

# **SPECIFICATION**

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## **DUPLEX Supply, Ship and Erect**

**PANGNIRTUNG, NUNAVUT  
PROJECT NO. 15-020-01-11**

**TENDER**

**Can-Tec Services Ltd.  
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**Part 1            General**

**1.1                WORK COVERED BY CONTRACT DOCUMENTS**

- .1        Work of this contract comprises the furnishing of all labour, materials, equipment and supervision required for general construction of a Duplex Residence and related work at Pangnirtung, Nunavut.
  - .1        Construction of a new two story building
  - .2        Final Building Location to Be Determined on site.
  - .3        For the duration of the construction phase: A subscription to a cloud-based project management site to provide a centralized and secure location for storage and sharing of contract documents and related communications. General Contractor to ensure that all sub-contractors are part of cloud system.

**1.2                SEPARATE PRICE**

- .1        Supply a separate price for the removal and installation of two new oil tanks located next to the existing facility building and storage building as noted on drawing M3.4

**1.3                CONTRACT METHOD**

- .1        Refer to instructions to Invitation to Tender and all reference documents.

**1.4                CONTRACTOR USE OF PREMISES**

- .1        Unrestricted use of site until Substantial Performance.

**1.5                EXISTING SERVICES**

- .1        Notify, Consultant and utility companies of intended interruption of services and obtain required permission.
- .2        Provide alternative routes for personnel and vehicular traffic.
- .3        Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.
- .4        Submit schedule to and obtain approval from Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5        Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .6        Where unknown services are encountered, immediately advise Consultant 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.

**1.6 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**

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- .8 Field Test Reports.
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- .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            ACCESS AND EGRESS**

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

**1.2            USE OF SITE AND FACILITIES**

- .1      Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate work as stated.
- .2      Maintain existing services to building and provide for personnel and vehicle access.
- .3      Closures: protect work temporarily until permanent enclosures are completed.

**1.3            BUILDING SMOKING ENVIRONMENT**

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

**Part 2          Products**

**2.1            NOT USED**

- .1      Not Used.

**Part 3          Execution**

**3.1            NOT USED**

- .1      Not Used.

**END OF SECTION**

**Part 1        General**

**1.1            REFERENCES**

- .1        Project Supplementary Conditions

**1.2            CASH ALLOWANCES**

- .1        Include in Contract Price specified cash allowances.
- .2        Cash allowances, unless otherwise specified, cover net cost to Contractor subcontractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.
- .3        Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.
- .4        Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.
- .5        Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.
- .6        Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.
- .7        Prepare schedule jointly with Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.
- .8        Amount of each allowance, for Work specified in respective specification Sections is as follows:
  - .1        Includes the stipulated sum of \$6,000.00 for the purchase and installation of window blinds for all windows.
  - .2        Includes \$15,000 for Electrical Services to Nunavut Power.

**Part 2        Products**

**2.1            NOT USED**

- .1        Not Used.

**Part 3        Execution**

**3.1            NOT USED**

- .1        Not Used.

**END OF SECTION**

**Part 1        General**

**1.1            ADMINISTRATIVE**

- .1     Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative or Consultant.
- .2     Prepare agenda for meetings.
- .3     Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative Consultant.
- .4     Provide physical space and make arrangements for meetings.
- .5     Preside at meetings.
- .6     Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7     Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance, Departmental Representative, Consultant.
- .8     Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.2            PRECONSTRUCTION MEETING**

- .1     After award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities. Meeting will be held at the location and time designated by the departmental representative.
- .2     Senior representatives of Departmental Representative Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3     Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4     Agenda to include:
  - .1     Appointment of official representative of participants in the Work.
  - .2     Schedule of Work: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .3     Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .4     Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
  - .5     Delivery schedule of specified equipment.
  - .6     Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
  - .7     Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
  - .8     Owner provided products.

- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.
- .5 Coordinate filed engineering and layout work with consultant

**1.3 PROGRESS MEETINGS**

- .1 During course of Work at the discretion of the Consultant and Departmental Representative , schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work Departmental Representative Consultant 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.

<b>Part 3</b>	<b>Execution</b>
<b>3.1</b>	<b>NOT USED</b>
.1	Not Used.

**END OF SECTION**

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**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 (GANNT 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 (GANNT) 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.
- .9      Project Planning, Monitoring and Control System: overall system operated by Departmental Representative DCC Representative Consultant to enable monitoring of project work in relation to established milestones.

**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 to Departmental Representative and Consultant 10 within working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative and Consultant within 5 working days of receipt of acceptance of Master Plan.

**1.4 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
  - .1 As per the main contract documents

**1.5 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative or Consultant will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

**1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .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 Structural Steel.
  - .9 Siding and Roofing.
  - .10 Interior Architecture (Walls, Floors and Ceiling).
  - .11 Plumbing.
  - .12 Lighting.
  - .13 Electrical.
  - .14 Piping.
  - .15 Controls.

- .16 Heating, Ventilating.
- .17 Millwork.
- .18 Testing and Commissioning.
- .19 Supplied equipment long delivery items.

**1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on bi-weekly 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.

**1.8 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        sGeneral**

**1.1            ADMINISTRATIVE**

- .1        Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2        Do not proceed with Work affected by submittal until review is complete.
- .3        Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4        Where items or information is not produced in SI Metric units converted values are acceptable.
- .5        Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6        Notify Consultant, 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 Consultant's review of submittals.
- .9        Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .10       Keep one reviewed copy of each submission on site.

**1.2            SHOP DRAWINGS AND PRODUCT DATA**

- .1        The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2        Submit drawings stamped and signed by professional engineer registered or licensed in Province of 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        Allow 7 days for Consultant's review of each submission.

- .5 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .8 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single line and schematic diagrams.
    - .10 Relationship to adjacent work.
- .9 After Consultant's review, distribute copies.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative DCC Representative Consultant.

- .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.
- .12 Submit 6 electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.
  - .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.
- .13 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant.
  - .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.
- .14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit 6 copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

### 1.3

#### 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 Consultant's business address.
- .3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

- .6 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

**1.4 MOCK-UPS**

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

**1.5 PHOTOGRAPHIC DOCUMENTATION**

- .1 Submit electronic digital photography in jpg format, fine resolution monthly with progress statement and as directed by Consultant.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
  - .1 Viewpoints and their location as determined by Consultant.
- .4 Frequency of photographic documentation: as directed by Consultant.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of Manitoba
  - .1 The Workers Compensation Act RSM 1987 - Updated 2013.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction, and Consultant.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials.
- .7 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within 5 days after receipt of comments from Consultant.
- .8 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

**1.3 FILING OF NOTICE**

- .1 File Notice of Project with Territorial authorities prior to beginning of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

**1.4 SAFETY ASSESSMENT**

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

**1.5 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.

**1.6 REGULATORY REQUIREMENTS**

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

**1.7 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Consultant may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

**1.8 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

**1.9 COMPLIANCE REQUIREMENTS**

- .1 Comply with The Workers Compensation Act, Workplace Safety Regulation, Nunavut.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

**1.10 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Safety Officer and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

**1.11 POSTING OF DOCUMENTS**

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

**1.12 CORRECTION OF NON-COMPLIANCE**

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



- .2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

**1.13 POWDER ACTUATED DEVICES**

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

**1.14 WORK STOPPAGE**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES AND CODES**

- .1        Perform Work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2        Meet or exceed requirements of:
  - .1        Contract documents.
  - .2        Specified standards, codes and referenced documents.

**1.2                BUILDING SMOKING ENVIRONMENT**

- .1        No Smoking allowed on site.

**Part 2            Products**

**2.1                NOT USED**

- .1        Not Used.

**Part 3            Execution**

**3.1                NOT USED**

- .1        Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                INSPECTION**

- .1      Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2      Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
- .3      If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

**1.2                INDEPENDENT INSPECTION AGENCIES**

- .1      Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or testing portions of Work.
- .2      Allocated costs: to Section 01 21 00 - Allowances.
- .3      Provide equipment required for executing inspection and testing by appointed agencies.
- .4      Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5      If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Consultant. Pay costs for retesting and reinspection.

**1.3                ACCESS TO WORK**

- .1      Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2      Co-operate to provide reasonable facilities for such access.

**1.4                PROCEDURES**

- .1      Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.
- .2      Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3      Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

**1.5                REJECTED WORK**

- .1      Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by

Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative and or Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by .

#### **1.6 REPORTS**

- .1 Submit 4 copies of inspection and test reports to Consultant.
- .2 Provide copies to subcontractor of work being inspected or tested.

#### **1.7 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.

#### **1.8 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative and or Consultant.
- .3 Prepare mock-ups for Departmental Representative and Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Consultant will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

#### **1.9 MILL TESTS**

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

#### **1.10 EQUIPMENT AND SYSTEMS**

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

**Part 2            Products**

**2.1                NOT USED**

.1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                ACTION AND INFORMATIONAL SUBMITTALS**

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

**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                WATER SUPPLY**

- .1        Provide continuous supply of potable water for construction use.
- .2        Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3        Pay for utility charges at prevailing rates.

**1.4                TEMPORARY HEATING AND VENTILATION**

- .1        Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2        Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3        Provide temporary heat and ventilation in enclosed areas as required to:
  - .1        Facilitate progress of Work.
  - .2        Protect Work and products against dampness and cold.
  - .3        Prevent moisture condensation on surfaces.
  - .4        Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  - .5        Provide adequate ventilation to meet health regulations for safe working environment.
- .4        Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
- .5        Ventilating:
  - .1        Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2        Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3        Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4        Ventilate storage spaces containing hazardous or volatile materials.
  - .5        Ventilate temporary sanitary facilities.

- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building, not to be used when available. Be responsible for damage to heating system if use is permitted.
- .7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
  - .5 Vent direct-fired combustion units to outside.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

## **1.5 TEMPORARY POWER AND LIGHT**

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Departmental Representative.
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant 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.

## **1.6 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1    Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2    Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3    Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**END OF SECTION**



**Part 1          General**

**1.1            REFERENCES**

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

**1.2            ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.3            INSTALLATION AND REMOVAL**

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

**1.4            SCAFFOLDING**

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding ramps ladders swing staging platforms temporary stairs.

**1.5            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.

**1.6 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.

**1.7 SECURITY**

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

**1.8 OFFICES**

- .1 Provide marked and fully stocked first-aid case in a readily available location.
- .2 Subcontractors to provide their own offices as necessary. Direct location of these offices.

**1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.10 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Consultant.

**1.11 CONSTRUCTION SIGNAGE**

- .1 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Consultant.

**1.12 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Consultant.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.

- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Consultant.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Consultant.

**1.13 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

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

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
  - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

**1.2 INSTALLATION AND REMOVAL**

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

**1.3 HOARDING**

- .1 Erect 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 two lockable truck gate. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.4 GUARD RAILS AND BARRICADES**

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

**1.5 WEATHER ENCLOSURES**

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

**1.6 DUST TIGHT SCREENS**

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

**1.7 ACCESS TO SITE**

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

**1.8 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 private and 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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative and or Consultant reserves right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be born by Departmental Representative Consultant in event of conformance with Contract Documents or by Contractor in event of non-conformance.

**1.2 QUALITY**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative and or Consultant based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

**1.3 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative and Consultant 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 Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right

to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

#### **1.4 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber 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 Consultant.
- .9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

#### **1.5 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

#### **1.6 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

#### **1.7 QUALITY OF WORK**

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



- .2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative and or Consultant, whose decision is final.

**1.8 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.9 CONCEALMENT**

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Consultant if there is interference. Install as directed by Consultant.

**1.10 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.

**1.11 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Consultant of conflicting installation. Install as directed.

**1.12 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.13 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

**1.14 PROTECTION OF WORK IN PROGRESS**

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

**1.15 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work.
- .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      QUALIFICATIONS OF SURVEYOR**

- .1      Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Consultant.

**1.2      SURVEY REFERENCE POINTS**

- .1      Existing base horizontal and vertical control points are designated on drawings.
- .2      Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3      Make no changes or relocations without prior written notice to Departmental Representative and Consultant.
- .4      Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5      Require surveyor to replace control points in accordance with original survey control.

**1.3      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 top soil 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.

**1.4      EXISTING SERVICES**

- .1      Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.
- .2      Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.

**1.5      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 Consultant 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 Consultant.

**1.6 RECORDS**

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

**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      ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Submit written request in advance of cutting or alteration which affects:
  - .1      Structural integrity of elements of project.
  - .2      Integrity of weather-exposed or moisture-resistant elements.
  - .3      Efficiency, maintenance, or safety of operational elements.
  - .4      Visual qualities of sight-exposed elements.
  - .5      Work of Owner or separate contractor.
- .3      Include in request:
  - .1      Identification of project.
  - .2      Location and description of affected Work.
  - .3      Statement on necessity for cutting or alteration.
  - .4      Description of proposed Work, and products to be used.
  - .5      Alternatives to cutting and patching.
  - .6      Effect on Work of Owner or separate contractor.
  - .7      Written permission of affected separate contractor.
  - .8      Date and time work will be executed.

**1.2      MATERIALS**

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

**1.3      PREPARATION**

- .1      Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2      After uncovering, inspect conditions affecting performance of Work.
- .3      Beginning of cutting or patching means acceptance of existing conditions.
- .4      Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5      Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

**1.4      EXECUTION**

- .1      Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2      Fit several parts together, to integrate with other Work.

- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping , full thickness of the construction element.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2      Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .3      Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5      Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .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.

**1.2                FINAL CLEANING**

- .1      When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2      Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3      Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4      Remove waste products and debris including that caused by Owner or other Contractors.
- .5      Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. 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, foors.
- .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          REFERENCES**

.1      Definitions:

- .1      Class III: non-hazardous waste - construction renovation and demolition waste.
- .2      Inert Fill: inert waste - exclusively asphalt and concrete.
- .3      Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .4      Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .5      Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .6      Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .7      Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1      Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2      Returning reusable items including pallets or unused products to vendors.
- .8      Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .9      Separate Condition: refers to waste sorted into individual types.
- .10     Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .11     Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.
- .12     Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .13     Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

.2      Reference Standards:

- .1 Canadian Construction Association (CCA)
  - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

**1.2 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not burn rubbish
- .3 Do not dispose of waste volatile materials mineral spirits oil paint thinner into waterways, storm, or sanitary sewers.
- .4 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
  - .4 Tonnage reused or recycled.
  - .5 Reused or recycled waste destination.
- .5 Remove materials on-site as Work progresses.
- .6 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

**1.3 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 APPLICATION**

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

**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.

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE REQUIREMENTS**

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

**1.2 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**
- .1        Not Used.

- Part 3**            **Execution**
- 3.1**            **NOT USED**
- .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 Departmental Representative and Consultant, in accordance with Section 01 31 19 - Project Meetings to:
    - .1 Verify Project requirements.
    - .2 Review warranty requirements manufacturer's installation instructions.
  - .2 Departmental Representative and Consultant to establish communication procedures for:
    - .1 Notifying construction warranty defects.
    - .2 Determine priorities for type of defects.
    - .3 Determine reasonable response time.
  - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
  - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative and Consultant, 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 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
  - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.

- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.
- .10 Provide all data on CD in PDF Format

#### **1.4 CONTENTS - PROJECT RECORD DOCUMENTS**

- .1 Table of Contents for Each Volume: provide title of project;
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Consultant and Contractor Design-Builder 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 Departmental Representative and Consultant 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.
  - .9 Electronic CAD, PDF

- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative and Consultant.

## **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 Consultant .
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.



**1.7 FINAL SURVEY**

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

**1.8 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control
- .15 Additional requirements: as specified in individual specification sections.

**1.9 MATERIALS AND FINISHES**

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

- .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

#### **1.10 MAINTENANCE MATERIALS**

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

#### **1.11 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.

- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative and Consultant.

**1.12 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative and Consultant approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative and Consultant receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative and Consultant 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 Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Consultant.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, commissioned systems fire protection, alarm systems, sprinkler systems, 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 4 and 9 month post-construction warranty inspections.
- .5 Procedure and status of tagging of equipment covered by extended warranties.
- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
- .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE REQUIREMENTS**

- .1    Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of substantial performance.
- .2    Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3    Preparation:
  - .1    Verify conditions for demonstration and instructions comply with requirements.
  - .2    Verify designated personnel are present.
  - .3    Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.
- .4    Demonstration and Instructions:
  - .1    Demonstrate start-up, operation, control, adjustment, trouble-shooting, , servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
  - .2    Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
  - .3    Review contents of manual in detail to explain aspects of operation and maintenance.
  - .4    Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's and Consultant's approval.
- .3    Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .4    Give time and date of each demonstration, with list of persons present.
- .5    Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

**1.3                QUALITY ASSURANCE**

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

**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      SUMMARY**

- .1 Section Includes:
  - .1 This section is limited to portions of the Building Management Manual (BMM) provided to Departmental Representative and Consultant by Contractor.
- .2 Acronyms:
  - .1 BMM - Building Management Manual.
  - .2 Cx - Commissioning.
  - .3 HVAC - Heating, Ventilation and Air Conditioning.
  - .4 PI - Product Information.
  - .5 PV - Performance Verification.
  - .6 TAB - Testing, Adjusting and Balancing.
  - .7 WHMIS - Workplace Hazardous Materials Information System.

**1.2      GENERAL REQUIREMENTS**

- .1 Standard letter size paper 216 mm x 279 mm.
- .2 Methodology used to facilitate updating.
- .3 Drawings, diagrams and schematics to be professionally developed.
- .4 Electronic copy of data to be in a format accepted and approved by Departmental Representative and Consultant.

**1.3      APPROVALS**

- .1 Prior to commencement, co-ordinate requirements for preparation, submission and approval with Departmental Representative and Consultant.

**1.4      GENERAL INFORMATION**

- .1 Provide Consultant the following for insertion into appropriate Part and Section of BMM:
  - .1 Complete list of names, addresses, telephone and fax numbers of contractor, sub-contractors that participated in delivery of project - as indicated in Section 1.2 of BMM.
  - .2 Summary of architectural, structural, fire protection, mechanical and electrical systems installed and commissioned - as indicated in Section 1.4 of BMM.
    - .1 Including sequence of operation as finalized after commissioning is complete as indicated in Section 2.0 of BMM.
  - .3 Description of building operation under conditions of heightened security and emergencies as indicated in Section 2.0 of BMM.
  - .4 System, equipment and components Maintenance Management System (MMS) identification - Section 2.1 of BMM..

- .5 Information on operation and maintenance of architectural systems and equipment installed and commissioned - Section 2.0 of BMM.
- .6 Information on operation and maintenance of fire protection and life safety systems and equipment installed and commissioned - Section 2.0 of BMM.
- .7 Information on operation and maintenance of mechanical systems and equipment installed and commissioned - Section 2.0 of BMM.
- .8 Operating and maintenance manual - Section 3.2 of BMM.
- .9 Final commissioning plan as actually implemented.
- .10 Completed commissioning checklists.
- .11 Commissioning test procedures employed.
- .12 Completed Product Information (PI) and Performance Verification (PV) report forms, approved and accepted by Departmental Representative DCC Representative Consultant.
- .13 Commissioning reports.

#### **1.5 CONTENTS OF OPERATING AND MAINTENANCE MANUAL**

- .1 For detailed requirements refer to Section 01 78 00 - Closeout Submittals.
- .2 Consultant to review and approve format and organization within 12 weeks of award of contract.
- .3 Include original manufactures brochures and written information on products and equipment installed on this project.
- .4 Record and organize for easy access and retrieval of information contained in BMM.
- .5 Include completed PI report forms, data and information from other sources as required.
- .6 Inventory directory relating to information on installed systems, equipment and components.
- .7 Approved project shop-drawings, product and maintenance data.
- .8 Manufacturer's data and recommendations relating: manufacturing process, installation, commissioning, start-up, O M, shutdown and training materials.
- .9 Inventory and location of spare parts, special tools and maintenance materials.
- .10 Warranty information.
- .11 Inspection certificates with expiration dates, which require on-going re-certification inspections.
- .12 Maintenance program supporting information including:
  - .1 Recommended maintenance procedures and schedule.
  - .2 Information to removal and replacement of equipment including, required equipment, points of lift and means of entry and egress.

