wire shall be weaved throughout the bottom 1/3 of the horizontal duct, plus if an outside

air intake duct is connected upstream to another side of the same duct, that 1/3 side shall also include weaved averaging wire as well.

.2 Penetrations in ductwork shall be adequately sealed.

.3 Outdoor Ambient Temperature Sensor:

.1 Install the probe in an area protected from radiant (sun) and convective (wind) heat transfer.

.2 Ensure sensor wiring is not more than 2 ohms total wire resistance between the sensor and the suitable translator / controller (i.e. thermostat).

.3 Humidistat / Humidity Sensors

.1 Duct mounted sensors shall be located no less than 10 feet (3 meters) downstream of humidity injection dispersions tubes.

.4 Damper Actuator

.1 Damper Actuators shall be located out of the air stream unless otherwise indicated.

.2 Actuators shall be installed such the visual position indication is readable from an accessible location.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives the required operational sequences pertaining to HVAC equipment.

1.2 RELATED SECTIONS

.1 Section 01 91 13 – General Commissioning Requirements

.2 Section 23 05 00 – Common Work Results for HVAC

1.3 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.1 Canadian Electrical Code

1.4 CONTRACTOR RESPONSIBILITY

.1 It is the HVAC contractor's responsibility to ensure thesupply and installation of all necessary components for a complete and functional HVAC system per the sequence of operations. Coordinate with other sub-contractors as required for ensuring the sequence of operations can occur as intended.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Provide accessories as needed to accomplish the intended sequence of operations.

.2 All control wiring shall be plenum rated with a developed smoke / flame spread rating of 25/50.

PART 3 - EXECUTION

3.1 GENERAL

.1 Line voltage requirements work shall be by a licensed electrician.

.2 Supply and installation of low voltage wiring, transformers, contactors, etc… shall be by

the mechanical contractor or controls contractor within the mechanical scope of work. Installers shall be suitable certified in the project jurisdiction to perform such work and meet the applicable requirements of the most recently adopted version of the Canadian Electrical code.

3.2 HEAT RECOVERY VENTILATOR (HRV-1)

.1 HRV shall cycle via programmable time clock, operation to match AH-1 occupied schedule.

.2 Occupied Mode:

.1 HRV-1 inlet and exhaust dampers shall open fully. Upon proof of open via end switches, HRV-1 shall energize and run continuously.

.2 PHC-1 shall have an integral discharge air temperature controller to maintain 12F at inlet to HRV-1, initial and adjustable.

.3 Unoccupied Mode:

.1 HRV-1 fans shall remain off.

.2 Associated motorized inlet/exhaust dampers shall close fully.

.4 There is no requirement for any input or output signal to a building management system (BMS) at this time.

3.3 AIR HANDLING UNIT AH-1 (ECONOMIZER DAMPERS/CONTROLLER)

.1 The controls shall operate equipment to meet space temperature setpoint requirements based on a space thermostat signal. The thermostat shall be a seven (7) day programmable model with automatic switch-over between cooling and heating modes. The thermostat shall initiate modulating heating coil (HC-1) or cooling (economizer cooling or DX mechanical cooling) as required. The thermostat shall be compatible with the economizer controller.

.2 Thermostats shall be wired to prevent simultaneous heating and cooling.

.3 AH-1 to be equipped with an economizer controller (United Air Cool - Marvel Mini) to operate the remote outdoor air, return air, and relief damper actuators. Honeywell W7220 Jade or equal, may also be accepted.

.4 Occupied mode:

.1 AH-1 shall operate continuously. Outdoor intake and relief dampers shall remain fully closed, return damper fully open. HRV-1 shall provide primary ventilation for AH-1.

.2 Heating: upon a thermostatic call for heating, economizer dampers shall remain at their normal position. The thermostat shall modulate the electric heating coil (HC-1) SCR to maintain thermostatic setpoint.

.3 Cooling: upon a thermostat call for cooling, a signal shall be received by the economizer controller and it shall use internal logic to determine whether free-cooling is available based on differential enthalpy, or whether mechanical DX cooling shall be used. The economizer controller shall also include enthalpy sensors located in the return duct and the outside air duct, and a mixed air

temperature sensor. Based on these inputs, the economizer controller shall modulate the outside air and relief air dampers open, and return air damper closed.

.1 If the outside air is above temperatures suitable for economizer cooling, a thermostat call for cooling will enable DX cooling stages at AH-1. The economizer dampers shall be modulated to normal position. The AH-1 controller shall modulate the digital scroll to maintain space setpoint.

.5 Unoccupied mode:

.1 The economizer dampers shall remain in normal position (outdoor intake, relief dampers closed, return damper open).

.2 The AH-1 fan, duct mounted heating coil (HC-1), or DX cooling shall modulate as required to maintain unoccupied space temperatures.

.6 There is no requirement for any input or output signal to a building management system (BMS) at this time.

3.4 SHOP AREA VENTILATION SYSTEM (EF-1, E/A AND O/A DAMPERS)

.1 Space temperature setpoints shall be maintained by unit heaters and respective space thermostats.

.2 Provide gas detector(s) and alarm, damper operator(s) with end switch(es), dampers, air flow switches, relays, dehumidistat, etc. All equipment within the washbay area shall be rated for use in wet locations.

.3 Exhaust fan EF-1, E/A damper actuator and O/A intake damper actuator shall be interlocked for simultaneous operation. Humidity sensors, gas detection system and manual fan switch to be wired in parallel such that detection at any device will initialize ventilation system. Power and control wiring to motorized dampers, sensors, gas detection systems, etc., shall be the responsibility of the controls contractor.

.1 Upon elevated levels of CO or NO2 (25 PPM and 0.7 PPM respectively, manual activation at the manual fan switch, or elevated humidity levels above setpoint within the wash bay area, the O/A inlet damper and E/A exhaust damper actuators (at envelope penetration)shall be commanded fully open. Upon proof of open via end switches, EF-1 shall energize. Should air flow not be proven at exhaust fan, the system shall de-energize and an audible alarm shall sound.

.2 If CO or NO2 levels continue to rise above alarm setpoint (75 PPM and 2 PPM respectively), an audible and visual alarm shall activate.

.3 Once humidity and CO/NO2 levels are below setpoint, and manual fan switch is in the OFF position, EF-1 will de-energize and dampers revert to their normally close positions.

.4 There is no requirement for any input or output signal to a building management system (BMS) at this time.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives guidance for utilizing appropriate metal ductwork for…

.1 HVAC supply and return air

.2 General exhaust

.3 Conveying flammables or combustibles (under 25% of Lower Flammability Limit)

.2 This section does not include laboratory, toxic, caustic or corrosive fumeexhaust ducts, dust or particulate matter collection systems, or ductwork for handling gases in concentration above 25% of the Lower Flammability Limit (LFL).

.3 This section does not include ductwork potentially containing a positive or negative pressure greater than 4”wc (1000 Pa). The design of such ducts shall follow ‘HVAC Duct Construction Standards – Metal and Flexible’ (SMACNA) for ductwork potentially handling up to 10”wc (2500 Pa) positive or negative pressure, or ‘Round Industrial Duct Construction Standards’ (SMACNA) for ductwork potentially handling more than 10”wc (2500 Pa) or positive or negative pressure.