#### **1.6 SUPPORTING DOCUMENTATION FOR INSERTION INTO SUPPORTING APPENDICES**

- .1 Provide Consultant supporting documentation relating to installed equipment and system, including:



- .1 General:
  - .1 Finalized commissioning plan.
  - .2 WHMIS information manual.
  - .3 Approved "as-built" drawings and specifications.
  - .4 Procedures used during commissioning.
  - .5 Cross-Reference to specification sections.
- .2 Architectural and structural:
  - .1 Inspection certificates, construction permits.
  - .2 Roof anchor log books.
  - .3 PV reports.
- .3 Fire prevention, suppression and protection:
  - .1 Test reports.
  - .2 Smoke test reports.
  - .3 PV reports.
- .4 Mechanical:
  - .1 Installation permits, inspection certificates.
  - .2 Piping pressure test certificates.
  - .3 Ducting leakage test reports.
  - .4 TAB and PV reports.
  - .5 Charts of valves and steam traps.
  - .6 Copies of posted instructions.
- .5 Electrical:
  - .1 Installation permits, inspection certificates.
  - .2 TAB and PV reports.
  - .3 Electrical work log book.
  - .4 Charts and schedules.
  - .5 Locations of cables and components.
  - .6 Copies of posted instructions.
- .2 Assist Departmental Representative DCC Representative Consultant with preparation of BMM.

## 1.7 USE OF CURRENT TECHNOLOGY

- .1 Use current technology for production of documentation. Emphasis on ease of accessibility at all times, maintain in up-to-date state, compatibility with user's requirements.
- .2 Obtain Departmental Representative's and Consultant's approval before starting Work.

**Part 2            Products**

**2.1                NOT USED**

.1                Not used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not used.

**END OF SECTION**

1. GENERAL

1.1 Gravel Pads and Driveways

All communities that will incorporate gravel pads and driveways form part of this tender. Refer to the drawings for configuration and location.

1.2 Location of Gravel Pads and Driveways

- .1 The RCMP Project Manager will locate and/or provide on site corner lot pins.
- .2 Layout and construction of gravel pad driveway and culverts to be responsibility of Contractor under direction of the Project Manager.

2. MATERIALS

2.1 Gravel Pad and Driveway Material

- .1 Locally available, clean natural sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter. Maximum gravel particle size to be 3". All material shall contain a minimum of ice and snow.
- .2 Stockpile materials in areas designated by the RCMP Asset Manager. Stockpile granular materials in manner to prevent segregation. Protect fill materials from contamination.
- .3 Quantity of material required for this tender to be determined by The Project Manager.

2.2 Culvert Bedding Material

- .1 Granular material for culvert bedding shall be locally available clean natural sand and gravel material free from silt, clay, loam, friable or soluble materials and organic matter with a maximum particle size of 1" for material that is in direct contact and to a distance of 6" from circumference of culvert.

All other culvert bedding material shall be as per 2.1.1 "Gravel Pad and Driveway Material" forming part of this section. All material shall not be frozen or contain ice and snow.

- .2 Quantity of material required for this tender to be determined by The Project Manager.

2.3 Embankment Protection Material for Culverts

- .1 Locally available boulders with a minimum diameter of 4" and a maximum diameter of 8".

2. MATERIALS

#### 2.4 Drainage Culverts

- .1 Drainage culverts shall be galvanized steel, corrugated, minimum 0.08" wall thickness to diameters and lengths as specified by the Manager. For bidding purposes, assume culvert of 20 inch diameter x 16 feet long.
- .2 Culvert couplers shall be galvanized steel bands, minimum 2'-0" wide complete with galvanized bolts and nuts.
- .3 Quantity of material required for this tender to be determined by The Manager.

### 3. EXECUTION

#### 3.1 Gravel Pads and Driveways

- .1 Construct gravel pads and driveways to size and elevations as indicated on drawings and information provided by the Project Manager.
- .2 Areas to receive gravel and driveway shall be free of debris, ice, snow, or water. Do not commence pad and driveway construction until areas to receive fill have been inspected and approved by the Manager. Contractor shall include in the tendered price all costs for removal of snow prior to placement of gravel pads and driveways.
- .3 Place and compact material in continuous horizontal layers not exceeding 6" loose depth. Use methods to prevent disturbing or damage to foundation system. Make good any damage at no cost to the Owner.
- .4 Slope grade away from building and construct gravel pad and driveway embankments to slopes as directed by the Manager.
- .5 Make good any damage to gravel pads and driveways as a result from execution of other portions of the work. Compact repaired and filled areas to density of adjacent materials.
- .6 All materials to be compacted to satisfaction of the Project Manager.
- .7 On completion of the job, the contractor will leave the site in a neat and tidy condition. All ruts and depressions shall be filled, compacted and bladed to the satisfaction of the RCMP Asset Manager. Ensure adequate drainage away from, and from underneath the building.

#### 3.2 Culverts, Bedding Material and Embankment Protection

- .1 Install culverts to length, diameter and locations as indicated on the drawings or by the Manager.

- .2 Install one piece, full length culverts where possible. If culverts are joined, place inside circumferential laps pointing downstream. Install coupling bands to all joints and make as tight as possible. Only one joint will be allowed in any length of buried culvert from intake to outlet.
- .3 Maintain positive drainage slope off all culverts to satisfaction of the Manager.

3. EXECUTION

3.2 Culverts, Bedding Material and Embankment Protection (continued)

- .4 Place and compact bedding material as outlined in 2.2.1 of this section in horizontal layers not exceeding 6" loose depth. Remove all material exceeding 1" in size that is in direct contact to a distance of 6" from circumference of culvert. Compact culvert bedding material by means as not to damage or displace culvert. Compaction to be to the satisfaction of the Manager.
- .5 The Contractor shall replace or repair any culvert damaged by his operation. All costs to replace or repair damaged culverts shall be borne solely by the Contractor, at no cost to the Owner.
- .6 Hand place embankment protection material in a single layer thickness as follows:
  - .1 To all beds and side slopes of existing drainage ditches, for 4'-0", in all directions, from entrance and exit mouths of all culverts.
  - .2 To all side slopes of new gravel driveways for 4'-0" around entire circumference of protruding entrance and exit mouths of culverts.
- .7 Place embankment protection material such that drainage flow will be through culverts. Side slopes of existing drainage ditches, new driveways and culvert bedding material shall be protected from erosion by embankment protection material.

3.3 Final Grading

- .1 On completion of job, the contractor will leave the site in a neat and tidy condition. All ruts and depressions shall be filled, compacted and bladed to the satisfaction of the Manager. Ensure adequate drainage away from, and from underneath the building.

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Final Grading (Section 02100)
- .2 Foundation Schedule

1.2 Location on Sites

- .1 RCMP Property Management Will Provide Site Plans showing location of new duplex
- .2 Layout of the foundation and building structure to be responsibility of the General Contractor. All costs for the layout to be included in the tendered price.

2. MATERIALS

2.1 Multi Point Tubular Space Frame

- .1 Structural steel tubing, precut, premachined, galvanized
- .2 Structural aluminium connector hubs c/w bolts and washers
- .3 Structural steel beam saddles, galvanized
- .4 Steel bearing plates, galvanized
- .5 Standard of Acceptance: Triodedic
- .6 Manufacturer to supply shop drawings sealed by an engineer registered in the territory of Nunavut for review as per section 01 33 00.

3. EXECUTION

3.1 Multi Pint tubular Space Frame

- .1 Place bearing plates on firm, level, well compacted gravel pad.
- .2 Contractor to make minor elevation adjustment to gravel pad at bearing point locations to ensure bearing plate elevation continuity. All gravel pad adjustments to be compacted to density of surrounding material.
- .3 Assemble space frame system as per manufacturer's written instructions and assembly drawings.
- .4 Ensure space frame is properly aligned and level prior to loading of frame with

building elements.

**END OF SECTION**

1. GENERAL

1.1 Related Work

- .1 Rough Carpentry
- .2 Multipoint Foundations
- .3 Structural Beams
- .4 Painting

2. MATERIALS

2.1 Metal Connector Plates

- .1 Metal connector plates: fabricated from steel to CSA G40.21-M1978 type 300 W. Refer to the drawings forming part of this tender for configuration of plates.

2.2 Structural Bolts and Nuts

- .1 Structural bolts: A307 structural grade complete with nuts and washers where required, to sizes indicated on the drawings.

2.4 Stair Treads

- .1 Metal stair tread, galvanized, 9 1/2" x 3'-0", 1 1/2", Grip Strut by Industrial Wire or approved alternate.

3. EXECUTION

3.1 Structural Connections

- .1 Install structural connector plates to beams, columns, stair stringers and ledgers as indicated on the drawings.
- .2 Install main floor structural beams to foundation saddles as indicated on the drawings.

END OF SECTION





1. GENERAL

1.1 Related Work

- .1 Rough Carpentry
- .2 Painting

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01340 – Shop Drawings, Product Data, samples and mock-ups.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories.

1.3 Projection

- .1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
- .2 Leave protective covering in place until final cleaning of building. Provide instruction for removal of protective covering.

2. PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates to CAN/CSA-40.21, Grade 300W
- .2 Steel pipe to ASTM A53 standard weight extra strong, double extra strong, black galvanized finish.
- .3 Welding Materials to CSA W50-1977
- .4 Bolts and anchor bolts to: ASTM A307-76b.
- .5 Stainless steel tubing: to ASTM A269, Type 302 Commercial Grade Seamless welded with AISI No. 4 Finish.
- .6 Welded steel treads and welded steel grate decking for steps and landings (sure grip).
- .7 Grout: non-shrink, non-metallic, flowable 24h, 15 Mpa, pull-out strength 7.9 Mpa

- .8 Wire mesh screen (for skirting around building) 38mm x 38mm x 3.86 mm thick galvanized screen, weld 55mm x 55mm x 6 mm steel frame.

## 2.2 Fabrication

- .1 Fabricate work square, true straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

## 2.3 Finishes

- .1 Galvanizing: Hot dipped galvanizing with zinc coating 600g/m<sup>2</sup> to CAN/CSA-G164.
- .2 Shop coat primer to CAN/CGSB-1.40.
- .3 Zinc Primer: Zinc rich, ready mix to CAN/CGSB-1.81.
- .4 Bituminous paint to: CAN/CGSB-1.108.

## 2.4 Isolation Coating

- .1 Isolate aluminium from the following components, by means of bituminous paint:
  - .1 Dissimilar metals except stainless steel, Zinc, or white bronze of small area
  - .2 Concrete, mortar
  - .3 Wood

## 2.5 Shop Painting

- .1 Apply one shop coat of primer to metal items, with the 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 7C.
- .3 Clean surfaces to be field welded do not paint.

3. EXECUTION

3.1 Erection

- .1 Do welding work in accordance with CSA W159 unless otherwise specified.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to mach finish and be compatible with material through which they pass.
- .5 Provide components for building by other section in accordance with shop drawings and schedule
- .6 Make field connections with bolts CAN/CSA-s16.1 or weld
- .7 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Rough Carpentry
- .2 Painting

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01340 – Shop Drawings, Product Data, samples and mock-ups.
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- .6 Make field connections with bolts CAN/CSA-s16.1 or weld
- .7 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding

END OF SECTION

**Part 1      General**

**1.1      RELATED REQUIREMENTS**

- .1      Section 06 10 00, 061500, 061753.

**1.2      REFERENCES**

- .1      American National Standards Institute/National Particleboard Association (ANSI/NPA)
  - .1      ANSI/NPA A208.1-2009, Particleboard.
  - .2      ASTM International
    - .1      ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - .2      ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
    - .3      ASTM C578-11a, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
    - .4      ASTM C1289-11, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
    - .5      ASTM C1396/C1396M-11, Standard Specification for Gypsum Board.
    - .6      ASTM D1761-06, Standard Test Methods for Mechanical Fasteners in Wood.
    - .7      ASTM D5055-11, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
    - .8      ASTM D5456-11, Standard Specification for Evaluation of Structural Composite Lumber Products.
  - .3      Canadian General Standards Board (CGSB)
    - .1      CAN/CGSB-11.3-M87, Hardboard.
    - .2      CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
    - .3      CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.
    - .4      CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.
  - .4      CSA International
    - .1      CAN/CSA-A123.2-03(R2008), Asphalt Coated Roofing Sheets.
    - .2      CAN/CSA-A247-M86 (R1996), Insulating Fiberboard.
    - .3      CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
    - .4      CSA O112.9-10, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
    - .5      CSA O121-08, Douglas Fir Plywood.
    - .6      CAN/CSA O122-06(R2011), Structural Glued-Laminated Timber.
    - .7      CSA O141-05(R2009), Softwood Lumber.



- .8 CSA O151-09, Canadian Softwood Plywood.
- .9 CSA O153-M1980 (R2008), Poplar Plywood.
- .10 CSA O325-07, Construction Sheathing.
- .11 CSA O437 Series-93(R2011), Standards on OSB and Waferboard.
- .12 CAN/CSA-Z809-08, Sustainable Forest Management.
- .5 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .6 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2010.
- .7 Sustainable Forestry Initiative (SFI)
  - .1 SFI-2010-2014 Standard.
- .8 The Truss Plate Institute of Canada
  - .1 Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses 2007.
- .9 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Manitoba, Canada.

### **1.4 QUALITY ASSURANCE**

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.
- .3 Sustainable Standards Certification:
  - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location 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 FRAMING STRUCTURAL AND PANEL MATERIALS

- .1 Description:
  - .1 Sustainability Characteristics:
    - .1 Lumber, Finger Jointed Lumber, Glulam, I-Joists, Trusses, SCL, CAN/CSA-Z809 or FSC or SFI certified.
    - .2 Plywood. Particleboard OSB urea-formaldehyde free, CAN/CSA-Z809 or FSC or SFI certified.
  - .2 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
    - .1 CSA O141.
    - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 Glulam in accordance with Structural Glued-Laminated Timber CAN/CSA-O122.
  - .4 Wood I-joists in accordance with Prefabricated Wood I-Joists ASTM D5055.
  - .5 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", The Truss Plate Institute of Canada.
  - .6 Structural Composite Lumber (SCL) in accordance with ASTM D5456.
  - .7 Framing and board lumber: in accordance with NBC.
  - .8 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
    - .1 Board sizes: "Standard" or better grade.
    - .2 Dimension sizes: "Standard" light framing or better grade.
    - .3 Post and timbers sizes: "Standard" or better grade.
  - .9 Plywood, OSB and wood based composite panels: to CSA O325.
  - .10 Douglas fir plywood (DFP): to CSA O121, standard construction.
  - .11 Canadian softwood plywood (CSP): to CSA O151, standard construction.
  - .12 Poplar plywood (PP): to CSA O153, standard construction.
  - .13 Interior mat-formed wood particleboard: to ANSI/NPA 208.1.
  - .14 Mat-formed structural panelboards (OSB wafer): to CAN O437.

- .15 Insulating fiberboard sheathing: to CAN/CSA-A247 CAN/ULC-S706.
- .16 Glass fibre board sheathing: non-structural, rigid, faced, fiberglass, insulating exterior sheathing board.
- .17 Gypsum sheathing: to ASTM C1396/C1396M.

## **2.2 ACCESSORIES**

- .1 Exterior wall sheathing paper: to CAN/CGSB-51.32
- .2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.
- .3 Roll roofing: to CAN/CSA A123.2, Type S.
- .4 Air seal: closed cell polyurethane or polyethylene.
- .5 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .6 Subflooring adhesive: to CAN/CGSB-71.26, cartridge loaded.
- .7 General purpose adhesive: to CSA O112.9.
- .8 Nails, spikes and staples: to CSA B111.
- .9 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
- .10 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.
- .11 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation. Hangers to be sized by truss manufacturer.
- .12 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Consultant.
- .13 Fastener Finishes:
  - .1 Galvanizing: to ASTM A123/A123M, ASTM A653, use galvanized fasteners for exterior work and treated lumber.
- .14 Wood Preservative:
  - .1 Preservative Coating: in accordance with manufacturer's recommendations for surface conditions:
    - .1 Preservative: VOC limit 350 g/L maximum to SCAQMD Rule 1113.
    - .2 Coatings: VOC limit 350 g/L maximum to SCAQMD Rule 1113.

## **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.
  - .1 Inform Consultant 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 Consultant.

### 3.2 PREPARATION

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

### 3.3 MATERIAL USAGE

- .1 Roof sheathing:
  - .1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, square edge, 12.5 mm thick.
- .2 Exterior wall sheathing:
  - .1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, square edge, 12.5 mm thick.
- .3 Subflooring:
  - .1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, T and G edge, 19 mm thick.

### 3.4 INSTALLATION

- .1 Install members true to line, levels and elevations, square and plumb.
- .2 Construct continuous members from pieces of longest practical length.
- .3 Install spanning members with "crown-edge" up.
- .4 Select exposed framing for appearance. Install lumber panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .5 Install subflooring combined subfloor and underlay with panel end-joints located on solid bearing, staggered at least 800 mm.
  - .1 In addition to mechanical fasteners, floor panels secure floor subflooring to floor joists using glue and screws. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt.
- .6 Install all wall sheathing in accordance with manufacturer's printed instructions.
- .7 Install all roof sheathing in accordance with requirements of NBC.
- .8 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

- .9 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
  - .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .10 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .11 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .12 Install sleepers as indicated.
- .13 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.
- .14 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .15 Countersink bolts where necessary to provide clearance for other work.
- .16 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

### **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 rough carpentry installation.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .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.
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  - .1 Architectural Woodwork Quality Standards, 1st edition, 2009.
- .3 ASTM International
  - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-11.3-M87, Hardboard.
- .5 CSA International
  - .1 CSA B111-74(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 CSA O153-M1980(R2008), Poplar Plywood.
  - .6 CAN/CSA-Z809-08, Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .7 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2010.
- .8 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .9 Sustainable Forestry Initiative (SFI)
  - .1 SFI-2010-2014 Standard.
- .10 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.

## **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  - .2 Indicate materials, thicknesses, finishes and hardware.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Submit duplicate 300 x 300 mm samples or 300mm long unless specified otherwise of materials.
- .4 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
- .5 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.

## **1.3 QUALITY ASSURANCE**

- .1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).
- .2 Sustainable Standards Certification:
  - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
- .3 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.
- .4 Wood fire rated frames and panels: listed and labelled by an organization accredited by Standards Council of Canada to CAN/ULC-S104 and CAN/ULC-S105.

## **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 60 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 from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
  - .1 CSA O141.
  - .2 CAN/CSA-Z809 or FSC or SFI certified.
  - .3 NLGA Standard Grading Rules for Canadian Lumber.
  - .4 AWMAC premium grade, moisture content as specified.
  - .5 Machine stress-rated lumber is acceptable.
  - .6 Hardwood lumber: moisture contain 6% or less in accordance:
    - .1 National Hardwood Lumber Association (NHLA).
    - .2 AWMAC premium grade, moisture content as specified.
    - .3 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Panel Material: urea-formaldehyde free
  - .1 CAN/CSA-Z809 or FSC or SFI certified.
  - .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
  - .3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
  - .4 Hardwood plywood: to ANSI/HPVA HP-1.
  - .5 Poplar plywood (PP): to CSA O153, standard construction.
  - .6 Particleboard: to ANSI A208.1.
    - .1 Manufactured with recycled wood fiber
  - .7 Hardboard: to CAN/CGSB-11.3.
  - .8 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m<sup>3</sup>.
    - .1 Manufactured with recycled wood fiber
  - .9 Low density fibreboard: to CSA-A247M.

**2.2 FINISH MATERIALS**

- .1 Plastic Laminate: CAN/CSA-A172M, 1.27 mm General Purpose grade; RCMP Project Manager to Choose Color.
- .2 Plastic laminate backings should be used on the reverse side of items which receive plastic laminate facing, to assist in maintaining the dimensional stability of item.
- .3 Plastic Laminate Backing: CAN/CSA-A172M, High pressure paper base laminate without a decorative finish; 0.5 mm thick, smooth surface finish.

**2.3 Wood Base**

- .1 Natural Hardwood Stain Grade
  - .1 Base :Woodland Supply 356-3 base Red Oak 7/16" x 3"

**2.4 Door and Window Casings**

- .1 Natural Hardwood Stain Grade.



- .1 Case: Woodland Supply 356-218 -7/16" x 2 1/8" Red Oak

**2.5 Coat Pegs**

- .1 Solid Birch or maple, 19mm Dia Stain Grade.

**2.6 HANDRAILS.**

- .1 See drawings for details

**2.7 STANDING AND RUNNING TRIM**

- .1 Exterior  
.1 Grade B and Better  
.2 Solid Stock : Fir Paint trade  
.1 See Elevations for sizes

**2.8 ACCESSORIES**

- .1 Contact Adhesives: Water base type.  
.2 Wall Adhesive: Water Base, cartridge type, compatible with wall substrate, capable of achieving durable bond.  
.1 PL400 or approved equal.  
.3 Nails: to CSA B111-1974 (R1998); galvanized for exterior work, interior humid area areas and for treated lumber; plain finish elsewhere.  
.4 Bolts, Nuts, Washers, Blind fasteners, Lags, and Screws: Size and type to suit application; plain finish.  
.1 Wood screws to CSA B35.4-72  
.2 Bolts: Sizes and styles as indicated to ASTM A 307-97  
.5 Lumber for Shimming, Blocking,: Softwood lumber of spruce species.  
.6 Primer: Alkyd primer sealer type.  
.7 Wood Filler: Water base, tinted to match surface finish colour.

**2.9 HARDWARE**

- .1 Drawer Pulls: Amerock "Highland Ridge".  
.2 Hinges: Blum 170 degree or Hettich 165 degree.  
.3 Drawer Slides: Accuride 7432 or Knape & Vogt 8400 or Hettich 5632.  
.4 Closet rods: KV #770 Bright chrome finish heavy wall (3mm) steel tubing, 32mm O.D., complete with KV #764 polished chrome, round flange rod end supports.

**2.10 SHELVING**

- .1 Fabricate shelf and supporting brackets from birch plywood, 19mm thick  
.2 Provide hardboard edging, natural finish, full length of exposed edges in full length pieces (no splices) as follows

- .1 Shelves 1000mm or less in length 8mm hardwood on all exposed edges
- .2 Shelves over 1000mm in length, 19mm thick x 40 mm length
- .3 Set and fill nails of edging ready for on site painting. Conceal other fasteners
- .4 Install closet rods
- .5 Schedule
  - .1 Coat spaces and clothes closets one shelf 350mm deep x width of closet with specified rod
  - .2 Linen shelves on at each of the following heights above the finished floor: 500mm, 875mm, 1250 mm and 162 mm.

## **2.11 SHOP FINISHING**

- .1 Shop finish work in accordance with AWMAC Factory Finishing - Transparent.
- .2

## **2.12 ACCESSORIES**

- .1 Nails and staples: to CSA B111; galvanized to ASTM A123/A123M for exterior work, interior humid areas and for treated lumber; plain stainless steel finish elsewhere.
- .2 Wood screws: plain steel, type and size to suit application.
- .3 Splines: Wood
- .4 Adhesive and Sealants: Recommended 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 wood products installation in accordance with manufacturer's written instructions.
  - .1 Inform Consultant of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied.

### **3.2 INSTALLATION**

- .1 Do finish carpentry to Quality Standards of (AWMAC).
- .2 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.
- .3 Form joints to conceal shrinkage.
- .4 Install trim, with nails.
- .5 Position items of finished carpentry work accurately, level , plumb, true and fasten or anchor securely.

- .6 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .7 Butt and cope internal joints of baseboards to make snug, tight joints. Cut right angle joints of casing and base with mitered joints. Make joints in baseboard, where necessary using a 45 deg scarf type joints.

### **3.3 CONSTRUCTION**

- .1 Shelving:
  - .1 Install shelving as indicated.

### **3.4 INSTALLATION OF SHELVING**

- .1 Fabricate shelf and supporting brackets from birch plywood, 19mm thick
- .2 Provide hardboard edging, natural finish, full length of exposed edges in full length pieces (no splices) as follows
  - .1 Shelves 1000mm or less in length 8mm hardwood on all exposed edges
  - .2 Shelves over 1000mm in length, 19mm thick x 40 mm length
- .3 Set and fill nails of edging ready for on site painting. Conceal other fasteners
- .4 Install closet rods
- .5 Schedule
  - .1 Coat spaces and clothes closets one shelf 350mm deep x width of closet with specified rod
  - .2 Linen shelves on at each of the following heights above the finished floor: 500mm, 875mm, 1250 mm and 162 mm.

### **3.5 SITE TREATMENT OF WOOD MATERIALS**

- .1 Brush apply 2 coats of preservative treatment on exterior located finish carpentry items.
- .2 Apply preservative treatment to manufacturer's instructions.

### **3.6 PREPARATION FOR SITE FINISHING**

- .1 Set exposed fasteners. Apply wood filler in exposed fastener indentations.

### **3.7 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

### **3.8 PROTECTION**

- .1 Protect installed products and components from damage during construction.

- .2 Repair damage to adjacent materials caused by finish carpentry installation.

**END OF SECTION**

**Part 1      General**

**1.1      REFERENCES**

- .1 American National Standards Institute (ANSI)
  - .1 ANSI A208.1-09, Particleboard.
  - .2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
  - .3 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.
- .2 ASTM International
  - .1 ASTM E1333-10, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
  - .2 ASTM D2832-92(R2011), Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.
  - .3 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
- .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  - .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 (2009).
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .5 CSA International
  - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
  - .2 CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
  - .3 CSA O121-08, Douglas Fir Plywood.
  - .4 CSA O141-05(R2009), Softwood Lumber.
  - .5 CSA O151-09, Canadian Softwood Plywood.
  - .6 CSA O153-M1980(R2008), Poplar Plywood.
  - .7 CAN/CSA-Z809-08, Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
- .7 Green Seal Environmental Standards (GS)
  - .1 GS-11-11, Paints and Coatings.
  - .2 GS-36-11, Commercial Adhesives.
- .8 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

- .9 International Organization for Standardization (ISO)
  - .1 ISO 14040-2006, Environmental Management-Life Cycle Assessment - Principles and Framework.
  - .2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.
- .10 National Electrical Manufacturers Association (NEMA)
  - .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).
- .11 National Hardwood Lumber Association (NHLA)
  - .1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011.
- .12 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2010.
- .13 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2011, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .14 Sustainable Forestry Initiative (SFI)
  - .1 SFI-2010-2014 Standard.

## **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
  - .1 Supply Shop drawings for review within two (2) weeks from award of tender.**
  - .2 Indicate details of construction, profiles, jointing, fastening and other related details.
    - .1 Scales: profiles full size, details half full size.
  - .3 Indicate materials, thicknesses, finishes and hardware.
  - .4 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
- .3 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures
  - .2 .
  - .3 Submit duplicate sample size 300 x 300 mm or 300mm long.
  - .4 Submit duplicate samples of laminated plastic for colour selection.
  - .5 Submit duplicate samples of laminated plastic joints, edging, cutouts and postformed profiles.
- .4 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

**1.3 QUALITY ASSURANCE**

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Sustainable Standards Certification:
  - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.
- .3 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1 Protect millwork against dampness and damage during and after delivery.
  - .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.
- .3 Storage and Handling Requirements:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect architectural woodwork from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
  - .1 CSA O141.
  - .2 CAN/CSA-Z809 or FSC or SFI certified.
  - .3 NLGA Standard Grading Rules for Canadian Lumber.
  - .4 AWMAC custom and premium grade, moisture content as specified.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Ensure manufacturing process adheres to Lifecycle Assessment (LCA) Standards to ISO 14040/14041 LCA Standards, CSA Z760-94 Life Cycle Assessment.
- .4 Hardwood lumber: moisture content 6 % or less in accordance with following standards:
  - .1 National Hardwood Lumber Association (NHLA).

- .2 CAN/CSA-Z809 or FSC or SFI certified.
- .3 AWMAC premium grade, moisture content as specified.
- .5 Douglas fir plywood (DFP): to CSA O121, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Plywood resin to contain no added urea-formaldehyde.
- .6 Canadian softwood plywood (CSP): to CSA O151, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Plywood resin to contain no added urea-formaldehyde.
- .7 Hardwood plywood: to ANSI/HPVA HP-1, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Plywood resin to contain no added urea-formaldehyde.
- .8 Poplar plywood (PP): to CSA O153, standard construction, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Plywood resin to contain no added urea-formaldehyde.
- .9 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Particleboard resin to contain no added urea-formaldehyde.
- .10 Birch plywood: to AWMAC Natural, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Plywood resin to contain no added urea-formaldehyde.
- .11 Fibreboard must contain less than 10% roundwood by weight, using weighted average over three month period at manufacturing locations.
  - .1 Fibreboard resin to contain no added urea-formaldehyde.
  - .2 CAN/CSA-Z809 or FSC or SFI certified.
- .12 Hardboard:
  - .1 To CAN/CGSB-11.3, CAN/CSA-Z809 or FSC or SFI certified.
  - .2 Hardboard resin to contain no added urea-formaldehyde.
- .13 MDF (medium density fibreboard) core: to ANSI A208.2, density 769 kg/m<sup>2</sup>, CAN/CSA-Z809 or FSC or SFI certified.
  - .1 Medium density fibreboard performance requirements to: ANSI A208.2.
  - .2 MDF resin to contain no added urea-formaldehyde.
- .14 Thermofused Melamine: to NEMA LD3 Grade VGL.
  - .1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).
- .15 Nails and staples: to CSA B111.
- .16 Wood screws: stainless steel type and size to suit application.
- .17 Splines: wood.
- .18 Sealant: in accordance with Section 07 92 00 - Joint Sealants.
  - .1 Sealants: VOC limit 250 g/L maximum to SCAQMD Rule 1168.



- .19 Laminated plastic adhesive:
  - .1 Adhesive: urea resin adhesive to CSA O112.10 contact adhesive to CAN/CGSB-71.20 resorcinol resin adhesive to CSA O112.10 polyvinyl adhesive to CSA O112.10 two component epoxy thermosetting adhesive.
  - .2 Adhesives: VOC limit 30 g/L maximum to GS-36.
  - .3 Clear Wood Finishes: VOC limit 350 550 g/L maximum to GS-11

### **Part 3 MANUFACTURED UNITS**

#### **3.1 HARDWARE**

- .1 Shelf Standards, Brackets, and Rests: By manufacturer.
- .2 Drawer and Door Pulls: Chrome, solid steel type, 1/4 inch diameter rod.
- .3 Drawer Slides: By manufacturer.
- .4 Hinges: By manufacturer.

#### **3.2 SHOP FINISHING**

- .1 Shop finish work stain and seal factory finishing.

#### **3.3 COUNTER TOPS**

- .1 Core Materials
  - .1 At counter tops with sinks fabricate from Douglas fir plywood (DFP)
  - .2 At all other counter tops may be fabricated from MDF.
- .2 Shop install Plastic laminate
  - .1 Laminate Manufacturers – Nevarmar, Formica, Arborite

#### **3.4 MANUFACTURERS**

- .1 Kitchen Craft – Integra Collection with the following features
  - .1 Wood Doors : Maple - Style Lexington
  - .2 Hardwood drawers: size large
  - .3 170 degree hinges
  - .4 Soft close doors
  - .5 Full extension concealed hinges

#### **3.5 FABRICATION**

- .1 Set nails and countersink screws apply wood filler to indentations, sand smooth and leave ready to receive finish.
- .2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .3 Shelving to cabinetwork to be adjustable unless otherwise noted.

- .4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .7 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .8 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.
- .9 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .10 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.
- .11 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .12 Apply laminated plastic liner sheet where indicated.

#### **Part 4 Execution**

##### **4.1 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 Inform Consultant of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative DCC Representative Consultant.

##### **4.2 INSTALLATION**

- .1 Do architectural woodwork to Quality Standards of AWMAC.
- .2 Install prefinished millwork at locations shown on drawings.
  - .1 Position accurately, level, plumb straight.
- .3 Fasten and anchor millwork securely.
  - .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.
- .4 Use draw bolts in countertop joints.
- .5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

- .6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.
- .7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.
- .8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .9 Install at location as indicated.
- .10 Site apply laminated plastic to units as indicated.
  - .1 Adhere laminated plastic over entire surface.
  - .2 Make corners with hairline joints.
  - .3 Use full sized laminate sheets.
  - .4 Make joints only where indicated approved Consultant.
  - .5 Slightly bevel arises.
- .11 For site application, offset joints in plastic laminate facing from joints in core.

#### **4.3 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 millwork and cabinet work outside surfaces inside cupboards drawers.
  - .2 Remove excess glue from surfaces.

#### **4.4 PROTECTION**

- .1 Protect millwork cabinet work from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.

**END OF SECTION**

Approved: 2010-06-30

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

.1                .

**1.2                REFERENCES**

.1                American National Standards Institute (ANSI)

.1                ANSI 208.1-09, Particleboard.

.2                ASTM International

.1                ASTM D2832-92(R2011), Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.

.2                ASTM D2369-10e1, Standard Test Method for Volatile Content of Coatings.

.3                Canadian General Standards Board (CGSB)

.1                CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.4                CSA International

.1                CSA O112.10-08, Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).

.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.

.5                Forest Stewardship Council (FSC)

.1                FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.6                Green Seal Environmental Standards (GS)

.1                GS-36-11, Commercial Adhesives.

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

.1                Material Safety Data Sheets (MSDS).

.8                National Electrical Manufacturers Association (NEMA)

.1                ANSI/NEMA LD-3-05, High Pressure Decorative Laminates (HPDL).

.9                Scientific Equipment and Furniture Association (SEFA)

.1                SEFA 8-99, Laboratory Furniture.

.10              South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1                SCAQMD Rule 1113-A2011, Architectural Coatings.

.2                SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Submit duplicate samples of joints, edging, cutouts and postformed profiles.
- .3 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .1 Wood Certification: submit vendor's manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
  - .2 Low-Emitting Materials:
    - .1 Submit listing of composite wood products used in building, stating they contain no added urea-formaldehyde resins, laminate adhesives used in building, stating they contain no urea-formaldehyde.
    - .2 Submit listing of adhesives and sealants sealers used in building, showing compliance with VOC and chemical component limits or restrictions requirements.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### **1.5 QUALITY ASSURANCE**

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

### **1.6 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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Laminated plastic for flatwork: to NEMA LD3.
  - .1 Type: general purpose.
  - .2 Grade: HGS.
  - .3 Size: 1.27 mm thick.
  - .4 Colour: integral colour throughout, multilayered.
  - .5 Pattern and Finish: Selected from manufacturers full range of available selections. Up to four different patterns / finishes will be selected.
- .2 Laminated plastic for postforming work: to NEMA LD3.
  - .1 Type: postforming.
  - .2 Grade: HGP .
  - .3 Size: 1.016 mm thick.
  - .4 Pattern and Finish: Selected from manufacturers full range of available selections, Up to four different patterns / finishes will be selected.
- .3 Laminated plastic for backing sheet: to NEMA LD3.
  - .1 Type: backer.
  - .2 Grade: BKM BKL.
  - .3 Size: not less than 0.5 mm thick or same thickness as face laminate.
  - .4 Colour: same colour as face laminate.
- .4 Laminated plastic adhesive: Low VOC acceptable to laminate manufacturer
  - .1 Test for acceptable VOC emissions in accordance with ASTM D2369 and ASTM D2832.
- .5 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.
  - .1 Draw bolts and splines: as recommended by fabricator.

**2.2 FABRICATION**

- .1 Comply with NEMA LD3, Annex A.
- .2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .3 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 3000 mm. Keep joints 600 mm from sink cutouts.
- .5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.

- .6 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.
- .7 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .8 Apply laminated plastic liner sheet to interior of cabinetry.

### **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 work plumb, true and square, neatly scribed to adjoining surfaces.
- .2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.
- .3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.
- .4 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.
- .5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.

#### **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 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

#### **3.4 PROTECTION**

- .1 Cover finished laminated 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**



## 1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C208-95(2001), Specification for Cellulosic Fiber Insulating Board.
  - .2 ASTM C591-01, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
  - .3 ASTM C612-04, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
  - .4 ASTM C726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
  - .5 ASTM C728-05, Standard Specification for Perlite Thermal Insulation Board.
  - .6 ASTM C1126-04, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
  - .7 ASTM C1289-05a, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
  - .8 ASTM E96/E96M-05, Standard Test Methods for Water Vapour Transmission of Materials.
- .2 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S604-M91, Standard for Type A Chimneys.
  - .2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  - .3 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
  - .4 CAN/ULC-S704-03, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

## 1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

- .3 Shop Drawings
  - .1 Submit shop drawings showing attachment details for Z-Girts and flashing

### **1.3 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 Convene pre-installation meeting one week prior to beginning work of this Section on-site installations in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) Section 01 32 16.07 - Construction Progress Schedules - Bar (GANNT) Chart.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordinate with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

## **Part 2 Products**

### **2.1 SUSTAINABLE REQUIREMENTS**

### **2.2 INSULATION**

- .1 Exterior Walls
  - .1 Expanded polystyrene (EPS): to CAN/ULC-S701.
    - .1 Acceptable Product Owens Corning Formular C-300.
      - .1 Type: 4.
      - .2 Compressive strength: 30 psi to ASTM D1621.
      - .3 Thickness: as indicated.
      - .4 Edges: shiplapped.
      - .5 R Value: 5 per inch ASTM C518
      - .6 Water Absorption  $\leq 0.7\%$  to ASTM D2842
      - .7 Water Vapour Permeance: 0.6 perm max to ASTM E96
      - .8 Flexural Strength:  $\geq 60$  PSI to ASTM C203

**2.3 ADHESIVES**

- .1 Manufacturers approved adhesive to Blueskin membrane

**2.4 ACCESSORIES**

- .1 Z-Girts Supports @ 400 O.C. Z Girts to be thermally Broken and 16 gauge.
  - .1 Girts to be attached to concrete with 2-#10 Concrete anchors @ 400 O.C.
  - .2 Girts to be attached to roof joists with 2- ¼" x 2" Tapcon Anchors @ 600 O.C.
- .2 Install with smooth face outwards

**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 WORKMANSHIP**

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys CAN/CGA-B149.1 and CAN/CGA-B149.2 type B L vents.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been inspected and approved by Consultant.