1.2 RELATED SECTIONS

.1 Section 07 84 00 – Firestopping

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment

.4 Section 23 07 13 – Duct Insulation

.5 Section 23 33 33 – Duct-Mounting Access Doors

1.3 REFERENCES

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

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

.2 National Fire Protection Association (NFPA)

.1 NFPA 91 Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids

.2 NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Operations

.3 Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA)

.1 HVAC Duct Construction Standards– Metaland Flexible

.2 Round Industrial Duct Construction Standards

.4 Underwriters Laboratory (ANSI/UL)

.1 UL 181 Standard for Factory-Made Air Ducts and Air Connectors

.2 ANSI/UL 1978 Standard for Grease Ducts

1.4 COORDINATION

.1 The duct layout design is schematic in nature. Relatively small deviations shall be allowed for and implemented based on site conditions and the work of other trades as long as there is no significant change to flow characteristics.

.2 There shall be mutual coordination between the trades in planning and installing their respective work to avoid conflict.

.3 No penetrations through ductwork (pipes, conduit, etc…) are allowed unless explicitly directed by the mechanical engineer.

1.5 DELIVERY AND STORAGE

.1 Ductwork to be installed shall be brought on site in relatively small batches to minimize storage space required.

.2 When storing ductwork, protect from physical damage and environmental conditions (moisture, dust, etc…).

PART 2 - PRODUCTS

2.1 GENERAL INFORMATION

.1 The contractor shall review the fan curve(s) and ensure the maximum potential pressure generated by the fan(s) connected to each duct system will not exceed the pressure handling capability of the ductwork.

.2 Unless otherwise indicated, the following sections of ductwork shall have capability of handling 4”wc (1000 Pa) positive or negative pressure…

.1 Vertical ductwork located within a shaft

.2 Ductwork conveying flammables or combustibles

.3 Supply air ductwork upstream of an airflow restrictor such as a VAV damper

.4 Ductwork indicated to be ‘medium’ pressure

.3 Unless otherwise indicated, all sections of ductwork shall have capability of handling 2”wc (500 Pa) positive or negative pressure.

.4 Upon prior approval, metal ductwork for HVAC supply and return air, and general exhaust air, may be substituted for a factory product meeting UL 181.

2.2 UP TO 2"WC (500 PA) PRESSURE (NOT GREASE-LADEN EXHAUST)

.1 Round Duct

.1 Unless otherwise indicated, use the following...

.2 Spiral seam

.3 Galvanized steel to ASTM A653

.4 Gages

.1 Diameter < 10" (254 mm): 28 gage

.2 Diameter 10" to 13" (254 mm to 330 mm): 26 gage

.3 Diameter 14" to 19" (356 mm to 483 mm): 24 gage

.4 Diameter 20" to 24" (508 mm to 610 mm): 22 gage

.5 Diameter 25" to 36" (635 mm to 914 mm): 20 gage

.6 Diameter 37" to 48" (940 mm to 1219 mm): 18 gage

.2 Rectangle Duct

.1 Unless otherwise indicated, use the following...

.2 Galvanized steel to ASTM A653

.3 2"wc (500 Pa) positive and negative pressure rating

.4 The contractor has options for choosing rectangular ductwork gage, lengths, joint connections, and reinforcement type and spacing depending on the dimensions of the particular duct. The options chosen must be within the parameters found in 'HVAC Duct Construction Standards Metal and Flexible' (SMACNA). If the contractor does not want to choose from appropriate options, the following shall be used by default for all ductwork up to 2"wc (500 Pa) positive or negative pressure...

.1 All ductwork shall be 22 gage.

.2 Longitudinal seams shall be "Pittsburgh" type seams

.3 For duct side dimension up to 14" (356 mm)

.1 Maximum 96" (244 cm) duct section length with T-1 type drive slip joints

.4 For duct side dimension from 14" (356 mm) up to 26" (660 mm)

.1 Maximum 96" (244 cm) duct section length with 1.5" (38 mm) high, 18 gage T-12 type standing 'S' joints

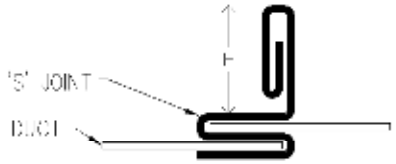
.2 Crossbroken or beaded panel area

.5 For duct side dimension from 26" (660 mm) up to 48" (122 cm)

.1 Maximum 48" (122 cm) duct section length with 1.5" (38 mm) high, 18 gage T-12 type standing 'S' joints

.2 Crossbroken or beaded panel area

T-1 DRIVE SLIP JOINT
SCALE: N.T.S

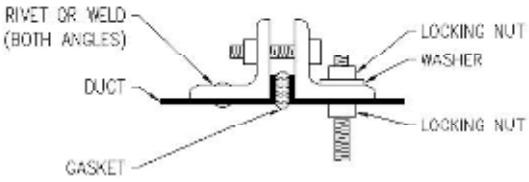


T-12 STANDING 'S' JOINT
SCALE: N.T.S

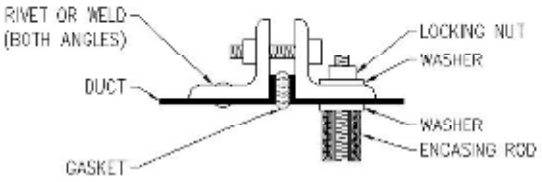
.6 For duct side dimension from 48” (122 cm) up to 96” (244 cm)

.1 Maximum 24” (610 mm) duct section length with T-22 type companion angled and gasketed joints.Duct ends shall be bent up into 3/8” (10 mm) flange with welded corners, sandwiched together by two 1.5”x1.5”x1/4” (38x38x6 mm) angles.Angles shall be welded or riveted to the duct every 12” (305 mm) and connected to each other every 6” (152 mm) with 5/16” (8 mm) bolts and nuts. On one side of each joint, install either a 3/8" (10 mm) internal tie rod (positive pressure duct) or a 1/2" (13 mm) internal tie rod encased in a 1/2” (13 mm) schedule 40 steel pipe (negative pressure duct) through the duct and top and bottom angles at the midpoint location of the duct. At each end of the tie rod, sandwich the duct/angle together using locking nuts inside the duct and outside.

.2 Crossbroken or beaded panel area



T-22 JOINT ('+' PRESS.)
SCALE: NTS



T-22 JOINT ('-' PRESS.)
SCALE: NTS

.3 Fittings

.1 Elbows (round duct)

.1 Elbows shall have a radius 1.5x the duct diameter.

.2 Elbows (rectangle duct)

.1 Supply and exhaust ducts shall be either elbows with turning vanes, or with radius 1.5x the duct dimension being bent.

.2 Return ducts may be a hard elbow when acoustically lined.

.3 Branch take-offs

.1 Shall have a 45 degree lead in for the direction of airflow.

.4 Duct transitions

.1 Maximum 30 degrees from axial when changing duct dimensions, unless otherwise allowed

.4 Internal Tie Rods

.1 For 2”wc (500 Pa) or less ‘positive’ pressure duct only.

.1 Up to 36” long rod: 1/4” (6 mm) galvanized steel with threaded ends and locked nuts

.2 Over 36” long rod: 3/8” (10 mm)galvanized steel with threaded ends and locked nuts

.2 For > 2”wc (500 Pa) ‘positive’, and all ‘negative’ pressure ducts…

.1 As per ‘HVAC Duct Construction Standards Metal and Flexible’ (SMACNA).

.5 Sealant

.1 Water based emulsion or polymer based mastic

.2 Non-flammable, non-combustible

.3 Paintable

.4 UV and mold resistant

.6 Tape

.1 Tape shall not be the primary sealant.

.2 Glass-fiber reinforced

.7 Gasket Material

.1 3/16” x 5/8” (5 mm x 16 mm) tape

.2 Non-hardening, butyl-polymer compound

.3 Hydrophobic

.4 Peel Adhesion: >2.0 PLI (galvanized steel)

PART 3 - EXECUTION

3.1 HVAC SUPPLY AND RETURN AIR AND GENERAL EXHAUST

.1 The contractor and installer shall be qualified to acquire and installappropriate ductwork in accordance with ‘HVAC Duct Construction Standards Metal and Flexible’ (SMACNA). Proof of qualifications shall be available upon request.

.2 For rectangular ductwork, the contractor has installation options depending on the ductwork size. Install using joints and reinforcement within the parameters for the size of duct per ‘HVAC Duct Construction Standards Metal and Flexible’ (SMACNA).

.3 Leave a gap between the duct and structure to avoid vibration/noise transfer.

.4 Unless otherwise indicated, seal all duct connections to ‘Seal Class B’ per ‘HVAC Duct Construction Standards Metal and Flexible’ (SMACNA).

.5 Ensure three (3) feet (1 meter) of straight duct prior to volume-control dampers, and coils.

.6 Make space allowances for insulation and access doors.

.7 Dimensions indicated on drawings refer to the open, internal area of a duct cross-section. The actual duct size will be bigger if there is internal insulation.

.8 Shower room exhaust ductwork or where directly exposed to moisture (Washbay): one gauge lighter than listed above constructed of 316 stainless steel.Use stainless steel screws on any fastenings and stainless steel hangers.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives requirements for the following types of HVAC and general exhaust air duct dampers:

- .1 Motorized Dampers
- .2 Manual Intake or Gravity Backdraft Dampers
- .3 Manual Volume Control Dampers
- .4 Fire, Smoke, and Fire-Smoke Dampers

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

.3 Section 07 84 00 – Firestopping

.4 Section 23 05 00 – Common Work Results for HVAC

.5 Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC

.6 Section 23 09 13 – Instrumentation and Control Devices for HVAC

.7 Section 23 09 93 – Sequence of Operations for HVAC Controls

.8 Section 23 31 13 – Metal Ducts

.9 Section 23 33 33 – Duct-Mounting Access Doors

1.3 REFERENCES

.1 Air Movement and Control Association International, Inc (AMCA)

- .1 ANSI/AMCA 500-D Laboratory Methods of Testing Dampers for Rating

.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

- .1 Fire, Smoke, and Radiation Damper Installation Guide for HVAC Systems
- .2 HVAC Duct Construction Standards

.3 Underwriters Laboratories (UL)

- .1 UL 33 Standard for Heat Responsive Links for Fire-Protection Service
- .2 UL 555 Standard for Fire Dampers
- .3 UL 555S Standard for Smoke Dampers

.4 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S112 Standard Method of Fire Test of Fire Damper Assemblies

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 Each fire damper and fire-smoke damper installation type shall be submitted as a shop drawing from the damper manufacturer or firestopping supplier showing damper type, sleeve, and bracket installation details.

.3 Submissions Prior to Certification:

.1 Submit to the mechanical engineer the Fire Damper Verification report for review.

.4 Closeout Submittals:

.1 Provide per Section 01 78 00 - Closeout Submittals.

.2 Include the Fire Damper Verification report within the Operation and Maintenance (O&M) Manual upon certification.

PART 2 - PRODUCTS

2.1 MOTORIZED DAMPERS

.1 Damper testing and resultant ratings shall be per ANSI/AMCA 500-D.

.2 Damper actuators shall be supplied and installed with the damper under the mechanical contractor's scope of work.

.3 Damper actuators shall be located out of the airstream unless approved by the mechanical engineer.

.4 General Use Dampers (Outside or Unconditioned Air):

.1 Frame: 0.08" (2 mm) aluminum, or stainless steel; thermally insulated and thermally broken frames and blades.

.2 Blades: Internally insulated aluminum

.3 Axle shaft: Steel, or stainless steel

.4 Pivots: Steel ball bearings, or polycarbonate / acetal copolymer bearings

.5 Actuator: Direct-coupled, electric

.1 Refer to drawings, schedules, and sections'23 09 13 Instrumentation and Control Devices for HVAC' and '23 09 93 Sequence of Operations for HVAC Controls' for additional actuator requirements (i.e. NEMA rating, control type, feedback signal, fail-safe position).

.6 Air Velocity Rating: At least 2000 fpm (10.2 m/s)

.7 Pressure Rating: 2”wc (500 Pa)

.8 Leakage at Pressure Rating: 3 cfm per sq.ft. of damper at 1”wc (250 Pa)

.9 Rated for operation down to -40F.

.10 Relief damper to have vertical blade orientation, with actuator and damper shaft at bottom of damper section.

.11 To Tamco 9000BF, Greenheck ICD, or equal.

.5 General Use Dampers (Conditioned Air):

.1 Frame: Galvanized steel, or stainless steel

.2 Blades: Aluminum, or stainless steel

.3 Axle shaft: Steel, or stainless steel

.4 Pivots: Steel ball bearings, nylon, or brass

.5 Actuator: Direct-coupled, electric

.1 Refer to drawings, schedules, and sections ‘23 09 13 Instrumentation and Control Devices for HVAC’ and ‘23 09 93 Sequence of Operations for HVAC Controls’ for additional actuator requirements (i.e. NEMA rating, control type, feedback signal, fail-safe position).

.6 Air Velocity Rating: At least 2000 fpm (10.2 m/s)

.7 Pressure Rating: 2”wc (500 Pa)

.8 Leakage at Pressure Rating: 2% or less

2.2 MANUAL INTAKE OR GRAVITY BACKDRAFT DAMPERS

.1 This section refers to standalone duct dampers. Dampers included within a piece of equipment (i.e. ceiling mount exhaust fan) shall be outside of this specification section and deemed acceptable if the equipment shop drawing is acceptable.

.2 Gravity backdraft dampers shall have either adjustable weight or spring operated blades.

.3 Unless otherwise noted, the material shall be the following...

.1 Frame: Galvanized steel, or stainless steel

.2 Blades: Aluminum, or stainless steel

.3 Axle shaft: Steel, or stainless steel

.4 Pivots: Steel ball bearings, nylon, or brass.

.4 Damper shall start to open at a differential pressure less than 0.05”wc (12.4 Pa) and have adjustment capability.

.5 Damper shall withstand at least 2”wc (500 Pa) back pressure.

.6 Unless otherwise noted, dampers shall be rated for at least 2000 fpm (10.2 m/s) air speed.

.7 Damper shall be rated to operate in the orientation installed.

2.3 MANUAL VOLUME CONTROL DAMPERS

.1 Maximum duct leakage rates shall be adhered to. Axle penetration point shall be suitable sealed to meet the sealing classification required of the attached ductwork.

.2 Axis of blade rotation shall be supported at two opposing points in housing with either a bearing or synthetic (nylon or similar) bushing.

.3 For round ducts:

.1 Damper shall be a single blade damper incorporating a locking mechanism to hold the damper in a fixed, readable quadrant position.

.2 Housing/duct material shall be 20 gauge or thicker galvanized steel; damper blade material shall be 18 gauge or thicker galvanized steel.

.3 Damper axle shall be continuous on ducts…

.1 12” (305 mm) diameter or greater, or

.2 Ducts conveying air at a static pressure of 2”wc (500 Pa) or greater.

.4 For rectangle ducts:

.1 For ducts 12” (305 mm) or less in height (meaning 6” (150 mm) on either side of the axis of rotation),

.1 The damper shall be a single blade damper incorporating a locking mechanism to hold the blade in a fixed, readable quadrant position.

.2 For ducts greater than 12” (305 mm) in height (meaning 6” (150 mm) on either side of the axis of rotation),

.1 The damper shall be a multi-blade damper with opposed orientation blades incorporating a locking mechanism to hold the blades in a fixed, readable quadrant position.