**3.3 EXAMINATION**

- .1 Examine substrates and immediately inform Departmental Representative DCC Representative Consultant in writing of defects.
- .2 Prior to commencement of work ensure:
  - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

**3.4 RIGID INSULATION INSTALLATION**

- .1 Apply adhesive in accordance with manufacturer's recommendations.

- .2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

**3.5 PERIMETER FOUNDATION INSULATION**

- .1 Exterior application: extend board. Install on exterior face of perimeter foundation wall with adhesive.

**3.6 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1      General**

**1.1      REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .2 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - .3 ASTM C1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Canadian Gas Association (CGA)
  - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
  - .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S604-M1991, Type A Chimneys.
  - .2 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.

**1.2      ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

**1.3      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 Convene pre-installation meeting one week prior to beginning work of this Section on-site installations in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordinate with other building subtrades.

- .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

#### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

### **Part 2 Products**

#### **2.1 INSULATION**

- .1 Mineral Wool Batt Insulation : Roxul or Approved Equivalent
  - .1 To Stud depth and spacing required
    - .1 89mm thickness: RSI 2.47 (R14)
    - .2 140mm Thickness: RSI 3.87 (R22)
  - .2 CAN/ULC-S702-97 – Mineral Fiber Thermal Insulation for Buildings Type 1
  - .3 Non Combustible
  - .4 Smoke Development less than 5
  - .5 Flame spread = 0

#### **2.2 SOUND INSULATION**

- .1 Mineral Wool Batt Insulation : Roxul Safe and Sound or Approved Equivalent
  - .1 To Stud depth and spacing required
    - .1 89mm thickness: RSI 2.47 (R14)
    - .2 140mm Thickness: RSI 3.87 (R22)
  - .2 CAN/ULC-S702-97 – Mineral Fiber Thermal Insulation for Buildings Type 1
  - .3 Non Combustible
  - .4 Smoke Development less than 5
  - .5 Flame spread = 0

#### **2.3 ACCESSORIES**

- .1 Insulation clips:
  - .1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
- .2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.
- .3 Staples: 12 mm minimum leg.
- .4 Tape: as recommended by manufacturer.

**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 – INSULATION - THERMAL**

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.
- .2 Install insulation with factory applied vapour barrier facing warm side of building spaces and vapour permeable membrane facing cold side. Lap ends and side flanges of membrane over framing members. Retain in position with insulation clips installed as recommended by manufacturer. Tape seal butt ends and lapped side flanges. Do not tear or cut vapour barrier.
- .3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .4 Do not compress insulation to fit into spaces.
- .5 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B L vents.
- .6 Do not enclose insulation until it has been inspected and approved by Consultant.

**3.3 INSTALLATION – INSULATION – ACOUSTIC**

- .1 Install acoustic batt insulation between studs in sound rated partitions in areas indicated. Ensure batts fill space continuously from floor to ceiling, over door and window openings, below window openings and around corners.
- .2 Coordinate installation of acoustic insulation with other work
- .3 Ensure insulation is packed around cut openings in gypsum board, behind outlet boxes, around plumbing, heating or structural items passing through the system or abutting walls.

**3.4 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

**1.2 REFERENCES**

- .1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)
- .2 Green Seal Environmental Standards
  - .1 Standard GC-03-93, Anti-Corrosive Paints.
  - .2 Standard GS-11-97, Architectural Paints.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1113-06, Architectural Coatings.
- .5 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S101-04, Fire Endurance Tests of Building Construction and Materials.
  - .2 CAN/ULC-S102-03, 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.
  - .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 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Test reports: 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.



- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and .
- .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

#### **1.4 QUALITY ASSURANCE**

- .1 Applicators to conform to CUFCA Quality Assurance Program.
- .2 Qualifications:
  - .1 Installer: person specializing in sprayed insulation installations approved by manufacturer with 5 documented experience.
  - .2 Manufacturer: company with minimum 5 years' 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 gloves respirators dust masks long sleeved clothing eye protection protective clothing when applying foam insulation.
  - .3 Workers must not eat, drink or smoke while applying foam insulation.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

#### **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 General purpose spray-applied foam insulation:
  - .1 Two component quick cure polyurethane foam. Chemically cured Class "A" with flame spread rating less than 25
  - .2 Dow Froth-Pack or approved equivalent
- .2 Foamed in Place Sealant: - Low Pressure Type single component polyurethane insulation to CAN/ULC-S710.1
  - .1 Dow Great Stuff Window and Door or approved equivalent.
- .3 Primers: in accordance with manufacturer's recommendations for surface conditions.

**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 APPLICATION**

- .1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 manufacturer's printed instructions.
- .2 Use primer where recommended by manufacturer.
- .3 Apply sprayed foam insulation in thickness as indicated mm.

**3.3 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 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
  - .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

**1.2 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:
    - .1 Product characteristics.
    - .2 Performance criteria.
    - .3 Limitations.
- .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
- .4 Quality assurance submittals:
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions and comply with written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**1.3 QUALITY ASSURANCE**

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Mock-Ups:
  - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box. Mock-up may be part of finished work.
  - .3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
  - .4 Locate where directed where indicated.
  - .5 Allow 24 hours for inspection of mock-up by Departmental Representative DCC Representative Consultant before proceeding with vapour barrier work.

- .3 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may not remain as part of finished work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative DCC Representative Consultant .

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **Part 2 Products**

#### **2.1 SHEET VAPOUR BARRIER**

- .1 Polyethylene film: to CAN/CGSB-51.34, 10 mm thick , 6mm thick.

#### **2.2 ACCESSORIES**

- .1 Joint sealing tape: air resistant pressure sensitive adhesive tape, cloth fabric duct tape type recommended by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.
- .2 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer. To Section 07 92 00 - Joint Sealants.
- .3 Staples: minimum 6 mm leg.
- .4 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Ensure services are installed and inspected prior to installation of retarder.
- .2 Install sheet vapour retarder on warm side of exterior wall ceiling and floor assemblies prior to installation of gypsum board to form continuous retarder.
- .3 Use sheets of largest practical size to minimize joints.
- .4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

#### **3.2 EXTERIOR SURFACE OPENINGS**

- .1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

#### **3.3 PERIMETER SEALS**

- .1 Seal perimeter of sheet vapour barrier as follows:

- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
- .2 Lap sheet over sealant and press into sealant bead.
- .3 Install staples through lapped sheets at sealant bead into wood substrate.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

#### **3.4 LAP JOINT SEALS**

- .1 Seal lap joints of sheet vapour barrier as follows:
  - .1 Attach first sheet to substrate.
  - .2 Apply continuous bead of sealant over solid backing at joint.
  - .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
  - .4 Install staples through lapped sheets at sealant bead into wood substrate.
  - .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

#### **3.5 ELECTRICAL BOXES**

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
  - .1 Install moulded box vapour barrier.
  - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

#### **3.6 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 REFERENCES**

- .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.

**1.2 PERFORMANCE REQUIREMENTS**

- .1 Provide an air barrier constructed to perform as a continuous air barrier assembly and as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water which has penetrated the cladding. Membrane shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.

**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.
  - .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
  - .3 Provide drawings of special joint conditions .
- .3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Existing Substrate Condition: report deviations, as described in PART 3 - EXAMINATION in writing to Consultant.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and .
  - .4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

## 1.4 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Applicator: company specializing in performing work of this section with minimum years documented experience with installation of air/vapour barrier systems.
    - .1 Completed installation must be approved by the material manufacturer.
  - .2 Applicator: company:
    - .1 Currently licensed by Liscenced Contractor by the Air Barrier quality Assurance Program (QAP) used by the NABA.
    - .2 Must maintain their license throughout the duration of the project.
  - .3 Project Requirements:
    - .1 Perform Work in accordance with manufacturer's written instructions and this specification.
    - .2 Maintain one copy of manufacturer's written instructions on site.
    - .3 Allow access to Work site by the air barrier membrane manufacturer's representatives.
    - .4 Submit document stating the applicator of the primary air barrier membranes specified in the section is authorized by the manufacturer as suitable for the execution of the work.
  - .4 Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, flashings and adhesives.
  - .5 Single-Source Responsibility: Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.
  - .6 Provide products which comply with all federal, provincial, and local regulations controlling use of volatile organic compounds (VOCs).
- .2 Mock-Up:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct typical exterior wall, window module, incorporating window frame and overlap to existing air vapour barrier .
  - .3 Locate where directed.
  - .4 Mock-up may remain as part of finished work.
  - .5 Test mock-up for air and water infiltration in accordance with ASTM E783 and ASTM E1105
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .2 Twice during progress of Work at 25% and 60%complete.
  - .3 Upon completion of Work, after cleaning is carried out.



**1.5 INSPECTIONS**

- .1 In accordance with 02 21 00 - Allowances

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Avoid spillage: immediately notify Consultant if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.

**1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

**1.8 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.

**1.9 SEQUENCING**

- .1 Sequence work in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.

**1.10 WARRANTY**

- .1 Provide manufacturer's standard 10-year assembly warranty.
- .2 Warranty: include coverage of installed sealant and sheet materials which:
  - .1 Fail to achieve air tight and watertight seal.
  - .2 Exhibit loss of adhesion or cohesion.
  - .3 Do not cure.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Air/vapor barrier membrane components and accessories must be obtained as a single source from the membrane manufacturer to ensure total system compatibility and integrity.
- .2 Acceptable manufacturer: Henry Baker / Blueskin SA air barrier system or equivalent products approved by Project Manager. All products must be by same manufacturer and approved for use as a complete system and for compatibility with existing and adjacent building materials.

**2.2 MEMBRANES**

- .1 Primary sheet air/vapor barrier membrane shall be Blueskin SA or approved equivalent.
  - .1 SBS modified bitumen, self-adhering sheet membrane complete with a cross laminated
  - .2 Polyethylene film. Membrane shall have the following physical properties:
    - .1 Air leakage: <0.0001 CFM/ft<sup>2</sup> @1.6 lbs/ft<sup>2</sup> to ASTM E 2178 and ASTM E 283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft<sup>2</sup> for 1 hour and gust wind load pressure of 62.8 lbs/ft<sup>2</sup> for 10 seconds when tested at 1.6 lbs/ft<sup>2</sup> to ASTM E331
    - .2 Tested to ASTM E 2357 for the air barrier assembly,
    - .3 Vapor permeance: 0.05 perms to ASTM E96
    - .4 Membrane Thickness: 0.0394" (40 mils)
    - .5 Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M
    - .6 Elongation: 200% to ASTM D412-modified
    - .7 Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements
    - .8 Apply air barriers in strict accordance with manufacturer's instructions, including temperature requirements. For application in low temperatures, use Blueskin SA LT.
- .2 Through-wall flashing membrane (Self-Adhering) shall be Blueskin TWF or approved equivalent.
  - .1 SBS modified bitumen, self-adhering sheet membrane complete with a cross laminated polyethylene film.
  - .2 Membrane shall have the following physical properties:
  - .3 Membrane Thickness: 0.0394 inches (40 mils)
  - .4 Film Thickness: 4.0 mils
  - .5 Flow (ASTM D5147): Pass @ 212 degrees F
  - .6 Puncture Resistance: 134 lbf to ASTM E154
  - .7 Tensile Strength (film): 5723 psi ASTM D882
  - .8 Tear Resistance: 13lbs. MD to ASTM D1004
  - .9 Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M

### 2.3 PRIMERS

- .1 PRIMERS
- .2 Use primer where recommended by manufacturer.
- .3 Use primer for installation over wood substrate unless manufacturer representative permits installation specific to project conditions without priming.
- .4 Primer must be used for low temperature installations or in situations where required adhesion is not achievable without its use.
- .5 Use primer for laps and improved adhesion at joints and at concrete / steel lap conditions.
- .6 Sealants in accordance with Section 07 92 00 - Joint Sealants.
- .7 Primer for self-adhering membranes at all temperatures shall be by same manufacturer as Air-Barrier membrane, and shall be a quick drying, rubber based adhesive designed to enhance the adhesion of self-adhesive membranes.
- .8 Verify compatibility with all adjacent materials.

## 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 installation.
- .2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials installation.
- .3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials installation.

### 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 Consultant in writing.
- .4 Do not start work until deficiencies have been corrected.
  - .1 Beginning of Work implies acceptance of conditions.

**3.4 PREPARATION**

- .1 Remove loose or foreign matter, which might impair adhesion of materials.
- .2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
- .4 Ensure metal closures are free of sharp edges and burrs.
- .5 Prime substrate surfaces to receive adhesive sealants in accordance with manufacturer's instructions.

**3.5 INSTALLATION**

- .1 Install materials in accordance with manufacturer's instructions.

**3.6 FIELD QUALITY CONTROL**

- .1 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

**3.7 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**3.8 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                SECTION INCLUDES**

- .1            Bevelled board siding for walls and soffits.

**1.2                RELATED SECTIONS**

- .1            Section 06100 - Rough Carpentry: Sheathing paper.
- .2            Section 06200 - Finish Carpentry: Exterior wood trim at windows.
- .3            Section 07900 - Sealants: Sealant at openings and dissimilar materials.

**1.3                SAMPLES**

- .1            Submit samples to requirements of Section 01005.
- .2            Samples: Submit two samples 300 x 300 in size, illustrating: surface, texture, and available colors.

**1.4                QUALITY ASSURANCE**

- .1            Grade materials in accordance with the following:
  - .1            Lumber Grading: Certified by NLGA.

**Part 2            Products**

**2.1                MANUFACTURERS**

- .1            Cape Cod Siding.

**2.2                SIDING MATERIALS**

- .1            Strapping: Spruce, Pine, Fir NLGA.122c, "standard, light framing grade, kiln dried, dressed.
- .2            Siding Board siding, Western Lodge Pole Pine, No 1 Select or Better, Rough face, free of knot holes or loose knots. Size 19mm thickness, 150mm with profiles indicated on drawings.
- .3            Manufacturer to supply all trim boards to match siding.

**2.3 ACCESSORIES**

- .1 Nails: Hot dipped galvanized; pre-finished to match siding finish, supplied by manufacturer.
- .2 Stain: Penetrating solid color by Olympic, Pratt and Lambert or Glidden.

**2.4 FABRICATION - BOARD SIDING**

- .1 Fabricate boards to profile shown. Provide boards in longest practical lengths.
- .2 Prefinish prior to shipping all surfaces of exterior siding and trim with two coats of stain. Apply stain by brush roller, spray or dipping in accordance with manufacturer printed instructions providing a uniform appearance. Wood must be clean and dry without touching. Spreading rate of application shall fall within the stain manufacturers published ranges.

**2.5 FINISH**

- .1 Pre-finish colour: colour as selected by RCMP Property Manager.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify that substrate surfaces are ready to receive work.

**3.2 PREPARATION - SITE TREATMENT OF WOOD MATERIALS**

- .1 Site apply preservative treatment in accordance with manufacturer's instructions.
- .2 Treat site-sawn ends. Allow preservative to cure prior to erecting materials.
- .3 Prime paint surfaces in contact with cementitious materials.

**3.3 INSTALLATION - BUILDING PAPER**

- .1 Install one layer of Weather Barrier horizontally on sheathed walls.

**3.4 INSTALLATION - SIDING**

- .1 Install siding, to manufacturer's instructions.
- .2 Install 19 x 64mm vertical wood strapping and max of 406mm o.c.. Provide continuous strapping near termination points of siding and around all openings and at corners. Nail strapping trough into wood stud framing

- .3 Install siding with edge square at vertical conditions where indicated on drawings, tight to openings; use full length boards; accumulation of short lengths in not permitted
- .4 At butt joints scarf together Lapp w/45 degree cuts.
- .5 Evenly distribute boards with lighter and darker shades of stain for a balanced overall appearance. Coat field cuts with stain matching factory applied finish.
- .6 Face nail siding board with two nails at each support
- .7 Install and securely fasten wood trim.
- .8 Where nailing is exposed, evenly space nails.
- .9 No boards shorter than 3 meter in length are to be used except where called for in elevation.

**3.5 PREPARATION FOR SITE FINISHING**

- .1 Sand work smooth and set exposed nails.

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for sheet metal roofing including mansard roofs.

**1.2 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 07 92 00 - Joint Sealing.

**1.3 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.

#### **1.4 SUBMITTALS**

- .1 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures and .
- .2 Submit product data in accordance with Section 01 33 00 - Submittal Procedures .
- .3 Submit product data sheets for bitumen roofing felts insulation. Include:
  - .1 Product characteristics.
  - .2 Performance criteria.
  - .3 Limitations.
- .4 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures .
- .5 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.
- .6 Submit samples in accordance with Section 01 33 00 - Submittal Procedures .
- .7 Submit duplicate 300 x 300 mm samples of each sheet metal material.

#### **1.1 STANDARDS**

- .1 Design of cladding system in accordance to the latest edition of:
  - .1 CSA-S136 for the design of Cold Formed Steel Structural Members
  - .2 Canadian Sheet Steel Building Institute Standards 10M, 20M, B11.
  - .3 National Building Code of Canada

#### **1.2 QUALITY ASSURANCE**

- .1 Manufacturer of roof system, and installer shall demonstrate at least five years experience in projects similar in scope.

.2 This section establishes the standard of quality required for the complete metal roof system.

Proposed substitutions must meet this standard, and will be considered as follows:

- .1 A written request for approval of a substitution is received at least ten (10) days prior to tender closing.
- .2 The request includes a complete item-by-item description comparing the proposed substitution to the specified system, together with manufacturer's literature, samples, test data, engineering standards and performance evaluation indicating comparable standards to those specified.

### 1.3 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 Deflection of the roof system is not to exceed  $1/180^{\text{th}}$  of the span for the specified live loading.

.3 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.

- .1 Temperature Change (Range): 20 deg C, ambient; 40 deg C, material surfaces

### 1.4 SAMPLES

.1 Submit samples of standard coloured metal roof sheet for review by the consultant, prior to fabrication.

### 1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

- .1 Indicate arrangement of pre-finished Roof Sheet, including joints, types and locations of supports, fasteners, flashing, gutters, mitres, and all metal components related to the roof installation. Include for, Membrane Air/Vapour Barrier, Insulation, as part of the roof system.
- .2 Drawings shall be signed and sealed by a Professional Engineer, attesting to the ability of the metal panels assembly to withstand the specified loads.

### 1.6 MAINTENANCE DATA

.1 Provide maintenance data for cleaning and maintenance of panel finishes for incorporation into manual.

### 1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

- .1 Store components and materials in accordance with panel manufacturer's recommendations and protect from elements.
- .2 Protect prefinished steel during fabrication, transportation, site storage and erection, in accordance with CSSBI Standards.

### **1.8 GUARANTEE**

- .1 For work in this section, warranty by installer against defects or deficiencies in materials or workmanship shall be for a period of one year from date of substantial completion.

### **1.9 WARRANTY**

- .1 Provide a manufacturer's written warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish within the warranty period. Warranty period for finish: 35 years after the date of Substantial Completion. The values below are based on normal environments and exclude any aggressive atmospheric conditions.
  - .1 10000 Series (Polyvinylidene Flouride - PVDF) will not visibly (within 10 metres to the unaided maked eye) crack, chip, or peel (lose adhesion) for thirty-five (35) years from date of application. This does not include minute fracturing that may occur during the normal fabrication process. 10000 Series (Polyvinylidene Flouride - PVDF) will not chalk in excess of a number eight (8) rating, in accordance with ASTM D-4214-98 method D659 at any time for thirty-five (35) years from date of installation (35.5 yrs from application); will not change colour more than five (5.0) Hunter  $\Delta E$  units as determined by ASTM method D-2244-02.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS:**

- .1 Roof System: Tradition100-4 by Vicwest.
  - .1 Underlayment: Membrane shall be as per section 07 27 00.01.
  - .2 Clip System:
    - .1 Thermally responsive clips to be fabricated from a minimum of 0.91 mm (.036") steel, with minimum Z275 galvanized coating designed to accommodate expansion and contraction of the roof sheet.
    - .2 Roof Fasteners: As specified by manufacturer, to resist wind uplift and sliding snow forces.
  - .3 Prefinished Roof Sheet, exposed to exterior.
    - .1 Profile: Tradition 100-4, with I-style ribs at 400 mm spacing.
    - .2 Panel: Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having a nominal core thickness 0.76mm (0.030").
  - .4 Snap Cap
    - .1 Provide 25 mm high snap caps for full length of the roof panel and retained by panel clips, fabricated from Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having a minimum nominal core thickness 0.61mm (0.024"). Finish and colour to match roof sheet.

### **2.2 PANEL FINISHES:**

- .1 Prefinished Roof Sheet coating Prepainted with 10,000 Series on interior face

### **2.3 COLOUR**

- .1 Prefinished Roof sheet colour to be selected from the manufacturer's standard colour range.

### **2.4 ACCESSORIES**

- .1 Flashing: In accordance with Section 07 62 00. Formed from same materials as the roof sheet.  
Custom fabricated to suit architectural details, as required.
- .2 Closures: Foam and metal closures to suit profiles selected, to manufacturer's recommendations.
- .3 Sealants: In accordance with manufacturer's recommendation and Section 07 92 00.

### **2.5 FABRICATION**

- .1 Fabricate roof components to comply with dimensions, profiles, gauges and details as shown on the shop drawings, including fascia and soffit panels and all companion flashing.
- .2 Fabricate all components of the system in the factory, ready for field installation.
- .3 Provide roof sheet and all accessories in longest practicable length to minimize field lapping of joints.

## **PART 3 — EXECUTION**

### **3.1 EXAMINATION**

- .1 Examine work of other Sections upon which work of this Section depends.
- .2 Report all discrepancies to consultant before beginning work on the roof system.

### **3.2 INSTALLATION**

- .1 Thermal & Moisture Protection:
  - .1 Thermal Barrier: Install exterior grade gypsum board Thermal Barrier perpendicular to flutes of Structural Liner. Fasten using manufacturer's recommended fasteners, with spacing to suit wind loading conditions.
  - .2 Air/Vapour Barrier: Install membrane Air/Vapour Barrier to manufacturer's recommendations. Ensure all joints are properly lapped, sealed and tied in with wall air/vapour barriers to ensure airtight construction. Provide a continuous seal at all openings in the roof system.
  - .3 Clip and Subgirts: Attach Tradition clips, hat bar, and zee clips using fasteners as recommended by the manufacturer, to suit the substrate.
  - .4 Insulation: Install rigid Insulation in two layers, as shown on the drawings. Tightly butt against support clips. Insulation should be continuous.
- .2 Roof Panel Installation
  - .1 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.
  - .2 Install the seam-cap at all side laps as shown on the approved shop drawings. Add sealant as required. Mitre snap-cap as required to resist water entry.

- .3 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.
- .4 Provide notched and formed closures, sealed against weather penetration, at changes in pitch, and at ridges and eaves, where required.
- .5 Install all companion flashing gutters, ventilators as shown on the shop drawings. Use concealed fasteners when possible. Exposed fasteners to match colour of roof sheet.

### **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 Architect and only where appearance after touch-up is acceptable to Architect.
- .3 Replace damaged panels and components that, in opinion of the Architect, cannot be satisfactorily repaired.

**END OF SECTION**

**Part 1            General**

**1.1            RELATED SECTIONS**

- .1    Section 01 33 00 - Submittal Procedures.
- .2    Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

**1.2            REFERENCES**

- .1    The Aluminum Association Inc. (AA)
  - .1    Aluminum Sheet Metal Work in Building Construction-2000.
  - .2    AA DAF45-97, Designation System for Aluminum Finishes.
- .2    American Society for Testing and Materials (ASTM International)
  - .1    ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2    ASTM A240/A240M-02, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  - .3    ASTM A591/A591M-98, Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
  - .4    ASTM A606-01, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  - .5    ASTM A653/A653M-01a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .6    ASTM A792/A792M-02, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .7    ASTM B32-00, Standard Specification for Solder Metal.
  - .8    ASTM B370-98, Standard Specification for Copper Sheet and Strip for Building Construction.
  - .9    ASTM D523-89(1999), Standard Test Method for Specular Gloss.
  - .10    ASTM D822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3    Canadian Roofing Contractors Association (CRCA)
  - .1    Roofing Specifications Manual 1997.
- .4    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  - .2    CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  - .3    CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
- .5    Canadian Standards Association (CSA International)

- .1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
- .2 CSA-A440-00/A440.1-00 - A440-00, Windows / Special Publication A440.1-00, User Selection Guide to CSA Standard A440-00, Windows.
- .3 CSA B111-1974(R1998), Wire Nails, Spikes and Staples.

### **1.3 SAMPLES**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit 50 x 50 mm samples of each type of sheet metal material, colour and finish.

## **Part 2 Products**

### **2.1 PREFINISHED STEEL SHEET**

- .1 Zinc coated (galvanized) steel sheet similar to metal cladding / roofing: commercial quality to ASTM A 653/A 653M, with Z275 (G90) designation zinc coating and SMP finish. Sheet steel to be min 24 GA.

### **2.2 ACCESSORIES**

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
- .3 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. same as sheet metal being secured.
- .4 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .5 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .6 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .7 Touch-up paint: as recommended by prefinished material manufacturer.

### **2.3 FABRICATION**

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AA-Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.

- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

## 2.4 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated steel to match roof and walls.
- .2 Form eaves troughs and downpipes from 24 GA steel to be chosen from manufacturers standard color set.

## Part 3 Execution

### 3.1 INSTALLATION

- .1 Install sheet metal work in accordance with CRCA FL series details, FL
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
- .8 Caulk flashing at cap flashing with sealant.
- .9 Install pans, where shown around items projecting through roof membrane.

### 3.2 EAVES TROUGHS AND DOWNPIPES

- .1 Install eaves troughs and secure to building at 750 mm on centre as per manufacturers requirements through spacer ferrules. Slope eaves troughs to downpipes as indicated. Solder joints watertight.
- .2 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1500 mm on centre; minimum two straps per downpipe. Install splash pans as indicated.

**END OF SECTION**



**Part 1            General**

**1.1                REFERENCES**

- .1    Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).
- .2    Underwriter's Laboratories of Canada (ULC)
  - .1    ULC-S115-2005, Fire Tests of Fire stop Systems.

**1.2                DEFINITIONS**

- .1    Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2    Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3    Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4    Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.
  - .1    Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

**1.3                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.
  - .2    Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3    Shop Drawings:
  - .1    Submit shop drawings of the proposed material, reinforcement, anchorage, fastenings and method of installation. Through the fire walls as shown on drawing A2.0
  - .2    Construction details should accurately reflect actual job conditions.
- .4    Samples:
  - .1    Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
  - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and .
  - .4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

#### **1.4 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Installer: company specializing in fire stopping installations and approved by manufacturer.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative Departmental Representative DCC Representative Consultant in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) Section 01 32 16.07 - 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.
- .3 Provide shop drawings of proposed ULC listed fire stopping systems for approval by Consultant
- .4 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .2 Once during progress of Work at 50% complete.
  - .3 Upon completion of Work, after cleaning is carried out.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
  - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

**Part 3 Execution**

**3.1 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 COORDINATION**

- .1 General Contractor is to coordinate work between sub-contractors to ensure proper fire stopping coordination
  - .1 Fire stopping installer is to review site prior to and during installation of work by other trades
  - .2 Ensure that work by all trades is installed in such a manor to meet the requirements of ULC listed fire stopping systems approved for use.
  - .3 Do not enclose shafts, walls and other spaces until completion of all fire stopping work.
  - .4 Photograph completion of fire stopping in all concealed spaces prior to enclosing

**3.3 PREPARATION**

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
  - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

**3.4 INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

**3.5 SEQUENCES OF OPERATION**

- .1 Proceed with installation only when submittals have been reviewed by Consultant.

- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
  - .1 Ensure pipe insulation installation precedes fire stopping.

### 3.6 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### 3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

### 3.8 SCHEDULE

- .1 All Penetrations through fire wall as shown on sheet A2.0
- .2 Fire stop and smoke seal at:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Top of fire-resistance rated masonry and gypsum board partitions.
  - .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
  - .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
  - .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
  - .6 Openings and sleeves installed for future use through fire separations.
  - .7 Around mechanical and electrical assemblies penetrating fire separations.
  - .8 Rigid ducts: greater than 129 cm<sup>2</sup> : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .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).

**1.2 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 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 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.

### **1.3 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

### **1.4 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.
- .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 joint sealants from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

### **1.5 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Proceed with installation of joint sealants only when:
    - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
    - .2 Joint substrates are dry.
    - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
  - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

### **1.6 ENVIRONMENTAL REQUIREMENTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.
- .2 Conform to manufacturers recommended installation conditions for applications of sealants

- .3 Ventilate area of work by use of portable supply and exhaust fans.

## **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.
- .4 All sealants to be used in accordance with manufacturers recommended applications
- .5 It remains the contractors responsibility to verify compatibility of the sealant with the substrate, primers, backer rods and weather conditions prior to installation.
- .1 Bring any discrepancies with the above to the attention of the project manager.

### **2.2 SEALANT MATERIAL DESIGNATIONS**

- .1 Exterior joints in horizontal wearing (concrete) surfaces: Polyurethane, semi-self-levelling, moisture curing, non-staining, non-bleeding, colour as selected.
- .1 ASTM C920
- .2 Single Component
- .3 Pourable
- .4 Class – Cyclic Movement - 100/50
- .5 CAN/CGSB – 19.13-M87
- .6 Acceptable Product: Vulkem 45 SSL – Tremco Sealants, or approved equivalent.
- .2 General exterior use: Silicone, neutral cure ultra-low modulus, moisture curing, nonstaining, nonbleeding, colour as selected.
- .1 ASTM C920
- .2 Single Component
- .3 Non-Sag
- .4 Class – Cyclic Movement - 100/50
- .5 Class ‘A’
- .6 ASTM C1248, C1382, E84
- .7 CAN/CGSB – 19.13-M87
- .8 Acceptable Product: Spectrem 1 – Tremco Sealants, or approved equivalent.
- .3 Glazing: Silicone, neutral cure, medium modulus, colour as selected.



- .1 ASTM C920
  - .2 Single Component
  - .3 Non-Sag
  - .4 Class – Cyclic Movement - 50
  - .5 Class ‘A’
  - .6 ASTM C1248
  - .7 CAN/CGSB – 19.13-M87
  - .8 Acceptable Product: Spectrem 2 – Tremco Sealants, or approved equivalent.
- .4 Air-Barrier to Window air-seal sealant: Silyl-terminated polyether polymer (STPe), moisture cure, medium modulus.
- .1 Compatible with Air-Barrier system.
  - .2 ASTM C920
  - .3 Single Component
  - .4 Non-Sag
  - .5 Class – Cyclic Movement - 25
  - .6 Class ‘A’
  - .7 Acceptable Product: Bakor HE925 BES, or approved equivalent.
- .5 General interior use: painted gypsum, painted concrete, painted concrete block: Acrylic latex, colour as selected.
- .1 Low VOC.
  - .2 Single Component
  - .3 Non-Sag
  - .2 Class – Cyclic Movement - 12.5
  - .3 Class ‘A’
  - .4 CAN/CGSB 19-GP-14M
  - .5 Acceptable Product: Tremflex 834 – Tremco Sealants, or approved equivalent.
- .6 Plumbing fixtures and general washroom / kitchen (wet-area) usage: sinks, tubs, urinals, water-closets, vanities: Silicone, acetoxo, moisture curing, with fungicide.
- .1 ASTM C920
  - .2 Single Component
  - .3 Non-Sag
  - .4 Class – Cyclic Movement – 25
  - .5 Class ‘A’
  - .6 CAN/CGSB – 19.13-M87
  - .7 Acceptable Product: Tremsil 200 – Tremco Sealants, or approved equivalent.

- .7 Acoustical Sealant: to ASTM C919: Synthetic rubber, single-component, non-skinning, non-hardening.
  - .1 Single Component
  - .2 Non-Sag
  - .3 Class – Cyclic Movement – N/A
  - .4 CAN/CGSB 19.21 M87
  - .5 Acceptable Product: Acoustical Sealant – Tremco Sealants, or approved
  
- .8 Preformed compressible and non-compressible back-up materials:
  - .1 Polyethylene, urethane, neoprene or vinyl foam:
    - .1 Extruded open closed cell foam backer rod.
    - .2 Size: oversize 30 to 50 %.
  - .2 Neoprene or butyl rubber:
    - .1 Round solid rod, Shore A hardness 70.
  - .3 High density foam:
    - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m<sup>3</sup> density, or neoprene foam backer, size as recommended by manufacturer.
  - .4 Bond breaker tape:
    - .1 Polyethylene bond breaker tape which will not bond to sealant.

### 2.3 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

## 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 Visually inspect substrate.
  - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  - .3 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 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

### **3.5 MIXING**

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

### **3.6 APPLICATION**

- .1 Sealant:
  - .1 Apply sealant in accordance with manufacturer's written instructions.
  - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
  - .3 Apply sealant in continuous beads.
  - .4 Apply sealant using gun with proper size nozzle.
  - .5 Use sufficient pressure to fill voids and joints solid.
  - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
  - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
  - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
  - .1 Cure sealants in accordance with sealant manufacturer's instructions.
  - .2 Do not cover up sealants until proper curing has taken place.

### **3.7 CLEANING**

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

- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

**3.8 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Exterior Doors: Insulated Steel
- .2      Wood doors: non-rated.

**1.2                RELATED SECTIONS**

- .1      Section 06200: Wood door frames.
- .2      Section 08710 - Door Hardware.
- .3      Section 08800 - Glazing.
- .4      Section 09910 - Painting: Site finishing doors.

**1.3                SUBMITTALS**

- .1      Submit under provisions of General Instructions.
- .2      Product Data: Indicate door core materials and construction; veneer species, type and characteristics; factory machining criteria, factory finishing criteria.
- .3      Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .4      Indicate each type of door, material, steel core, thickness, mortises, reinforcements, location of exposed fasteners, openings, glazed louvered, arrangement of hardware and finishes.

**1.4                QUALITY ASSURANCE**

- .1      Perform work in accordance with AWMAC Quality Standard, Custom Grade.
- .2      Finish doors in accordance with AWMAC Quality Standard, to grades identified in schedule.

**1.5                WARRANTY**

- .1      Provide warranty to the following term:
  - .1      Exterior Doors: five (5) years.
  - .2      Interior Doors: two (2) years.

- .2 Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction.

## **Part 2 Products**

### **2.1 MANUFACTURERS**

- .1 Exterior Doors
  - .1 All Weather Windows: Strong Arm steel entry doors.
  - .2 Or approved equal.
- .2 Interior Doors
  - .1 Masonite: wood veneer book matched oak Pre-finished Natural
  - .2 Premdoor: wood veneer book matched oak Pre-finished Natural.

### **2.2 DOOR TYPES**

- .1 Flush Exterior Doors: Insulated aluminium 6 panel doors, prehung type. Sheet Steel to commercial quality, with whipped zinc finish or mill phosphate finish. For mechanical room doors, delete embossed panels. Cores to be injected with rigid urethane bonded to steel skins. R value min R12. Overall door thickness 45mm.
  - .1 Door bumpers: single stud neoprene type, 3 per door
  - .2 Doors to be complete with bottom weather stripping and vinyl bulb magnetic weather stripping.

### **2.3 DOOR CONSTRUCTION**

- .1 Core Hollow: to CAN/DSA-0132.2.2.
- .2 Steel Exterior doors: to ASTM A 526W25

### **2.4 FLUSH DOOR FACING**

- .1 Veneer Facing (Flush Interior Doors): AWMAC Custom quality species wood, with book matched grain, transparent finish.

### **2.5 ACCESSORIES**

- .1 Facing Adhesive: Type 3 - waterproof.
- .2 Glazing Stops: Wood, of same species as door facing.

### **2.6 FABRICATION**

- .1 Fabricate non-rated doors in accordance with AWMAC Quality Standards requirements.

- .2 Provide lock blocks at lock edge for hardware reinforcement.
- .3 Factory pre-fit doors for frame opening dimensions identified on shop drawings.

**2.7 FINISH**

- .1 Factory finish doors in accordance with approved sample.

**2.8 STORAGE AND PROTECTION**

- .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
- .2 Store doors within well ventilated room, off floor, in accordance with manufacturer's recommendations.
- .3 Protect doors from scratches, handling and other damage.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install doors in accordance with manufacturer's instructions.
- .2 Adjust hardware for correct function
- .3 Install stops.

**3.2 INSTALLATION TOLERANCES**

- .1 Conform to NWWDA requirements for fit and clearance tolerances and maximum diagonal distortion.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SCOPE OF WORK**

- .1 Remove and dispose of existing windows.
- .2 Provide labour, material, equipment and services necessary and incidental to the general replacement of the windows. Replace window components as described herein.

### **1.2 REFERENCES**

- .1 CAN/CGSB-12.8-97, Insulating Glass Units.
- .2 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .3 CAN/CGSB-79.1-M91, Insect Screens.
- .4 CSA-A440-90, Windows
- .5 CSA-A440-05, Windows
- .6 CSA-A440.1-90, User Selection Guide to A440
- .7 CSA-A440.2-90, Energy Performance of Windows and Other Fenestration Systems
- .8 CSA-A440.3-90, User Guide to A440.2
- .9 CSA-A440.4-98, Window and Door Installation
- .10 CAN/CSA- G164 – M92 (R2003), Hot Dip Galvanizing of Irregular Shaped Articles.

### **1.3 PERFORMANCE REQUIREMENTS**

- .1 Design frames in exterior walls to accommodate expansion and contraction within services temperature range of -45°C to 75°C.
- .2 Laboratory testing of each composite window type by an independent testing laboratory is mandatory. Written test results, indicating that each window type has met the specifications in accordance with CAN/CSA-A440, must be received prior to the installation of any windows on site. Results will provide full descriptions of the composite windows tested. All windows for installation will be identical to the tested specimens. Any supplier/installer proposed revision to the window make-up may require additional testing.
- .3 Window air tightness to meet the rating of A3 when tested in accordance with CAN/CSA-440 windows.
- .4 Window water tightness shall meet the B6 rating when tested in accordance with CAN/CSA-440 windows.



- .5 Structural performance shall be based on CSA Standard for fiberglass windows and a maximum deflection of 1/175 of the span.
- .6 Windload resistance for window shall meet the C3 rating or better when tested in accordance with CAN/CSA-A440 Windows.
- .7 The fixed window thermal transmittance U-Value shall be a minimum 0.32 W/(m<sup>2</sup>x°C) when tested in accordance with AAMA 1503.1 and CAN/CSA-A440.2.  
  