.3 Housing/duct material shall be 18 gauge or thicker galvanized steel; damper blade material shall be 16 gauge or thicker galvanized steel.

.4 Damper blade axle shall be continuous on ducts…

.1 Wider than 19” (480 mm) parallel to the axis of rotation, or

.2 Ducts conveying air at a static pressure of 2”wc (500 Pa) or greater.

2.4 FIRE, SMOKE, AND FIRE-SMOKE DAMPERS

.1 Fire Dampers

.1 Damper meets UL 555 and ULC S112

.2 Fusible link meeting UL 33, activation at 165 F (74 C)

.3 Sleeve: 14 gauge steel, or as permitted by UL 555

.4 For dampers NOT connected to a duct at the separation (i.e. transfer air opening)…

.1 Static damper

.5 For dampers connected to a duct (on either side or both sides of the separation)...

.1 Dynamic damper

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

.1 Installer qualified in performing work in this section shall have at least five (5) years successful experience in similar installations.

.2 Damper installers must be current members of SMACNA, have received adequate training, and are proven competent in understanding ductwork and duct accessory installation methods.

3.2 GENERAL INSTALLATION

.1 Follow damper manufacturer installation instructions.

3.3 SPECIFIC INSTALLATION – MOTORIZED DAMPERS

.1 Mechanical contractor shall provide a low voltage transformer to power the actuator if required. Coordinate with electrical contractor to provide line voltage, and include all associated costs.

3.4 SPECIFIC INSTALLATION – MANUAL INTAKE OR GRAVITY BACKDRAFT DAMPERS

.1 The maximum size of duct or opening using a gravity backdraft damper is 124 sq.in. (0.08 m2). Larger ducts or openings require a motorized damper.

3.5 SPECIFIC INSTALLATION – MANUAL VOLUME CONTROL DAMPERS

.1 Install in an accessible location where the damper position can be read.

3.6 SPECIFIC INSTALLATION – FIRE, SMOKE, AND FIRE-SMOKE DAMPERS

.1 Review architectural wall ratings and locations of smoke separations prior to duct installation.

.2 The installation shall follow the instructions provided by the damper manufacturer with no changes.

.3 Fire Dampers:

.1 Required for any duct completely penetrating a fire rated wall with a fire resistance rating

.2 Required for any duct terminating at a fire rated wall

.3 Required for any non-ducted air flow (transfer) opening within a fire rated wall

.4 Air gap between the sleeve and the rough opening shall be between 1/4” (6 mm) and 1.5” (38 mm). For round dampers, the rough opening shall be 7/8” (22 mm) larger than the outside diameter of the damper.

3.7 PERFORMANCE VERIFICATION

.1 Upon completion of a damper installation, test for full range of easy, unencumbered motion.

.2 For actuators, verify correct position based on input signal.

.3 Fire and smoke damper installation shall be verified by an agency or person certified by the Associated Air Balance Council (AABC). Their report shall be submitted.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes requirements for turning vanes and rails required for mitered elbows in square/rectangular ducts conveying air.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 HVAC Duct Construction Standards – Metal and Flexible

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 Upon request, submit the manufacturer's printed datasheet showing which vane and rail system is used at each location.

.3 Quality Assurance:

.1 Upon request, provide proof of vane and rail material type and thickness and installation method.

PART 2 - PRODUCTS

2.1 FOR AIR VELOCITY 1000 FPM (5.1 M/S) OR LESS

.1 Unless otherwise indicated on construction drawings, turning vanes are not required in mitered elbows conveying air with a velocity of 1000 fpm (5.1 m/s) or less.

.2 When required, rails and vanes shall conform to the requirements specified for air velocities between 1000 fpm (5.1 m/s) and 2500 fpm (12.7 m/s).

2.2 FOR AIR VELOCITY BETWEEN 1000 FPM (5.1 M/S) AND 2500 FPM (12.7 M/S)

.1 Vanes:

.1 Single wall type

.2 Material to match rail and duct

.1 22 gauge galvanized steel, or

.2 22 gauge stainless steel, or

.3 22 gauge aluminum

.3 4.5” +/- 0.5” (114 mm +/- 13 mm) radius

.4 36” (914 mm) maximum length of each vane without requiring tie rod support bracing

.1 Vanes over 36” (914 mm) long shall be braced with a tie rod every 24” (610 mm) or less. The tie rod(s) shall be parallel to the supporting rails and travel through each vane. Tie rod(s) shall be welded, or otherwise securely fastened per the engineer’s approval, to the ductwork at each end.

.2 Rails:

.1 Material to match vanes and duct

.1 22 gauge galvanized steel, or

.2 22 gauge stainless steel, or

.3 22 gauge aluminum

.2 3.25” +/- 0.25” (83 mm +/- 6 mm) spacing between vanes

.3 Rail shall allow for vane attachment such that leading and training tangents of vane are parallel to the ductwork/airflow.

.3 Metal-Bonding Adhesive:

.1 Two-part acrylic, suitable for bonding aluminum, stainless steel, and galvanized steel in structural applications

.2 Suitable products:

.1 3M Scotch-Weld Metal Bonder Acrylic Adhesive DP8407NS

.2 Loctite H8600 Structural Adhesive

.3 SikaFast 3121

2.3 FOR AIR VELOCITY OVER 2500 FPM (12.7 M/S)

.1 Vanes:

.1 Double wall type

.2 Material to match rail and duct

.1 22 gauge galvanized steel, or

.2 22 gauge stainless steel, or

.3 22 gauge aluminum

.3 4.5” +/- 0.5” (114 mm +/- 13 mm) radius

.4 72” (1.8 m) maximum length of each vane without requiring tie rod support bracing

.1 Vanes over 72” (1.8 m) long shall be braced with a tie rod every 48” (1.2 m) or less. The tie rod(s) shall be parallel to the supporting rails and travel through each vane. Tie rod(s) shall be welded, or otherwise securely fastened per the engineer’s approval, to the ductwork at each end.

.2 Rails:

.1 Material to match vanes and duct

.1 22 gauge galvanized steel, or

.2 22 gauge stainless steel, or

.3 22 gauge aluminum

.2 3.25” +/- 0.25” (83 mm +/- 6 mm) spacing between vanes

.3 Rail shall allow for vane attachment such that leading and training tangents of vane are parallel to the ductwork/airflow.

.3 Metal-Bonding Adhesive:

.1 Two-part acrylic, suitable for bonding aluminum, stainless steel, and galvanized steel in structural applications

.2 Suitable products:

.1 3M Scotch-Weld Metal Bonder Acrylic Adhesive DP8407NS

.2 Loctite H8600 Structural Adhesive

.3 SikaFast 3121

PART 3 - EXECUTION

3.1 INTENT

.1 The turning vanes shall change the direction of the air through a mitered elbow such that the static pressure drop does not exceed 0.1”wc (25 Pa) and there is no noise from metal-to-metal contact during operation.

3.2 INSTALLATION

.1 Installers shall be knowledgeable in SMACNA's HVAC Duct Construction Standards – Metal and Flexible. It may be referred to; however, the requirements in this specification shall be adhered to.

.2 Vane to Rail Fastening:

.1 Suitable methods:

.1 Welded

.2 Pressure fit, snap-in, or crimped fastening methods are suitable only when used in conjunction with a metal-bonding adhesive.

.3 Rail to Duct Fastening:

.1 If the duct elbow includes an acoustic liner, the rails shall be fastened to the metal duct with a minimum of three (3) screws per rail located 12" (300 mm) on center. The acoustic liner shall be sandwiched between the duct and the rail.

.2 If the duct elbow does not include an acoustic liner, the rails shall be fastened directly to the metal duct using a metal-bonding adhesive, plus a minimum of three (3) screws or rivets per rail located 12" (300 mm) on center.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes access doors for metal ducts specified in Section 23 31 13 Metal Ducts.

.2 This section does not include access doors required in walls, floors, enclosures, etc...

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 31 13 – Metal Ducts

.4 Section 23 33 13 – Dampers

1.3 REFERENCES

.1 National Fire Protection Agency (NFPA)

- .1 NFPA 91 Exhaust Systems for Air Conveying Vapors, Gases, Mists, and Noncombustible Particulate Solids
- .2 NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Operations

.2 Underwriters Laboratories of Canada (ULC)

- .1 Current listing directory

PART 2 - PRODUCTS

2.1 FOR USE IN METAL HVAC DUCTS

.1 Material: same as duct

.2 Rated for maximum static pressure within the duct

.3 Piano style hinge and hand operated, self-tightening cam latch

.4 Closed cell neoprene gasket between frame and duct, and door and frame.

.5 Door shall be insulated.

.6 For secure or vandal resistant applications, cylinder lock and key shall be used.

PART 3 - EXECUTION

3.1 INTENT

.1 Access doors in ducts are required wherever a maintenance item needs to be accessed (i.e. fire damper). Locate upstream and downstream of all duct mounted heating coils.

.2 Access doors are required wherever the duct may be subject to an accumulation of medium or deposits.

3.2 INSTALLATION (GENERAL)

.1 Follow manufacturer’s instructions.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section gives requirements for flexible duct connectors for HVAC air supply and return ducts, and general exhaust ducts, including laboratory exhaust.

.2 The design intent is to provide a flexible duct connector between every vibration causing device (i.e. fan, air handler), and the associated ductwork for the purpose of minimizing vibration and noise transfer.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 HVAC Duct Construction Standards

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102 Surface Burning Characteristics of Building Materials and Assemblies

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 Upon request, submit the manufacturer's printed datasheet showing which flexible connector type is used at each location.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR ALL PRODUCTS

.1 Flexible connectors shall consist only of material suitable for the air exposed to it.

Request more information if unclear on construction documents.

.2 Meets CAN/ULC S102:

.1 Maximum flame spread rating: 25

.2 Maximum smoke development rating: 50.

2.2 FABRIC FLEXIBLE CONNECTORS

.1 Pressure Rating: minimum 10”wc positive and 10”wc negative

.2 Metal Duct Connection Material: galvanized steel, or stainless steel

.3 Fabric and Joint Seal: air and water tight

.4 Fabric Width: minimum 4”; maximum 10”

.5 Fabric Material:

.1 Base fabric:

.1 Nylon, polyester, or fiberglass (including blends)

.2 Coating:

.1 Neoprene (not for acidic, or chlorinated air)

.2 Vinyl (not for strong acidic air or air containing alcohols)

.3 Silicone (not for acidic air or air containing alcohols)

.4 Hypalon (not for steam, or chlorinated air, or air containing disodium phosphate)

.5 Teflon

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

.1 Installer qualified in performing work in this section shall have at least five (5) years successful experience in similar installations.

.2 Flexible connector installers must be current members of SMACNA, have received adequate training, and are proven competent in understanding ductwork and duct accessory installation methods.

3.2 GENERAL INSTALLATION

.1 Follow manufacturer installation instructions.

.2 Seal seams (fold over sealant and staple) per SMACNA HVAC Duct Construction Standards.

3.3 SPECIFIC ENVIRONMENT INSTALLATION

.1 Installer shall review the air contaminants being conveyed in the duct, and the surrounding air prior to ordering and installing suitable flexible connectors. Request more information if unclear on construction documents.

.2 For outdoor, exposed applications, use Hypalon coated material.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section provides requirements for short length flexible ducts used in HVAC supply systems.

.2 This section does not include fabric supply distribution ducts, specialized flexible exhaust ducts (i.e. vehicle tailpipe hose), or flexible connectors used for vibration isolation.

1.2 RELATED SECTIONS

.1 Section 01 33 00 –Submittal Procedures

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 07 13 – Duct Insulation

.4 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 Underwriters Laboratories (UL)

.1 UL 181 Standard for Factory-Made Air Ducts and Air Connectors

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S102Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 CAN/ULC S102.2Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

.3 National Energy Code of Canada for Buildings (NECB)

1.4 SUBMITTALS

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

.2 Manufacturers Datasheet:

.1 Submit manufacturer's printed product datasheet. Clearly identify products used on this job. Include product characteristics, performance criteria, limitations, and standards met (i.e. CAN/ULC S102).

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC S102 or CAN/ULC S102.2:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 FLEXIBLE DUCT

.1 Duct shall be Class 0 or 1 per UL 181.

.2 Flexible ducts shall be insulated when required by the NECB or indicated on the construction drawings. Insulation shall comply with requirements in section 23 07 13 – Duct Insulation.

.3 Material:

.1 Coated, woven fiberglass fabric supported by coated spring-steel wire.

.4 Pressure Rating:

.1 10”wc (2500 Pa) positive

.5 Air Velocity Capability:

.1 5000 fpm (25.4 m/s)

.6 Temperature Range:

.1 -20 F to 200 F (-29 C to 93 C)

PART 3 - EXECUTION

3.1 INTENT

.1 Wherever practical and possible, use metal ductwork. Flexible ducts introduce a larger pressure drop and more turbulent flow into the system than metal ducting which affects performance and efficiency. Therefore, the use of flexible ducts shall be limited. Flexible ducts may only be used when an offset adjustment is required between the metal ductwork and a termination device such as a ceiling diffuser. Any other application of flexible ductwork requires approval of the mechanical engineer prior to installation.

3.2 RESTRICTIONS

.1 Flexible duct shall not be used outside, and shall not be used for conveying outside air.

.2 Flexible duct shall not used on within 10’ (3 m) of ductwork penetrating, or terminating through, the building thermal envelope.

.3 Lengths of flexible duct shall be limited to no more than 3' (1 m) per termination device (i.e. diffuser or grille). Installation shall be as short as possible to accomplish the intent.

.4 Flexible ducts shall not be used to form elbows.

3.3 INSTALLATION

.1 The installation of flexible duct shall be as short as possible, and not have any kinks, sags, or tight radii bends. If the installation is deemed to be in violation of this somewhat subjective requirement in the opinion of the installation inspector (mechanical engineer or engineer's representative), the contractor shall be responsible for correcting prior to receiving installation certification.

.2 Connection to metal ducts shall be made with metal bands or clamps. Between 2" and 4" (50 mm and 100 mm) of duct overlap is required.

.3 Do not install any ports or flow devices (balancing dampers, pressure pitot tubes, etc…) in flexible duct. Install ports or devices in rigid ductwork only.

.4 Any exposed flexible duct shall be protected from UV light.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This section includes guidance on internally applied acoustic insulation for ductwork and plenums conveying HVAC air between -40 F (-40 C) and 122 F (50 C), and under 4000 fpm (20 m/s).

.2 Although the products of this section shall include some thermal insulating properties, the use of duct liners shall be for the purpose of insulating ductwork acoustically only.