The operable window thermal transmittance U-Value shall be minimum 0.34 W/(m<sup>2</sup>x°C) when tested in accordance with AAMA 1503.1 and CAN/CSA-A440.2.
- .8 The window Energy Rating for heating conditions, ER, shall be 3.0 W/m<sup>2</sup> for fixed windows and -6.0 W/m<sup>2</sup> for operable windows.
- .9 Insect screens to be provided for all vent windows; Rating S1 as per Table 4, CSA A440.
- .10 Resistance to Forced Entry: F10.
- .11 Design glass, glazing system, mullions and frames to support a live load of 100 pounds per foot acting vertically, 110 pounds acting horizontally at any point up to 42 inches above the floor or, 50 pounds per foot at 42 inches above the floor or, 50 pounds per foot at 42 inches above the floor, whichever produces the greatest effect.
- .12 Costs for the initial independent testing of window Type A will be included in the contract. Any costs incurred for additional testing for items not meeting the specifications including costs for transportation and for the required modifications will be borne by contractor.
- .13 Windows shall conform to the requirements of CSA A440, latest applicable edition and meet eligibility requirements of the Manitoba Hydro Power Smart Program. Prior to contract award, the low bidder shall provide the owner with test reports for the proposed new windows completed by an independent technical source, tested to CSA A 440.2 (1998 to current). Alternately, windows listed with current NFRC Certified Products Listing are also acceptable. Window must meet an over all U-Value range category of 1.41 to 1.70.

#### 1.4 QUALITY ASSURANCE

- .1 Submit test reports from independent testing agency indicating that windows exceed the performance requirements of CAN/CSA-A440 at the appropriate performance levels to meet climactic requirements, and as specified herein.
- .2 Contractor shall provide independent test report confirming that Type A windows conform to specification requirements for air leakage, window driven rain, and structural capacity, prior to delivery to the site.

#### 1.5 QUALIFICATIONS

- .1 Manufacturer and installers are to be specialized in the manufacturing and installation respectively of Fiberglass window system with a minimum of three years

each of documented experience.

## **1.6 DELIVERY, STORAGE AND HANDLING**

.1 Protect pre-finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

## **1.7 SAMPLES**

- .1 Prior to use in this project, upon request by the Owner, a minimum 300 mm x 300 mm (12"x12") corner sample of windows shall be submitted to the Owner and Consultant for approval.
- .2 Include frame, sash, sill, interlock, glazing and weather-proofing method, insect screens, surface finish and all hardware.

## **1.8 TEST REPORTS**

- .1 Submit test reports to the Owner and Consultant for all window units, including combination windows. Test reports to be from an independent certified testing laboratory to determine compliance with CSA-A440-90 and CGSB Standards applying to the type of materials specified. Test results for same model, type, layout and standard size windows, reported within the last 60 months, can be submitted. Differences between the tested window and the installed window to be noted on the shop drawings. Standard testing and test reports to be done at no additional cost to the Owner.
- .2 Testing of all window units to include air, water tightness, and wind load resistance. The fixed portion of slider windows will be deemed a fixed window for air leakage calculation purposes. Total allowable air leakage for combination windows will be calculated using the summation of allowable air leakage values of each window type.
- .3 Overall U-value of each window type to be calculated as outlined in CSA-A440.2-90.
- .4 Windows must satisfy all requirements as outlined in Section 10 of CSA A440-90 and egress requirements as detailed in the most current copy of the Building Code.
- .5 Testing for compliance with A440-90 and A440.2-90 to be done on the same window. (ie. If steel reinforcement is used for structural testing, steel reinforcement must be included in the energy simulations).

## **1.10 MAINTENANCE DATA**

- .1 Provide operation and maintenance data for windows for incorporation into Manitoba Housing operation and maintenance manual.

## **1.11 CODE REQUIREMENTS**

- .1 All windows to comply with the current edition of the National Building Code and Amendments.

- .2 All material on site to comply with WHMIS requirements. MSDS to be provided on request.

## **1.12 WARRANTY**

- .1 Provide written warranty for window sashes and frames against material or manufacturing defects occurring within 20 years from date of substantial performance.
- .2 Provide written warranty for glazing seal failure against material or manufacturing defects occurring within 10 years from the date of substantial performance.
- .3 Provide written lifetime warranty for all operating hardware.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Insulated Glass Seal: Flexible Silicone Foam tape, dessicant filled with pre-applied side adhesive and vapour retardant backer, minimum 6.5mm (¼") thick. Secondary seal to consist of hot melt butyl, polyurethane or solvent free polysulphide.
- .2 Sealants: shall be a high grade anti-fungicidal silicone or approved equal according to installation specifications of the window manufacturer. Colours shall match that of the material to which it is applied.
- .3 Screen frame: baked on enamel finish, roll formed aluminum complete with corner keys and retainer spline. Casement and awning screen to include integral perimeter flange. Screens removable to the inside only.
- .4 Screens: aluminum or galvanized or fiberglass mesh.
- .5 Jamb extensions: 18 mm (¾") Fiberglass jamb extensions to suit wall thickness. Jamb extensions to have factory edge adjacent to casings. End caps not permitted.
- .6 Air sealing insulation material; one component, low expansion (<20%) polyurethane foam, dispensed through a commercial grade foam gun.
- .7 Backer rod: closed cell ethafoam rod, oversized 30%-50%.
- .8 Casings or finish trim: paint grade lumber (or approved equal), minimum width to suit site conditions.

### **2.2 WINDOW TYPES**

- .1 All windows to be full frame replacements complete with renovation brick mould and jamb extensions.

### **2.3 PICTURE WINDOW**

- .1 Dry glazed interior stops, sealed unit to be removable to interior.

## 2.6 CASEMENT WINDOW

- .1 Locking Hardware: Die cast multi point lever lock complete with die cast adjustable mushroom head rollers and keepers. Minimum 2 point lock on all sashes.
- .2 Operating Hardware: Roto gear dual arm operator using sill mounting or flange mounting with reinforcing back plate. High-pressure zinc die cast housing and steel base plate, hardened steel drive worm and gear arm.
- .3 Weather-stripping: compression type seal against sash, single weather seal at exterior.

## 2.8 FABRICATION

- .1 Fabricate in accordance with CSA-A440-90 supplemented as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm (0.06") for units with a diagonal measurement of 1800 mm (71") or less and plus or minus 3 mm (0.12") for units with a diagonal measurement over 1800 mm. (71").
- .3 Face dimensions detailed are maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement to be galvanized.
- .6 All Fiberglass Frames to be made from pultruded fiberglass and assembled with tightly silicone sealed mitered corners with foam-filled reinforced and mechanically integrated nylon shear blocks.
- .7 Drain hole covers for Fiberglass windows to be rigid or manufacturer to provide one extra hinged cover per window.
- .8 Brick moulds and jamb extension to be installed using arrowhead slots, sealed and mechanically fastened to main frame.
- .9 Provide horizontal and vertical galvanized steel or aluminum reinforcement as required to achieve structural requirements as specified.
- .10 Vertical and Horizontal sliding windows: sash and frame meeting rails to be reinforced with aluminum or galvanized steel channel, as required to meet structural requirements as specified.
- .11 All windows within a tolerance of  $\pm 6$  mm ( $\pm 1/4$ ") shall be fabricated to one dimension.

## 2.9 GLAZING

- .1 Glaze windows in accordance with CSA-A440-90 and CAN/CGSB-12.8-97, Insulating Glass Units, supplemented as follows:
  - .1 3 mm glass for sealed units  $< 1$  m<sup>2</sup> (10.76 ft<sup>2</sup>)

- .2 4 mm glass for sealed units  $\geq 1 \text{ m}^2$  (10.76  $\text{ft}^2$ ).
- .2 Glazing Performance:
  - .1 Centre of glass U value:  $U \leq 1.7 \text{ W/m}^2\text{-C}$  (0.30  $\text{BTU/ft}^2\text{-F}$ ) based on 3mm glass, Winter night time values
  - .2 Solar Heat Gain Coefficient:  $0.35 \leq \text{SHGC} \leq 0.50$
- .3 Glazing method;
  - .1 Operable units: laid in glazing with dry glaze snap in stops.
  - .2 Picture windows: laid in glazing with dry glaze snap in stops to interior only.
  - .3 Removable Air Conditioner Panel: dry glaze or foam gasket to exterior of insulated glazing.
  - .4 Sealed units to be IGMAC certified. Permanently indicate Manufacturers name, IGMAC number and date of manufacture in corner of sealed unit.
  - .5 All windows to be triple glazed.
  - .6 All windows to have super spacer or approved equal.

## **2.10 Manufacturer**

- .1 Standard of Acceptance:
  - .1 Accurate Dorwin - Commercial Fiberglass Windows
  - .2 Approved Equal

## **PART 3 - EXECUTION**

### **3.1 WORKMANSHIP**

- .1 Install in accordance with CSA-A440.4-98 supplemented with installation instructions in this specification and manufacturers recommendations. Conflict between installation instructions in this specification and manufacturers instructions must be brought to the attention of the Owner and Consultant prior to installation.

### **3.2 PREPARATION**

- .1 All window sizes and measurements shall be taken from the jobsite. The Contractor shall check and verify all site dimensions, on an individual basis, prior to fabrication of windows. The Contractor shall not make any claim to the Owner for mis - measured or improperly measured work.
- .2 Remove existing sash, tracks, frames, interior and exterior trims and discard.
- .3 Examine openings into which windows are to be installed to ensure that it is

satisfactory before commencement of work. Notify Owner of any rot, damage or deterioration that is evident prior to proceeding with the Work.

- .4 Furr out existing openings to achieve ½" maximum shim space. All furring set into the original opening shall be bedded in acoustic sealant.
- .5 Move furniture and appliances and remove window coverings as required, to gain access to window area. The Owner will make arrangements to move fragile items.

### 3.3 INSTALLATION

- .1 Set window into opening plumb and square. Shim along sill at corners, at all vertical mullions and other locations as required to achieve shims at maximum 600 mm (24") o/c.
- .2 Provide temporary shims at window sides and head to ensure proper alignment of window during fastening.
- .3 All windows to be mechanically fastened through side jambs and head, adjacent to shims. Do not fasten through sill. Fastening to be 150-300 mm (6"-12") from each corner and at maximum 600 mm (24") o/c. All screw holes through PVC to be predrilled; holes to be 2mm larger than screw diameter. Fasten with minimum #8 stainless steel pan head screws, length sufficient to penetrate framing material a minimum of 35 mm (1½"). Screws to be concealed at all possible locations. Exposed screws to be capped.
- .4 Remove shims from side jambs and head of window.
- .5 All spaces between the window frame and the rough opening to be filled to a minimum depth of 50 mm (2") with low-expansion one component polyurethane foam to ensure air and vapour seal. For cold weather installation, install ethafoam rod or fibreglass insulation backer on exterior face of jamb, prior to filling the cavity with foam.
- .6 All existing flashings and drip mouldings to remain in place. If such flashings are damaged during the removal of existing or installation of new windows, or if the existing flashings are not adequate to cover the new windows, these flashings must be replaced at the Contractor's expense.
- .7 Check and adjust all hardware. Leave all surfaces clean, including removal of any excess glazing compound from all surfaces.
- .8 Replace, at no extra cost to the Owner, all glass cracked or broken during the Work of this contract, or otherwise damaged prior to substantial performance. Any breakage due to improper setting and installation shall be replaced by the Contractor, at no extra cost to the Owner for a period of one year following substantial performance.
- .9 The Contractor shall ensure that damage done to the interior and exterior finishes, caused by the removal of existing windows, is kept to a minimum. The Contractor will be responsible to repair any damage caused, and to provide and finish any fillers required to fill between surface of new window and the existing surface of the exterior

skin of the structure. The cost incurred to do this work will be considered as incidental to the Contract and will not be paid for separately.

### **3.4 CAULKING**

- .1 Seal joints between windows and exterior finish. Use foam backer rod to achieve 2:1 width:depth joint ratio.
- .2 Apply sealant in accordance with manufacture's specifications.

### **3.5 RESTORATION OF INTERIOR AND EXTERIOR FINISHES**

- .1 Any and all finishes removed or damaged by the removal of the existing windows or installation of the new windows shall be repaired or replaced to original condition.
- .2 Provide new wood, primed and finish painted interior trim casing (color to be selected by Owner)
- .3 The Contractor will be responsible for the removal and replacing of existing window coverings. The cost for doing this will be considered as incidental to the contract. Reinstall all rails, rods, drapery, drapery tracks, blinds or any other window treatments removed to necessitate the installation of the new windows.

### **3.6 FINAL CLEANING**

- .1 Every piece of glass shall bear the manufacturer's names, type and thickness of the glass. Leave all labels on the glass until they have been inspected and approved by the owner. Labels shall not be removed until final cleaning; leaving no glue residue that may remain after the removal of the label.
- .2 Upon completion of glazing, glass shall be thoroughly cleaned, all imperfections corrected and all damaged glass replaced.
- .3 Clean the work area and remove all debris from site on a daily basis.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1        Hardware for wood insulated steel doors.

**1.2            RELATED SECTIONS**

- .1        Section 8210: Wood door frames.
- .2        Section 08180 - Storm Doors and Frames: Hardware for same.

**1.3            REFERENCES**

- .1        AHC - Association of Hardware Consultants.
- .2        Canadian Steel Door and Frame Manufacturers Association - Manufacturing Standard for Steel Doors and Frames.
- .3        Canadian Steel Door and Frame Manufacturers Association - Canadian Fire Labelling Guide for Steel Doors and Frames.
- .4        Canadian Steel Door and Frame Manufacturers Association - Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

**1.4            COORDINATION**

- .1        Coordinate work of this section with other directly affected sections involving manufacturer of and internal reinforcement for door hardware.
- .2        Supply templates to manufacturers of components affected by hardware.

**1.5            QUALITY ASSURANCE**

- .1        Hardware Supplier: Company specializing in supplying commercial door hardware approved by manufacturer.
- .2        Hardware Supplier Personnel: Employ an AHC (Architectural Hardware Consultant) to supervise the work of this section.

**1.6            REGULATORY REQUIREMENTS**

- .1        Conform to ULC requirements for fire rated doors, frames, and hardware.

**1.7            SUBMITTALS**

- .1        Submit product data to requirements of Section 01005.



- .2 Indicate on shop drawings, locations and mounting heights of each type of hardware.
- .3 Supply templates to door frame manufacturers to enable accurate sizes, locations of cut outs, and reinforcement for hardware.
- .4 Provide product data on specified hardware.

**1.8 EXTRA STOCK AND SPARE PARTS**

- .1 Provide 3 keys for every lock. Unless otherwise directed by the RCMP, Key front and rear door locks and deadbolts alike for each unit. Provide master key for both units.

**1.9 MAINTENANCE MATERIALS**

- .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.

**Part 2 Products**

**2.1 ACCEPTABLE MANUFACTURERS**

- .1 Hinges: Stanley, Hagar.
- .2 Latch Sets: Schlage D Series.
- .3 Lock Cylinders: Schlage D Series.
- .4 Bolts: Schlage 660.
- .5 Weatherstripping: by door manufacturer.

**2.2 KEYING**

- .1 Door Locks: Keyed in like-groups.
- .2 Supply 3 keys for each lock. Supply 2 master keys for each duplex .

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify that door and frame components are ready to receive work and dimensions are as instructed by the manufacturer.

- .2 Beginning of installation means acceptance of site conditions.

**3.2 INSTALLATION**

- .1 Install hardware to manufacturer's instructions and requirements of Canadian Steel Door and Frame Manufacturers Association.
- .2 Use the templates provided by hardware item manufacturer.

**3.3 SCHEDULE**  
See Drawings.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1      Glass and glazing for Sections referencing this section for Products and installation.

**1.2            RELATED SECTIONS**

- .1      Section 8500: Fiberglass Windows.

**1.3            REFERENCES**

- .1      IGMAC (Insulated Glass Manufacturers Association of Canada) - Quality Standard Specification.
- .2      FGMA - Glazing Manual and Glazing Sealing Systems Manual.

**1.4            SYSTEM DESCRIPTION**

- .1      Glass and glazing materials of this section shall provide continuity of building enclosure air barrier and vapour retarder.
- .2      Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass.
- .3      Limit glass deflection to 1:200 with full recovery of glazing materials, whichever is less.

**1.5            SUBMITTALS**

- .1      Submit product data to requirements of Section 01005.
- .2      Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

**1.6            QUALITY ASSURANCE**

- .1      Perform Work in accordance with FGMA Glazing Manual, IGMAC - Quality Standard Specification and Glazing Recommendations for Sealed Insulated Glass Units for glazing installation methods.
- .2      Select glazing compounds and sealants in accordance with glass manufacturers instructions.

**1.7            WARRANTY**

- .1      Provide a ten year warranty

- .2 Warranty: Include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

**Part 2 Products**

**2.1 FLAT GLASS MATERIALS**

- .1 Float Glass (Type FG-A): CAN/CGSB-12.3M glazing quality, 6 mm thick minimum.
- .2 Mirror Glass (Type FG-F): CAN/CGSB-12.5M; float glass, 6 mm thick, sizes noted on Drawings.

**2.2 SEALED INSULATING GLASS MATERIALS**

- .1 Insulated Glass Units (Type SG-A): CAN/CGSB-12.8M:
  - .1 Triple pane low emmissivity ( Low E)
  - .2 Edge Seal: by manufacturer
  - .3 Outer Pane: Clear float glass.
  - .4 Inner Pane: Clear float glass.
  - .5 Middle Pane: Clear float glass.
  - .6 Interpane Space: Purged dry [hermetic] air
  - .7 Total Unit Thickness: 42 mm

**2.3 GLAZING COMPOUNDS**

- .1 Acrylic Sealant (Type GC-A): CGSB 19-GP-5M, single component, solvent curing, cured Shore A hardness of 15 to 25; non-bleeding; as selected.

**2.4 GLAZING ACCESSORIES**

- .1 Setting Blocks: Neoprene80 to 90 Shore A durometer hardness.
- .2 Spacer Shims: Neoprene50 to 60 Shore A durometer hardness.
- .3 Glazing Tape: Preformed macro-polyisobutylene, highly adhesive and elastic with continuous built-in shim, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper: 13 MM wide use two different thickness to satisfy offset conditions at glazing stops; black color
- .4 Glazing Splines: by window supplier.
- .5 Mirror Attachment Accessories: Stainless steel clips.

**Part 3            Execution**

**3.1                EXAMINATION**

- .1        Verify that openings for glazing are correctly sized, within tolerance and clean.

**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.

**3.3                INSTALLATION - MIRRORS**

- .1        Set mirrors with clips. Anchor rigidly to wall construction.
- .2        Place plumb and level.

**3.4                CLEANING**

- .1        Remove glazing materials from finish surfaces.
- .2        Remove labels after Work is complete.
- .3        Clean glass and mirrors.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Aluminum Association (AA)
  - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
  - .1 ASTM C475-02(2007), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - .2 ASTM C514-04(2009e1), 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 C840-08, Standard Specification for Application and Finishing of Gypsum Board.
  - .5 ASTM C954-07, 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 C1002-07, 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 C1047-09, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
  - .8 ASTM C1280-99, Standard Specification for Application of Gypsum Sheathing.
  - .9 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - .10 ASTM C1178/C1178M-08, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
  - .11 ASTM C1396/C1396M-09a, Standard Specification for Gypsum Wallboard.
- .3 Association of the Wall and Ceilings Industries International (AWCI)
  - .1 AWCI Levels of Gypsum Board Finish-97.
- .4 Canada Green Building Council (CaGBC)
  - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
  - .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
- .5 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.
- .6 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
  - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- .8 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-07, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

## **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies and include product characteristics, performance criteria, physical size, finish and limitations.