1.2 RELATED SECTIONS

.1 Section 01 33 00 –Submittal Procedures

.2 Section 23 05 00 – Common Work Results for HVAC

.3 Section 23 31 13 – Metal Ducts

1.3 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings

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

.1 ASTM C209 Standard Test Methods for Cellulosic Fiber Insulating Board

.2 ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)

.3 ASTM C1104 Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation

.4 ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings

.5 ASTM C1534Standard Specification for Flexible Polymeric Foam Sheet Insulation Used as a Thermal and Sound Absorbing Liner for Duct Systems

.6 ASTM C1617 Standard Practice for Quantitative Accelerated Laboratory Evaluation of Extraction Solutions Containing Ions Leached from Thermal Insulation on Aqueous Corrosion of Metals

.3 Thermal Insulation Association of Canada (TIAC)

.1 Best Practices Guide

.4 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102 Surface Burning Characteristics of Building Materials and Assemblies

.5 National Building Code (NBC)

.6 National Energy Code of Canada for Buildings (NECB)

1.4 DEFINITIONS

.1 For purposes of this section:

.1 “FACING” – a protective layer around the outside of the insulation, for the purpose of vapour retardation, minimizing microbial growth, and protecting from physical contact.

.2 “MINERAL FIBER” - includes glass fiber, rock wool, or slag wool.

.3 “PLENUM” – an enclosed region where specific air (supply, return, or exhaust) is transferred between source point(s) and termination point(s) not bound entirely by a metal duct, but does have a rigid structure outside of the insulation itself.

1.5 SUBMITTALS

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

.2 Manufacturers Datasheet:

.1 Upon request, submit manufacturer's printed product datasheet. Clearly identify products used on this job. Include product characteristics, performance criteria, limitations, and standards met (i.e. CAN/ULC S102).

.3 Quality Assurance:

.1 Upon request, submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Has currentcertifications required in performing work of this Section

.2 Has at least five(5) years successful experience in this size and type of project

.3 Is qualified to understand, and experienced with, the TIAC Best Practices Guide.

.2 Supplier:

.1 Has at least five(5) years successful experience in this size and type of project

.2 Must be a company specializing in work of this Section.

.3 Must be available and competent to give installation support to the installer.

.3 Manufacturer:

.1 Must be a company specializing in work of this Section.

.2 Must be listed in the relevant section of the TIAC Best Practices Guide.

.3 Must be available and dedicated to providing installation support for their product.

PART 2 - PRODUCTS

2.1 FIRE AND SMOKE RATING (ALL PRODUCTS)

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Insulated duct panels (panels that form the entire duct without a metal duct or plenum structure included) are not allowed unless the project mechanical engineer gives formal approval for a specific application area, either through specific indication on the construction documents or upon request by the contractor.

.2 Use only closed cell elastomeric insulation when required within 8’ (2.4 m) downstream of a cooling coil or humidifier dispersion tube. Do not use inorganic mineral fiber.

.3 Duct Acoustic Insulation:

.1 Inorganic mineral fiber with mat facing meeting ASTM C1071 Type 1:

.1 Material (unless otherwise indicated): density 2.0 PCF, 1” thick

.2 Corrosion rate: less than that of 1 PPM chloride solution per ASTM C1617

.3 Water vapor sorption:less than 3% per ASTM C1104

.4 Microbial growth:does not promote per ASTM C1338

.2 Closed cell elastomeric foam to ASTM C1534:

.1 Material (unless otherwise indicated): 1” thick

.2 Water vapor sorption less than 0.2% per ASTM C209

.3 Microbial growth meeting ASTM C1338

.4 Plenum Acoustic Insulation:

.1 Inorganic mineral fiber with mat facing meeting ASTM C1071 Type 2:

.1 Material (unless otherwise indicated): density 3.0 PCF, 2” thick

.2 Corrosion rate: less than that of 1 PPM chloride solution per ASTM C1617

.3 Water vapor sorption:less than 5% per ASTM C1104

.4 Microbial growth:does not promote per ASTM C1338

.2 Closed cell elastomeric foam to ASTM C1534:

.1 Material (unless otherwise indicated): 1” thick

.2 Water vapor sorption less than 0.2% per ASTM C209

.3 Microbial growth meeting ASTM C1338

2.3 INSULATION SECUREMENTS

.1 “Peel and stick” integral insulation adhesive by the insulation manufacturer

.2 Quick setting contact adhesive by the insulation manufacturer

.3 Mechanical pins with 0.75 sq.in. (480 mm2) area, 10 mil (0.25 mm) thick head.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Surfacesshall be clean, dry, and free from foreign material.

.2 Review manufacturer installation documentation prior to installation.

3.2 INSTALLATION

.1 Do not include both acoustic duct liner and external thermal insulation on the same duct section unless specifically stated to use both by the mechanical engineer. Only external duct insulation shall be used when both functions are required by the design.

.2 Unless approved otherwise by the mechanical engineer, use only closed cell elastomeric insulation within 8’ (2.4 m) downstream of a cooling coil or humidifier dispersion tube when acoustic insulation is required. Do not install mineral fiber insulation.

.3 Acoustic insulation shall be used on ductwork connected to…

.1 Air handlers (including rooftop units),

.2 Other ducts indicated by the design.

.4 Unless otherwise indicated, acoustic insulation shall be applied to ductwork from the point of noise generation to a point at least 10’ (3 m) away and include at least one elbow.

.5 Refer to the TIAC Best Practices Guide to install to the codes specified.

.1 For duct acoustic insulation, install per TIAC code CIF/1.

.1 Exception: Mechanical fasteners shall not be used with closed cell elastomeric insulation.

.2 For plenum acoustic insulation, install per TIAC code CIR/1.

.1 Exception: Mechanical fasteners shall not be used with closed cell elastomeric insulation.

3.3 INSTALLATION (RECOMMENDATIONS)

.1 Acoustic insulation works well to mitigate sound when sound waves hit the insulation face directly on, rather than travelling parallel to the surface. Therefore, it is good practice to include insulated elbows rather than only straight runs of duct away from the point of noise generation.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Friction Piles:

.1 Provide Lump sum price for the foundation work in accordance with the structural drawings.

1.2 REFERENCES

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

.1 ASTM A36/A36M-05, Standard Specification for Carbon Structural Steel.

.2 ASTM A53/A53M-05, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.2 American Welding Society (AWS)

.1 AWS D1.4/D1.4M-05, Structural Welding Code - Reinforcing Steel.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-04(July 2005), Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-G30.18-M92(2002), Billet Steel Bars for Concrete Reinforcement.

.3 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.

.5 CSA W48-01(R2006), Filler Metals and Allied Materials for Metal Arc Welding.

1.3 EXISTING CONDITIONS

.1 Sub-surface investigation report has been included as part of this specification. Contractor is to review the report and become familiar with the subsurface conditions.

.2 Notify Contract Administrator in writing if subsurface conditions at site differ from those indicated and await further instructions from Geotechnical Engineer.

1.4 SUBMITTALS

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

.2 Shop Drawings:

.1 Indicate: size of pile, reinforcing steel and ties.

.3 Pile Installation:

.1 Provide pile installation sequence for review of the Contract Administrator at least two weeks in advance of pile installation.

Part 2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.2 Reinforcing steel: to CAN/CSA-G30.18 and in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Steel casing: As required and designed by installer.

.4 Grout: in accordance with Section 03 30 00 - Cast-in-Place Concrete.

2.2 SOURCE QUALITY CONTROL

.1 Mill report to CAN/CSA-S16.

.2 Concrete tests: to CSA-A23.1/A23.2.

Part 3 Execution

3.1 INSTALLATION

.1 Friction Piles:

.1 Bore holes to diameters and lengths as indicated. The tips of the piles should not penetrate the glacial till.