## **1.3 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 gypsum board assemblies materials level off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
  - .3 Protect from weather, elements and damage from construction operations.
  - .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
  - .5 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
  - .6 Replace defective or damaged materials with new.
- .4 Dispose of waste in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

#### 1.4 AMBIENT CONDITIONS

- .1 Maintain temperature 10 degrees C minimum, 21 degrees C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

#### Part 2 Products

##### 2.1 MATERIALS

- .1 Standard board: to ASTM C1396/C1396M regular, Type X, as per drawings, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .2 Gypsum sheathing board: to ASTM C1396/C1396M, regular, Type X, mm thick, 1200 mm wide x maximum practical length.
  - .1 For use in washrooms, change rooms and exercise room.
- .3 Metal furring runners, hangers, tie wires, inserts, anchors: to ASTM C1280.
- .4 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .5 Resilient clips drywall furring : 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .6 Nails: to ASTM C514.
- .7 Steel drill screws: to ASTM C1002.
- .8 Stud adhesive: to CAN/CGSB-71.25 ASTM C557.
- .9 Laminating compound: as recommended by manufacturer, asbestos-free.
- .10 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .11 Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.
- .12 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .13 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .14 Insulating strip: rubberized, moisture resistant, 3 mm thick cork closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.
- .15 Joint compound: to ASTM C475, asbestos-free.



**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.

**3.2 ERECTION**

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840 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, 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, except where specified otherwise.
- .11 Furr openings and around built-in equipment, cabinets, access panels, , on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .13 Erect drywall resilient furring transversely across studs joists between the layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 38 mm common nail 25 mm drywall screw.
- .14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

**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 /metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. 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.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
- .2 Double-Layer Application:
  - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
  - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
  - .3 Apply base layers at right angles to supports unless otherwise indicated.
  - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
- .3 Apply single layer gypsum board to concrete block surfaces, where indicated, using laminating adhesive.
  - .1 Comply with gypsum board manufacturer's recommendations.
  - .2 Brace or fasten gypsum board until fastening adhesive has set.
  - .3 Mechanically fasten gypsum board at top and bottom of each sheet.
- .4 Exterior Soffits and Ceilings: install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.
- .5 Apply water-resistant gypsum board where wall tiles coating to be applied adjacent to slop sinks janitors closets. 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.
- .6 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, , in partitions where perimeter sealed with acoustic sealant.
- .7 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .8 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .9 Install gypsum board with face side out.
- .10 Do not install damaged or damp boards.
- .11 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

### **3.4 ACCOUSTIC ASSEMBLIES**

- .1 Apply 12mm dia 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 and ducts and other penetrations.
- .2 Acoustic rated rooms will be tested to ensure a minimum STC 46 Rating is achieved
- .3 Any tests indicating the minimum STC 46 rating has not been achieved will be corrected at the contractor's expense.
- .4 Retesting of acoustic rated rooms to confirm compliance with the STC rating will be at the contractors' expense.

### **3.5 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 using contact adhesive for full length at 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 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.
- .6 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
- .7 Provide continuous polyethylene dust barrier behind and across control joints.
- .8 Locate control joints at changes in substrate construction.
- .9 Install control joints straight and true.
- .10 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
- .11 Install expansion joint straight and true.
- .12 Install cornice cap where gypsum board partitions do not extend to ceiling.
- .13 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
- .14 Splice corners and intersections together and secure to each member with 3 screws.
- .15 Install access doors to electrical and mechanical fixtures specified in respective sections.
  - .1 Rigidly secure frames to furring or framing systems.

- .16 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.
- .17 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 taping, 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.
- .18 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.
- .19 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 is completed.
- .20 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .21 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .22 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
- .23 Mix joint compound slightly thinner than for joint taping.
- .24 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .25 Allow skim coat to dry completely.
- .26 Remove ridges by light sanding or wiping with damp cloth.

### 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.
- .2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**3.7 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by gypsum board assemblies installation.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Resilient sheet flooring.

**1.2            SUBMITTALS**

- .1    Submit product data to requirements of Section
- .2    Provide product data on specified products, describing physical and performance characteristics; sizes, patterns and colours available.

**1.3            SAMPLES**

- .1    Submit samples to requirements of Section 01005.
- .2    Submit two samples 300X300 mm size illustrating colour and pattern for each floor material specified.

**1.4            QUALITY ASSURANCE**

- .1    Floor Materials: Conform to applicable code for flame/smoke rating requirements to ASTM E84.

**Part 2           Products**

**2.1            ACCEPTABLE MANUFACTURERS - SHEET FLOORING**

- .1    Armstrong Cushionstep Vinyl Sheet (Best Quality):
  - .1    Overall Thickness: 155 mm
  - .2    Wear Layer 20 mil
  - .3    Warrantee 25 years
- .2    Color to be Chosen from Manufacturers Complete Range
- .3    Or Approved Equal

**2.2            SHEET FLOORING MATERIALS**

- .1    Vinyl Sheet With Backing: Vinyl wear surface thickness of .25 mm, Class A- Fibrous (non asbestos) backing; total thickness of 1.6 mm; sheet width of 3650 mm.

**2.3 ACCESSORIES**

- .1 Sub-Floor Filler: Hydraulic (portland) cement based patching and leveling compounds as recommended by flooring manufacturer for use with their product type.
- .2 Primers and Adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above on or below grade..
- .3 Edge Strips: Aluminum extruded, smooth, mill finish stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .4 Sealer and Wax: Types recommended by flooring manufacturer.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify concrete floors are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- .2 Verify that site conditions are ready to receive work.
- .3 Beginning of installation means acceptance of site conditions.

**3.2 PREPARATION**

- .1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler..
- .2 Apply primer to all surfaces.

**3.3 INSTALLATION - SHEET MATERIAL**

- .1 Install in accordance with manufacturer's instructions.
- .2 Spread only enough adhesive to permit installation of materials before initial set.
- .3 Set flooring in place, press with heavy roller to attain full adhesion.
- .4 Lay flooring with joints and seams parallel to building lines to produce minimum number of seams.
- .5 Install sheet flooring parallel to width of room. Provide minimum of 1/3 full roll width. Double cut sheet and continuously seal.
- .6 Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

- .7 Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

**3.4 CLEANING**

- .1 Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

**END OF SECTION**



**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Resilient sheet flooring.

**1.2                SUBMITTALS**

- .1      Submit product data to requirements of Section
- .2      Provide product data on specified products, describing physical and performance characteristics; sizes, patterns and colours available.

**1.3                SAMPLES**

- .1      Submit samples to requirements of Section 01005.
- .2      Submit two samples 300X300 mm size illustrating colour and pattern for each floor material specified.

**1.4                QUALITY ASSURANCE**

- .1      Floor Materials: Conform to applicable code for flame/smoke rating requirements to ASTM E84.

**Part 2            Products**

**2.1                ACCEPTABLE MANUFACTURERS - SHEET FLOORING (RF)**

- .1      Armstrong Cushionstep Vinyl Sheet (Best Quality):
  - .1      Overall Thickness: 155 mm
  - .2      Wear Layer 20 mil
  - .3      Warrantee 25 years
- .2      Color to be Chosen from Manufacturers Complete Range
- .3      Or Approved Equal

**2.2                SHEET FLOORING MATERIALS**

- .1      Vinyl Sheet With Backing: Vinyl wear surface thickness of .25 mm, Class A- Fibrous (non asbestos) backing; total thickness of 1.6 mm; sheet width of 3650 mm.

**2.3 ACCESSORIES**

- .1 Sub-Floor Filler: Hydraulic (portland) cement based patching and leveling compounds as recommended by flooring manufacturer for use with their product type.
- .2 Primers and Adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above on or below grade..
- .3 Edge Strips: Aluminum extruded, smooth, mill finish stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .4 Sealer and Wax: Types recommended by flooring manufacturer.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify concrete floors are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- .2 Verify that site conditions are ready to receive work.
- .3 Beginning of installation means acceptance of site conditions.

**3.2 PREPARATION**

- .1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- .2 Apply primer to all surfaces.

**3.3 INSTALLATION - SHEET MATERIAL**

- .1 Install in accordance with manufacturer's instructions.
- .2 Spread only enough adhesive to permit installation of materials before initial set.
- .3 Set flooring in place, press with heavy roller to attain full adhesion.
- .4 Lay flooring with joints and seams parallel to building lines to produce minimum number of seams.
- .5 Install sheet flooring parallel to width of room. Provide minimum of 1/3 full roll width. Double cut sheet and continuously seal.
- .6 Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

- .7 Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

**3.4 CLEANING**

- .1 Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM F1066-04, Standard Specification for Vinyl Composition Floor Tile.
  - .2 ASTM F1344-04, Standard Specification for Rubber Floor Tile.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
  - .2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit duplicate tile in size specified, base, nosing, feature strips, treads, edge strips 300 mm long.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.3                DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.4                ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.

**1.5                MAINTENANCE**

- .1 Extra Materials:

- .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide 12 m<sup>2</sup> of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Extra materials from same production run as installed materials.
- .4 Identify each container of floor tile and each container of adhesive.
- .5 Deliver to occupant, upon completion of the work of this section.
- .6 Store where directed by Departmental Representative.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 High vinyl tile: to ASTM F1066, Composition 1 - non asbestos
  - .1 Armstrong Lux Plank
    - .1 Color to be chosen from one of the following collections
      - .1 Exotic Fruitwood
      - .2 Timber Bay Hickory
      - .3 Amendoim
      - .4 English Walnut
      - .5 Kingston Walnut
    - .2 Wear Layer Min 0.51mm
    - .3 Finish Urethane Plus
    - .4 Warantee Residential: Lifetime
    - .5 Tile Dimensions: 6" x 48" or 4 ½" x 48".
  - .2 Underlayment:
    - .1 As per manufacturers instructions
  - .3 Finish:
    - .1 Factory prefinished.
  - .4 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
    - .1 Flooring adhesives:
      - .1 Adhesive: maximum VOC limit 50 60 g/L to SCAQMD Rule 1168.
    - .2 Cove base adhesives:
      - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
  - .5 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.
  - .6 Metal edge strips: aluminum extruded, smooth, mill finish polished with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

**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 INSPECTION**

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

**3.3 SUB-FLOOR TREATMENT**

- .1 Remove existing resilient flooring.
- .2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.
- .3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .5 Install underlayment

**3.4 TILE APPLICATION**

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Install flooring as per manuf. instructions
- .5 Cut tile and fit neatly around fixed objects.
- .6 Install feature strips and floor markings where indicated. Fit joints tightly.
- .7 Install flooring in pan type floor access covers. Maintain floor pattern.
- .8 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .9 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .10 Install metal edge strips at unprotected or exposed edges where flooring terminates.

**3.5 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.

**3.6 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

**3.7 PROTECTION**

- .1 Protect new floors from until final waxing.
- .2 Prohibit traffic on floor for 48 hours after installation.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM F1066-04, Standard Specification for Vinyl Composition Floor Tile.
  - .2 ASTM F1344-04, Standard Specification for Rubber Floor Tile.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
  - .2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit duplicate tile in size specified, base, nosing, feature strips, treads, edge strips 300 mm long.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**1.4 ENVIRONMENTAL REQUIREMENTS**

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.

**1.5 MAINTENANCE**

- .1 Extra Materials:



- .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide 12 m<sup>2</sup> of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Extra materials from same production run as installed materials.
- .4 Identify each container of floor tile and each container of adhesive.
- .5 Deliver to occupant, upon completion of the work of this section.
- .6 Store where directed by Departmental Representative.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 High vinyl tile (VT) : to ASTM F1066, Composition 1 - non asbestos
  - .1 Armstrong Lux Plank
    - .1 Color, to be chosen from one of the following collections
      - .1 Exotic Fruitwood
      - .2 Timber Bay Hickory
      - .3 Amendoim
      - .4 English Walnut
      - .5 Kingston Walnut
    - .2 Wear Layer Min 0.51mm
    - .3 Finish Urethane Plus
    - .4 Warantee Residentail: Lifetime
    - .5 Tile Dimensions: 6" x 48" or 4 ½" x 48".
  - .2 Underlayment:
    - .1 As per manufacturers instructions
  - .3 Finish:
    - .1 Factory prefinished.
  - .4 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
    - .1 Flooring adhesives:
      - .1 Adhesive: maximum VOC limit 50 60 g/L to SCAQMD Rule 1168.
      - .2 Cove base adhesives:
        - .1 Adhesive: maximum VOC limit 50 g/L to SCAQMD Rule 1168.
    - .5 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.
    - .6 Metal edge strips: aluminum extruded, smooth, mill finish polished with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

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**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 INSPECTION**

- .1 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

**3.3 SUB-FLOOR TREATMENT**

- .1 Remove existing resilient flooring.
- .2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.
- .3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .5 Install underlayment

**3.4 TILE APPLICATION**

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 Install flooring as per manuf. instructions
- .5 Cut tile and fit neatly around fixed objects.
- .6 Install feature strips and floor markings where indicated. Fit joints tightly.
- .7 Install flooring in pan type floor access covers. Maintain floor pattern.
- .8 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .9 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .10 Install metal edge strips at unprotected or exposed edges where flooring terminates.

**3.5 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.

**3.6 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

**3.7 PROTECTION**

- .1 Protect new floors from until final waxing.
- .2 Prohibit traffic on floor for 48 hours after installation.

**END OF SECTION**

**Part 1          General**

**1.1            SECTION INCLUDES**

- .1      Carpeting and cushioned underlay.

**1.2            REGULATORY REQUIREMENTS**

- .1      Conform to applicable code for carpet flammability requirements to CAN/ULC-S102M.

**1.3            SUBMITTALS**

- .1      Submit product data to requirements of Section 01005.
- .2      Provide product data on specified products, describing physical and performance characteristics; sizes, patterns, colours available, and method of installation.

**Part 2          Products**

**2.1            ACCEPTABLE MANUFACTURERS - CARPETING**

- .1      Peerless Stainmaster collection, Carpet to be chosen from manufacturers standard selection.
- .2      Carpet dimensions: roll width 3660mm.

**2.2            CARPETING MATERIALS**

**2.3            CUSHION MATERIALS**

- .1      Cushion Underlay: CGSB 20-GP-23M, Urethane foam particles bonded with liquid urethane, 4 ply, polyethylene and non-woven nylon top side, recycled core, double film polypropylene netting bottom, 9MM thick, maximum flame spread 25, 145 kg/sq m density, to ASTM E 84.

**2.4            ACCESSORIES**

- .1      Carpet Gripper: Type recommended by carpet manufacturer.
- .2      Base Gripper: as recommended by manufacturer.

**Part 3            Execution**

**3.1                EXAMINATION**

- .1      Verify that site conditions are ready to receive work.
- .2      Beginning of installation means acceptance of site conditions.

**3.2                PREPARATION**

- .1      Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

**3.3                INSTALLATION - CUSHION**

- .1      Install in accordance with manufacturer's instructions.
- .2      Install cushion using maximum size pieces.
- .3      Lay out cushion so that carpet seams will not fall directly over cushion seams.
- .4      Butt edges together and tight to edge of carpet gripper.

**3.4                INSTALLATION - CARPET**

- .1      Install in accordance with manufacturer's instructions.
- .2      Verify carpet pattern match before cutting to ensure minimal variation between dye lots.
- .3      Double cut carpet, to allow intended seam and pattern match.
- .4      Join seams by hot adhesive tape method.
- .5      Cut and fit carpet around interruptions.
- .6      Where wall bases are scheduled, cut carpet 6mm from walls to allow re-stretching.

**3.5                CLEANING**

- .1      Clean and vacuum carpet surfaces.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Environmental Protection Agency (EPA)
  - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - February 2004.
  - .2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.
- .4 National Fire Code of Canada.
- .5 Society for Protective Coatings (SSPC)
  - .1 Systems and Specifications, SSPC Painting Manual 2005.

**1.2 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
  - .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
  - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
  - .4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
  - .5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
  - .6 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
  - .7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative DCC Representative Consultant .
  - .8 Standard of Acceptance:
    - .1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.

- .2 Soffits: No defects visible from 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.

### **1.3 PERFORMANCE REQUIREMENTS**

- .1 Environmental Performance Requirements:
  - .1 Provide paint products meeting MPI "Environmentally Friendly" E1 E2 E3 ratings based on VOC (EPA Method 24) content levels.
  - .2 Green Performance in accordance with MPI Standard GPS-1.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Upon completion, submit records of products used. List products in relation to finish system and include the following:
  - .1 Product name, type and use.
  - .2 Manufacturer's product number.
  - .3 Colour numbers.
  - .4 MPI Environmentally Friendly classification system rating.
  - .5 Manufacturer's Material Safety Data Sheets (MSDS).
- .4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
    - .1 3 mm plate steel for finishes over metal surfaces.
    - .2 13 mm birch plywood for finishes over wood surfaces.
    - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
    - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
    - .5 10 mm cedar hardboard siding plywood 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 Submit full range of available colours where colour availability is restricted.

### **1.5 QUALITY CONTROL**

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

- .2 When requested by Consultant or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

## 1.6 MAINTENANCE

- .1 Extra Materials:
  - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Submit two four litre cans of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

## 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
  - .1 Deliver and store materials in original containers, sealed, with labels intact.
  - .2 Labels: to indicate:
    - .1 Manufacturer's name and address.
    - .2 Type of paint or coating.
    - .3 Compliance with applicable standard.
    - .4 Colour number in accordance with established colour schedule.
  - .3 Remove damaged, opened and rejected materials from site.
  - .4 Provide and maintain dry, temperature controlled, secure storage.
  - .5 Observe manufacturer's recommendations for storage and handling.
  - .6 Store materials and supplies away from heat generating devices.
  - .7 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.
  - .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
  - .9 Remove paint materials from storage only in quantities required for same day use.
  - .10 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
  - .11 Fire Safety Requirements:
    - .1 Provide one 9 kg Type ABC dry chemical 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.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
  - .3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
  - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
  - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
    - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
    - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
    - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
    - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
    - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
  - .6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
  - .7 Set aside and protect surplus and uncontaminated finish materials: . Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.
  - .8 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

## **1.8 AMBIENT CONDITIONS**

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces.
  - .2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

- .3 Where required, provide continuous ventilation for seven days after completion of application of paint.
  - .4 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.
  - .5 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:
    - .1 Ambient air and substrate temperatures are below 10 degrees C.
    - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
    - .4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.
    - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  - .2 Perform no painting work when maximum moisture content of substrate exceeds:
    - .1 12% for concrete and masonry (clay and concrete brick/block).
    - .2 15% for wood.
    - .3 12% for plaster and gypsum board.
  - .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
  - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
- .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
  - .3 Apply paint when previous coat of paint is dry or adequately cured.
  - .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
  - .5 Do not apply paint when:
    - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

- .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
- .3 Surface to be painted is wet, damp or frosted.
- .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
- .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
- .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
- .9 Paint occupied facilities in accordance with approved schedule only.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems: to be products of single manufacturer.
- .3 Only qualified products with E3 "Environmentally Friendly" ratings are acceptable for use on this project.

### **2.2 COLOURS**

- .1 Departmental Representative will provide color schedule after award.
- .2 Colour schedule will be based upon selection of five base colours and three accent colours. No more than eight colours will be selected for entire project and no more than three colours will be selected in each area.
- .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.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

### **2.3 MIXING AND TINTING**

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

- .4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

**2.4 GLOSS/SHEEN RATINGS**

- .1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	85	

- .2 Gloss level ratings of painted surfaces as noted on Finish Schedule.