.2 Install within 50mm of exact centres set out, 2% of vertical plumb and 25mm of required elevation. Correction of deviations beyond those defined to be at the discretion of the Contract Administrator, costs for correction are to be borne by the Contractor.

.3 Remove loose material, foreign matter and water as directed by geotechnical engineer.

.4 Vibrate top 4500mm of each pile.

.2 Protective steel casing:

.1 Install casing as required. Cost of casing shall be included in lump sum for foundation work.

.3 Remove stones up to 300mm in dimension, boulders over 300mm and rock in whole or in part before boring tool is deflected. If required, lower boring tool and clean hole to ensure that machine auger has reached the required depth.

.4 Dispose of excavated materials off site.

.5 Install steel reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing and as indicated.

.6 Fill pile excavations with concrete to elevations as indicated.

.1 Place concrete in one continuous pour in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.7 Steel protective casing may be removed at option of Contractor.

.8 Where steel protective casing is to be removed, provide concrete with minimum slump of 125 mm and with retarder to prevent arching or setting of concrete.

.1 Withdraw casing in conjunction with concrete placing, keeping bottom of casing below level of concrete.

.9 Where steel protective casing is left in place, fill void space between casing and shaft excavation with concrete.

.10 Use tremie pipe or concrete pumping as required. Costs of tremied concrete shall be included in the lump sum for the foundation work.

3.2 PROTECTION

.1 If superimposed work is to be placed later, protect top of each unit with at least 150mm of damp sand.

3.3 DEFECTIVE PILES

.1 Cased concrete shaft piles rejected where:

.1 Soil has entered casing.

.2 Water has entered casing.

.3 Casing is damaged, out of tolerance or alignment.

.2 Defective Friction Piles:

.1 Leave rejected pile in place, place adjacent pile and modify pile cap as directed in writing by Contract Administrator.

.2 No extra compensation will be made for additional piles and other costs due to installation of damaged or defective piles.

3.4 SAFETY

.1 Conform to the latest regulations of the Provincial Building Protection Act and Provincial Building Code and provide all necessary safety equipment required.

3.5 FIELD QUALITY CONTROL

.1 Independent review of friction piling and caisson operations shall be done by an independent inspection and testing agency and paid for by the contractor.

.2 Maintain accurate records for each pile installation, including:

.1 Pile size and length, location of pile.

.2 Location.

.3 Top of Pile Elevation.

.4 Bearing Condition.

.5 Bearing Capacity.

.6 Presence of Water.

.7 Other pertinent information.

.3 Provide Contract Administrator with three copies of records.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 62 00- Sheet Metal Flashing and Trim

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C136-13 , Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C979/C979M-10 , Standard Specification for Pigments for Integrally Colored Concrete.

.2 CSA Group

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

.2 CAN/CSA-A179-04(R2009) , Mortar and Grout for Unit Masonry.

.3 CSA A231.1/A231.2-06(R2010) , Precast Concrete Paving Slabs/Precast Concrete Pavers.

.4 CSA A283-06(R2011) , Qualification Code for Concrete Testing Laboratories.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Indicate on drawings layout, pattern and relationship of paving joints to fixtures and project formed details.

.4 Samples:

.1 Submit full size sample of each type and size of pavers.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in precast concrete paver installations with 5 years documented experience.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

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

.2 Store and protect precast concrete units and splashpads from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONCRETE PAVERS

.1 Concrete pavers: to CSA A23.1/A23.2 and as follows:

.1 Standard of Acceptance: Holland Stone, Manufactured by Expocrete or approved equal.

.2 Size: 4” x 8” x 2.4” and 8” x 8” x 2.4”.

.3 Shape: Rectangular and Square.

.4 Colour: Contract Administrator to select colour from manufacturers full range of colours.

.5 Laying Pattern: Pattern 31 – Running bond with Soldier.

.2 Manufactured in moulds, with spacers, suitable for installation and delivered on site in cubes of laying panels.

.3 Pigment in concrete pavers: to ASTM C979/C979M.

2.2 BEDDING AND JOINT MATERIAL

.1 Bedding: Refer to Drawings

.1 Compacted granular base, in accordance with Manufacturer’s Instructions and Civil.

.2 Joint material: in accordance with Manufacturer’s Instructions.

2.3 EDGE RESTRAINTS

.1 Edge restraints shall be plastic.

.1 PVC or medium density polyethylene, industrial and flexible type edging, manufactured for use in paver installation, complete with connectors and pre-manufactured anchoring locations for spikes.

.2 Anchoring: install in accordance with manufacturer’s instructions.

.3 Standard of Acceptance: Snap Edge, Manufactured by Expocrete or approved equal.

2.4 CLEANING COMPOUND

.1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.

.2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

2.5 SPLASHPADS

.1 Precast Concrete Splashpads at locations shown on drawings:

.1 12” wide x 30” long x 2.5” high

.2 Standard of Acceptance: 30” Natural (Item No. 105604), manufactured by Barkman or approved equal.

Part 3 Execution

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: comply with manufacturer’s written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION OF EDGE RESTRAINTS

.1 Install restraints true to grade, in accordance with manufacturer's recommendations.

3.3 PLACING OF BEDDING MATERIAL

.1 Ensure bedding material is not saturated or frozen at all times until installation is complete.

.2 Spread and screed material on structural surface to achieve 25 mm compacted thickness after vibrating pavers in place. Do not use joint sand for bedding sand.

.3 Do not disturb screeded material. Do not use bedding material to fill depressions in structural surface.

3.4 INSTALLATION OF CONCRETE PAVERS

.1 Lay pavers to patterns indicated. Joints between pavers: as recommended by manufacturer

.2 Use appropriate end, edge and corner stones. Saw cut pavers to fit around obstructions and at abutting structures.

.3 Use a low amplitude, high frequency plate compactor capable of at least 22 kN centrifugal compaction force to vibrate pavers into bedding sand.

.4 Inspect, remove, and replace chipped, broken and damaged pavers.

.5 Sweep dry joint sand material into joints.

.6 Settle sand by vibrating pavers with plate compactor.

.7 Continue application of joint material and vibrating of pavers until joints are full. Do not vibrate within 1 m of unrestrained edges of pavers.

.8 Sweep off excess joint material when installation is complete.

.9 Final surface elevations not to exceed plus or minus 10 mm under 3 m long straightedge.

.10 Ensure conformance of final elevations.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

END OF SECTION

Part 1 General

1.1 REFERENCE

.1 City of Winnipeg Specification CW3550 – Chain Link and Drift Control Fence.

.2 ASTM International

.1 ASTM A53/A53M-10 , Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A90/A90M-09 , Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

.3 ASTM A121-07 , Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

.4 A653/A653M-10 , Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM C618-08a , Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.6 ASTM F1664-08 , Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.7 ASTM A123/A123M-09 , Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-138.1-96 , Fabric for Chain Link Fence.

.2 CAN/CGSB-138.2-96 , Steel Framework for Chain Link Fence.

.3 CAN/CGSB-138.3-96 , Installation of Chain Link Fence.

.4 CAN/CGSB-138.4-96 , Gates for Chain Link Fence.

.5 CAN/CGSB-1.181-99 , Ready-Mixed Organic Zinc-Rich Coating.

.4 CSA Group (CSA)

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

.2 CAN/CSA-A3000-08 , Cementitious Materials Compendium.

.5 Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition .

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Contractor shall supply shop drawings of all Interior and Exterior fences, posts gates and related elements to be supplied prior to manufacture for the Contract Administrators's approval.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00- Common Product Requirements.

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect fence and gate materials from damage .

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: in accordance with CSA A23.1

.1 Nominal coarse aggregate size: 20-5 .

.2 Compressive strength: 20 MPa minimum at 28 days.

.2 Chain-link fence fabric: to CAN/CGSB-138.1 .

.1 Height of fabric: as indicated.

.3 Terminal Posts: to CAN/CGSB-138.2 , galvanized steel pipe.

.1 Exterior Fence Height: 3050 mm

.2 Pipe Dia. (outside): 88.9mm

.3 Pipe Length: 4420mm

.4 Dia. & Depth of Concrete Pile: 300 x 1800mm

.4 Line Posts: to CAN/CGSB-138.2 , galvanized steel pipe.

.1 Standard seamless, continuous weld, schedule 40 hot dip galvanized steel pipe weighing 5.43 kg per lineal metre. Tubing, conduit or open seam pipe will not be accepted. Line posts shall be suppied with weatherproof eye top caps to accommodate continuous horizontal top rail.

.1 Fence Height: 3050 mm

.2 Pipe Dia. (outside): 60.3

.3 Pipe Length: 4420

.4 Dia. & Depth of Concrete Pile: 250 x 1800mm

.5 Top and Bottom Rails to CAN/CGSB-138.2 , galvanized steel pipe.

.1 Top rails, or bottom rails where specified, shall be standard continuous weld, schedule 40 hot dip galvanized steel pipe weighing 3.38 kg per lineal metre.

Tope rails shall be 6700 mm in length and have an outside diameter of not less than 43mm

.6 Top and Bottom Rail Sleeve Couplings.

.1 Top and bottom rail sleeve couplings shall be schedule 40, hot dip galvanized steel pipe, 171 mm long and 45 mm inside diameter to accommodate a 43 mm outside diameter top rail and manufactured specifically as a top/bottom rail sleeve coupling for chain link fence.

.7 Fabric.

.1 Fabric shall be No. 9 gauge steel wire woven into a uniform 50 mm diamond pattern mesh or as specified. Size of mesh shall be determined by measuring the minimum clear distance between the wires forming the parallel sides of the mesh. Permissible variation in size of mesh shall be 3 mm. Diameter of wire shall be no less than 3. 68 mm. The top and bottom selvage shall be knuckles

.2 Fabric shall be zinc coated before weaving by the hot dip process to an average mass per unit area of not less than 490 g/m2.

.3 Mesh fabric shall not be excessively rough, or have blisters, sal ammoniac spots, bruises or flaking.

.4 Chain link fabric shall have a minimum tensile strength of 415 MPa.

.8 Bottom tension wire: to CAN/CGSB-138.2 , No. 6 gauge, single strand, galvanized steel wire.

.9 Tunbuckles

.1 Shall be drop forged steel and be hot dip galvanized. The average overall length shall be approximately 300mm, with ends in the closed position. Bolt diameter shall be 10mm and shall be capable of taking up a minimum of 150mm slack.

.10 Braces

.1 Shall be schedule 40 hot dip galvanized steel pipe, not less than 43mm outside diameter and weigh 3.38 kg per lineal metre.

.11 Tie wire fasteners: [aluminum alloy wire.

.12 Tension bar: to ASTM A653/A653M , 5 x 19 mm minimum galvanized steel and not less than 50mm shorter than the geight of the fabic with which they are to be used. Cut ends of tension bars shall be ground smoot to remove all sharp edges and burrs.

.13 Tension Bands: 3 x19 mm galvanized flat steel c/w 8 x 32 mm galvanized carriage bolts and nuts to fasten top rail receptacles to terminal posts.

.14 Brace Bands: 3 x 19 mm galvanized flat steel c/w 8 x 32 mm galvanized carriage bolts and nuts to fasten top rail receptacles to terminal posts.

.15 Fabric Clips: No. 9 gauge alumium alloy wire.

.16 Weatherproof post tops/caps, receptacles and fitting: shall be of adequate strength and may be of aluminum alloy, malleable steel or pressed steel. All ferrous metals shall be hot dip galvanized.

.17 Gates: to CAN/CGSB-138.4 .

.18 Gate frames: to ASTM A53/A53M , galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.

.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.

.2 Fasten fence fabric to gate with twisted selvage at top.

.3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position .

.5 Gate Fabric to match fence.

.6 Hinges shall permit the gate to swing back 180 degrees in line with the fence and shall be installed so as not to permit easy removal of the gate.

.19 Organic zinc rich coating: to CAN/CGSB-1.181.

.20 Grounding rod: to Section 26 05 27- Grounding - Primary.

.21 Concrete:

.1 Where concrete piles are specified for post installation, the concrete shall conform to CW 2160 and be sulphate resitant type 50, minimum compressive strength of 25 MPa at 28 days, air content of 4%-7% maximum slump of 80mm and a maximum size of course aggregate of 40mm.

.22 Interior Chain Link Cage: Refer to drawings for extent and dimensions

2.2 FINISHES

.1 Galvanizing:

.1 For chain link fabric: to CAN/CGSB-138.1.

.2 For pipe: 550 g/m^2 .

.3 For other fittings: to ASTM A123/A123M .

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Contract Administrator .

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been.

3.2 PREPARATION

.1 Grading:

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

3.3 ERECTION OF FENCE

.1 Erect fence along lines as indicated on the drawings and to CAN/CGSB-138.3.

.2 Excavate post holes to dimensions indicated.

.3 Terminal and line posts, except where otherwise specified, shall be intalled to a depth equal to the difference between the proposed fence height and the specified pipe length.

.4 Use hydraulic equipment to push or pound posts into the existing ground

.5 Concrete piles shall be of the lengths and dimensions indicated.

.6 Posts shall be set in the centre of concrete piles. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.7 Tops of concrete piles shall be corwned or domed to shed water and be installed 100mm below the finished grade.

.8 Posts shall be plumbed and set to give correct alignment. Bending of posts to give correct alignment is not acceptable

.9 Weatherproof post tops/caps shall be securely attached to eliminate removal by hand. Eye top caps shall allow for the insertion of a top rail in a horizontal position.

.10 Space line posts maximum 3050mm apart, measured parallel to ground surface.

.11 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.

.12 Install additional straining posts at sharp changes in grade and where directed by Contract Administrator .

.13 Install corner post where change in alignment exceeds 10 degrees.

.14 Install end posts at end of fence and at buildings.

.1 Install gate posts on both sides of gate openings.

.15 Install fence fabric after concrete has cured, minimum of 5 days.

.16 Install brace between end and gate posts and nearest line post,.

.1 Install braces on both sides of corner and straining posts in similar manner.

.17 Install overhang tops and caps.

.18 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.19 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

.20 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.

.1 Knuckled selvedge at bottom.

.2 Twisted selvedge at top.

.21 Tension bars, bands and bolts shall be used to fasten the fabric to terminal posts. Maximum spacing for tension bands and bolts shall be 380mm. Top of tension bars shall not protrude above the bottom of the top rail

.22 The bottom tension wire shall be stretched taut along the bottom of the fabric and securely attached to all terminal and line posts and attached to the bottom edge of the fabric at 450mm masimum spacing using hog rings.

.23 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.

.1 Give tie wires minimum two twists.

.24 Where turnbuckles are specified for installation, they shall be used to stretch the bottom tension wire taut and be able to take up a minimum of 150 mm slack.

.25 Install grounding rods as indicated.

3.4 INSTALLATION OF GATES

.1 Install gates in locations as indicated.

.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.3 Determine position of centre gate rest for double gate.

.1 Cast gate rest in concrete as directed.

.2 Dome concrete above ground level to shed water.

.4 Install gate stops where indicated.

3.5 TOUCH UP

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas .

.1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

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

END OF SECTION