**2.5 EXTERIOR PAINTING SYSTEMS**

- .1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
  - .1 EXT 2.1A - Latex zone/traffic marking finish.
  - .2 EXT 2.1B - Alkyd zone/traffic marking finish.
- .2 Structural Steel and Metal Fabrications:
  - .1 EXT 5.1B - Waterborne light industrial insert gloss level coating (over inorganic zinc).
- .3 Steel - High Heat: heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted
  - .1 EXT 5.2A - Heat resistant enamel finish, maximum 205 degrees C
- .4 Galvanized Metal: not chromate passivated
  - .1 EXT 5.3B - Alkyd insert gloss level finish.
- .5 Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.
  - .1 EXT 6.2E - Varnish gloss finish (over stain).
  - .2 EXT 6.2K - Varnish gloss semi-gloss finish.
  - .3 EXT 6.2L - Semi-transparent stain finish.
- .6 Dressed Lumber: doors, door and window frames, casings, battens, smooth facias, etc.
  - .1 EXT 6.3A - Latex insert gloss level finish. do not use flat finish on doors.
  - .2 EXT 6.3B - Alkyd insert gloss level finish do not use flat finish on doors.

- .3 EXT 6.3C - Solid colour stain finish do not use in high contact areas or on doors.
- .4 EXT 6.3D - Semi-transparent stain finish do not use on doors.
- .5 EXT 6.3E - Varnish gloss semi-gloss finish (over stain).
- .6 EXT 6.3F - Varnish gloss semi-gloss finish.
- .7 EXT 6.3G - Clear (2 component) polyurethane finish.
- .8 EXT 6.3H - Pigmented polyurethane finish.
- .9 EXT 6.3J - Waterborne light industrial insert gloss level coating use gloss or semi-gloss finish on doors and frames only.
- .10 EXT 6.3K - Waterborne solid colour stain finish do not use flat finish on doors and frames.
- .11 EXT 6.3L - Latex insert gloss level finish (over latex primer) do not use flat finish on doors.

### **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 EXAMINATION**

- .1 Exterior repainting work: inspected by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule.
- .2 Exterior surfaces requiring repainting: inspected by both painting contractor and Paint Inspection Agency who will notify Consultant in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.
- .3 Where assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.
- .4 Where "special" repainting or recoating 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 work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative .

### 3.3 PREPARATION

- .1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
  - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
  - .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.
- .4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminants from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.
- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

### 3.4 EXISTING CONDITIONS

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative DCC Representative Consultant. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

- .3 Maximum moisture content as follows:
  - .1 Stucco: 12%.
  - .2 Concrete: 12%.
  - .3 Clay and Concrete Block/Brick: 12%.
  - .4 Wood: 15%.

### **3.5 PROTECTION**

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Consultant.
- .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 Consultant.

### **3.6 APPLICATION**

- .1 Method of application to be as approved by Consultant. Apply paint by brush roller air sprayer airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
  - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
  - .2 Work paint into cracks, crevices and corners.
  - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
  - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative DCC Representative Consultant.
  - .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 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 Consultant.
- .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.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### **3.7 MECHANICAL/ELECTRICAL EQUIPMENT**

- .1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.
- .2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .3 Do not paint over nameplates.
- .4 Paint fire protection piping red.
- .5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

### **3.8 FIELD QUALITY CONTROL**

- .1 Inspection:
  - .1 Field inspection of exterior painting operations to be carried out by independent inspection firm as designated by Consultant and paid for by the cash allowance.
  - .2 Advise Consultant when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
  - .3 Co-operate with inspection firm and provide access to areas of work.
- .2 Manufacturer's Field Services:
  - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.



**3.9 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

**3.10 RESTORATION**

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1    Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.

**1.2                REFERENCES**

- .1    Department of Justice Canada (Jus)
  - .1    Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2    Environmental Protection Agency (EPA)
  - .1    EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
- .3    Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).
- .4    Master Painters Institute (MPI)
  - .1    MPI Architectural Painting Specifications Manual, 2004.
- .5    National Fire Code of Canada - 1995
- .6    Society for Protective Coatings (SSPC)
  - .1    SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.
- .7    Transport Canada (TC)
  - .1    Transportation of Dangerous Goods Act (TDGA), 1992, c. 34 .

**1.3                QUALITY ASSURANCE**

- .1    Qualifications:
  - .1    Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
  - .2    Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
  - .3    Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.
- .2    Pre-Installation Meeting:
  - .1    Convene pre-installation meeting one week prior to beginning work of this Section on-site installations in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
    - .1    Verify project requirements.

- .2 Review installation and substrate conditions.
  - .3 Coordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.
- .3 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

#### **1.4 SCHEDULING**

- .1 Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Consultant for changes in work schedule.
- .3 Schedule painting operations to prevent disruption of occupants.
- .4 The mechanical Rooms and other rooms where a significant amount mechanical and electrical equipment are to be painted prior to the installation of the electrical and mechanical work.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit product data and instructions for each paint and coating product to be used.
  - .2 Submit product data for the use and application of paint thinner.
  - .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.
- .3 Samples:
  - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
  - .2 Submit duplicate 200 x 300 mm sample panels of each paint stain clear coating special finish 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 13 mm birch plywood for finishes over wood surfaces.
    - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
    - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
    - .5 10 mm cedar hardboard siding plywood for finishes over wood surfaces.
  - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

- .4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .1 Lead, cadmium and chromium: presence of and amounts.
  - .2 Mercury: presence of and amounts.
  - .3 Organochlorines and PCBs: presence of and amounts.
- .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation application instructions.
- .7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
  - .1 Product name, type and use.
  - .2 Manufacturer's product number.
  - .3 Colour numbers.
  - .4 MPI Environmentally Friendly classification system rating.

## 1.6 MAINTENANCE

- .1 Extra Materials:
  - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
  - .2 Quantity: provide one - four litre can of each type and colour of primer stain finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
  - .3 Delivery, storage and protection: comply Consultant requirements for delivery and storage of extra materials.

## 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
  - .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.
- .2 Acceptance at Site:
  - .1 Identify products and materials with labels indicating:
    - .1 Manufacturer's name and address.
    - .2 Type of paint or coating.
    - .3 Compliance with applicable standard.
    - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Storage and Protection:
  - .1 Provide and maintain dry, temperature controlled, secure storage.

- .2 Store materials and supplies away from heat generating devices.
- .3 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
  - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
  - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
  - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.
- .9 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Handle and dispose of hazardous materials in accordance with Regional and Municipal, regulations.
  - .4 Ensure emptied containers are sealed and stored safely.
  - .5 Unused paint coating materials must be disposed of at official hazardous material collections site as approved by Consultant.
  - .6 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
  - .7 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
  - .8 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
  - .9 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
    - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
    - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

- .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .10 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
- .11 Set aside and protect surplus and uncontaminated finish materials: . Deliver to or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing.

## 1.8 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces .
  - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Provide continuous ventilation for seven days after completion of application of paint.
  - .4 Coordinate use of existing ventilation system with Departmental Representative DCC Representative Consultant and ensure its operation during and after application of paint as required.
  - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  - .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless pre-approved written approval by Paint Inspection Agency Authority and product manufacturer, perform no painting when:
    - .1 Ambient air and substrate temperatures are below 10 degrees C.
    - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
    - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
    - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

- .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
- .2 Perform painting work when maximum moisture content of the substrate is below:
  - .1 Allow new concrete and masonry to cure minimum of 28 days.
  - .2 15% for wood.
  - .3 12% for plaster and gypsum board.
- .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
  - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
  - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .4 Additional interior application requirements:
  - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Materials and resources in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .3 Provide paint materials for paint systems from single manufacturer.
- .4 Only qualified products with E3 "Environmentally Friendly" rating are acceptable for use on this project.
- .5 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .6 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .7 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

- .8 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

## 2.2 COLOURS

- .1 Departmental Representative will provide color schedule after contract award
- .2 Colour schedule will be based upon selection of seven base colours and five accent colours. No more than twelve colours will be selected for entire project and no more than five colours will be selected in each area.
- .3 Selection of colours from manufacturers full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

## 2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .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.

## 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 as noted on Finish Schedule.

## 2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete horizontal surfaces: floors and stairs:



- .1 INT 3.2F - Concrete floor sealer.
- .2 Concrete masonry units: smooth and split face block and brick:
  - .1 INT 4.2D - High performance architectural G5 latex finish.
- .3 Structural steel and metal fabrications: columns, beams, joists:
  - .1 INT 5.1B - Waterborne light industrial G5 coating.
- .4 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
  - .1 INT 5.3B - Waterborne light industrial G5 coating.
- .5 Dressed lumber: including doors, door and window frames, casings, mouldings:
  - .1 INT 6.3E - Polyurethane varnish G5 finish (over stain).
- .6 Wood paneling and casework: partitions, panels, shelving, millwork:
  - .1 INT 6.4E - Polyurethane varnish G5 finish (over stain).
- .7 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
  - .1 INT 9.2A - Latex G3 finish (over latex sealer).
- .8 Canvas and cotton coverings.
  - .1 INT 10.1A - Latex G3 finish.

**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 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, 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 Stucco, plaster and gypsum board: 12%.
  - .2 Concrete: 12%.
  - .3 Clay and Concrete Block/Brick: 12%.
  - .4 Wood: 15%.

### 3.4 PREPARATION

- .1 Protection:
  - .1 Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
  - .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 the building.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative DCC Representative Consultant.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly.
  - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
  - .6 Use trigger operated spray nozzles for water hoses.
  - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air vacuum cleaning.
- .8 Touch up of shop primers with primer as specified.
- .9 Do not apply paint until prepared surfaces have been accepted Consultant

### 3.5

#### APPLICATION

- .1 Method of application to be as approved by Consultant. Apply paint by brush roller air sprayer airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
  - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
  - .2 Work paint into cracks, crevices and corners.
  - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
  - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
  - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
  - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
  - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
  - .4 Brush out immediately all runs and sags.

- .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### 3.6

#### **MECHANICAL/ELECTRICAL EQUIPMENT**

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red.
- .9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .10 Paint natural gas piping yellow.
- .11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .12 Do not paint interior transformers and substation equipment.

### 3.7

#### **SITE TOLERANCES**

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

### **3.8 FIELD QUALITY CONTROL**

- .1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.
- .2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Consultant and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
- .3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Departmental Representative.
- .4 Standard of Acceptance:
  - .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.
- .5 Field inspection of painting operations to be carried out by independent inspection firm as designated by Departmental Representative and paid for by Section 01 21 00 Allowances.
- .6 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .7 Cooperate with inspection firm and provide access to areas of work.
- .8 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative Consultant.

### **3.9 RESTORATION**

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Toilet and bath, shower, washroom accessories.

**1.2                RELATED SECTIONS**

- .1      Section 08800 - Glazing: Wall mirrors.

**1.3                SUBMITTALS**

- .1      Submit product data to requirements of Section 01005.
- .2      Provide product data on accessories describing size, finish, details of function, attachment methods.

**1.4                SAMPLES**

- .1      Submit samples to requirements of Section 01005.

**Part 2            Products**

**2.1                ACCEPTABLE MANUFACTURERS**

- .1      Waterous
- .2      Kohler
- .3      American Standard.

**2.2                MATERIALS**

- .1      Sheet Steel: ASTM A366.
- .2      Stainless Steel Sheet: ASTM A167, Type 304.
- .3      Tubing: ASTM A269, stainless steel.
- .4      Adhesive: Contact type, waterproof.
- .5      Fasteners, Screws, and Bolts: Hot dip galvanized.

**2.3                Accessories**

- .1      Toilet tissue dispenser

- .1 W-7305 single surface mounted paper holder, stainless steel with chrome plated roller
- .2 Provide one dispenser per washroom
- .2 Shower Curtain: Model W1206. Stainless steel with satin finish curtain rod flanges, rod to be 2.54mm diameter, length as required. Provide 1 in each bathroom.
- .3 Towel bar
  - .1 Model w-7355, 19mm diameter, 762mm length. Provide one in each washroom on each floor.
- .4 Robe Hook
  - .1 Provide in each upper washroom adjacent to tub
- .5 Mirrors in washrooms as shown on drawings.

## **2.4 FABRICATION**

- .1 Weld and grind smooth, joints of fabricated components.
- .2 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .3 Back paint components where contact is made with building finishes to prevent electrolysis.

## **2.5 FINISHES**

- .1 Galvanizing: CSA G164 to Z275
- .2 Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.
- .3 Enamel: Pre-treat to clean condition, apply one coat primer and minimum two coats baked enamel.
- .4 Chrome/Nickel Plating: ASTM B456, Type Satin finish.
- .5 Stainless Steel: Polished finish.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verify that site conditions are ready to receive work.
- .2 Beginning of installation means acceptance of site conditions.



**3.2 PREPARATION**

- .1 Provide templates and rough-in measurements as required.

**3.3 INSTALLATION**

- .1 Install fixtures, accessories and items in accordance with manufacturers' instructions.

**END OF SECTION**



**Part 1            General Instructions**

**1.1                Shop Drawings**

- .1        Submit shop drawings as per Section 01 33 00 submittal procedures

**Part 2            MATERIALS**

- .1        Five inch solid brass house numbers, complete with brass screws.

**Part 3            EXECUTION**

- .1        Contractor must determine the correct house number for each house in his contract by consulting the appropriate Hamlet office.
- .2        Install house numbers with screws in a true and secure manner ensuring rigid anchorage to the lap siding or plywood siding. Drill pilot holes for screws.
- .3        Install numbers at a sufficient height to be clearly seen from the access road and driveway. Ensure numbers are not obscured by handrails.
- .4        Numbers are to be installed immediately following siding installation.

**END OF DOCUMENT**

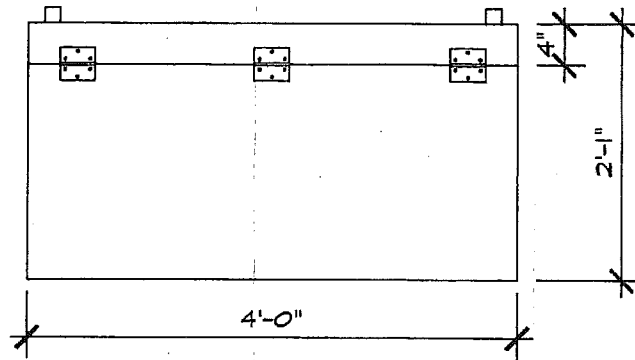
**Part 1 MATERIALS**

- .1 ¾" plywood and s 2" x 2" and 2" x 4" dimensional lumber.
- .2 Stanley Residential Hinges 08-3100 - 4 inch, 6 screws per hinge.

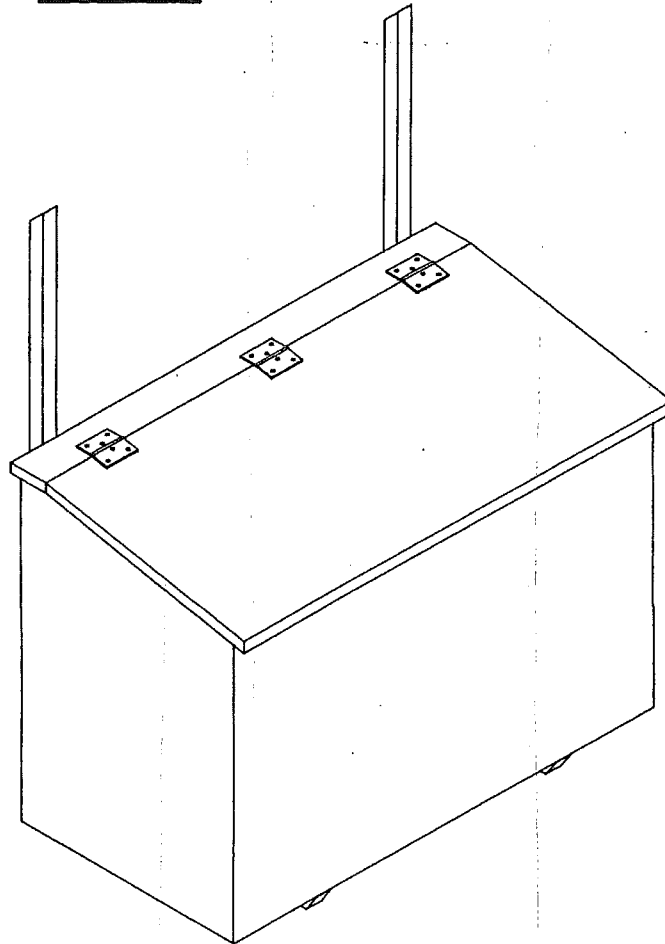
**Part 2 EXECUTION**

- .1 Construct one garbage box for each house in accordance with sketch bound herein.
- .2 Stain all exterior surfaces of garbage box two coats same colour as steps, landings and railings.
- .3 Empty garbage box prior to turn over of building to owner.

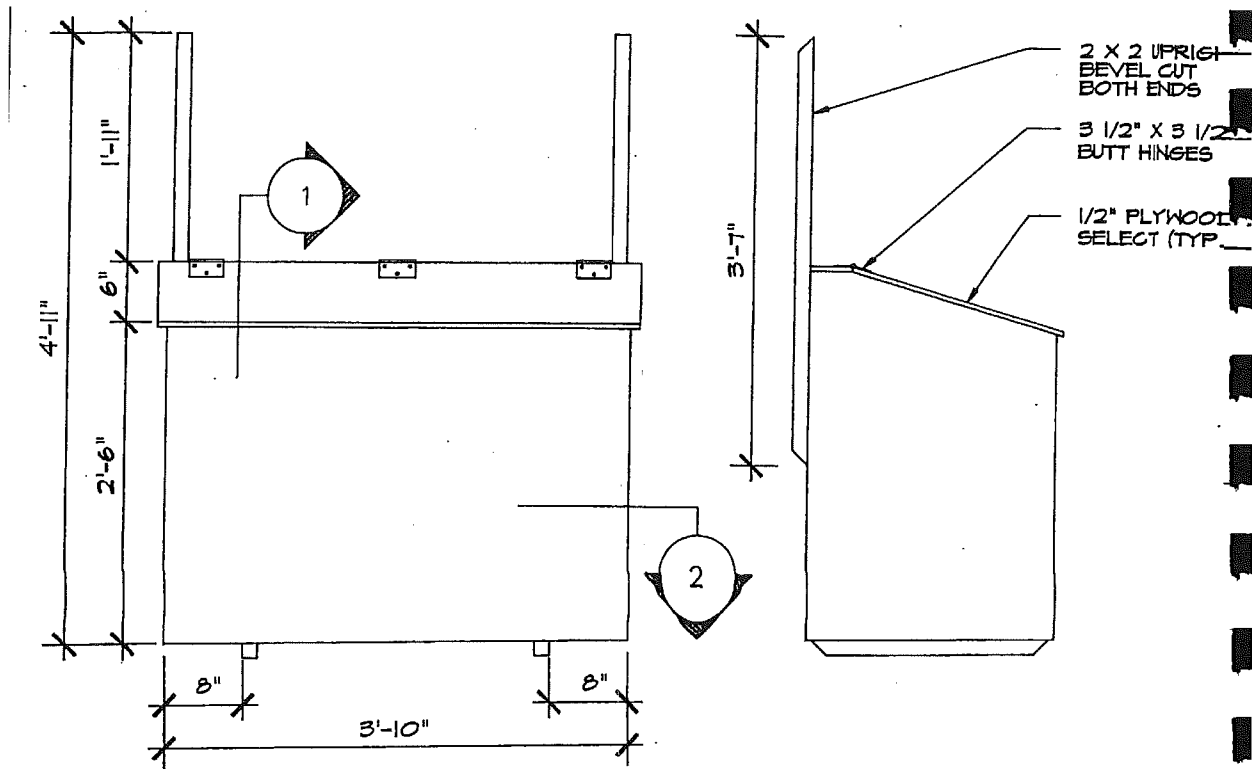
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PLAN VIEW

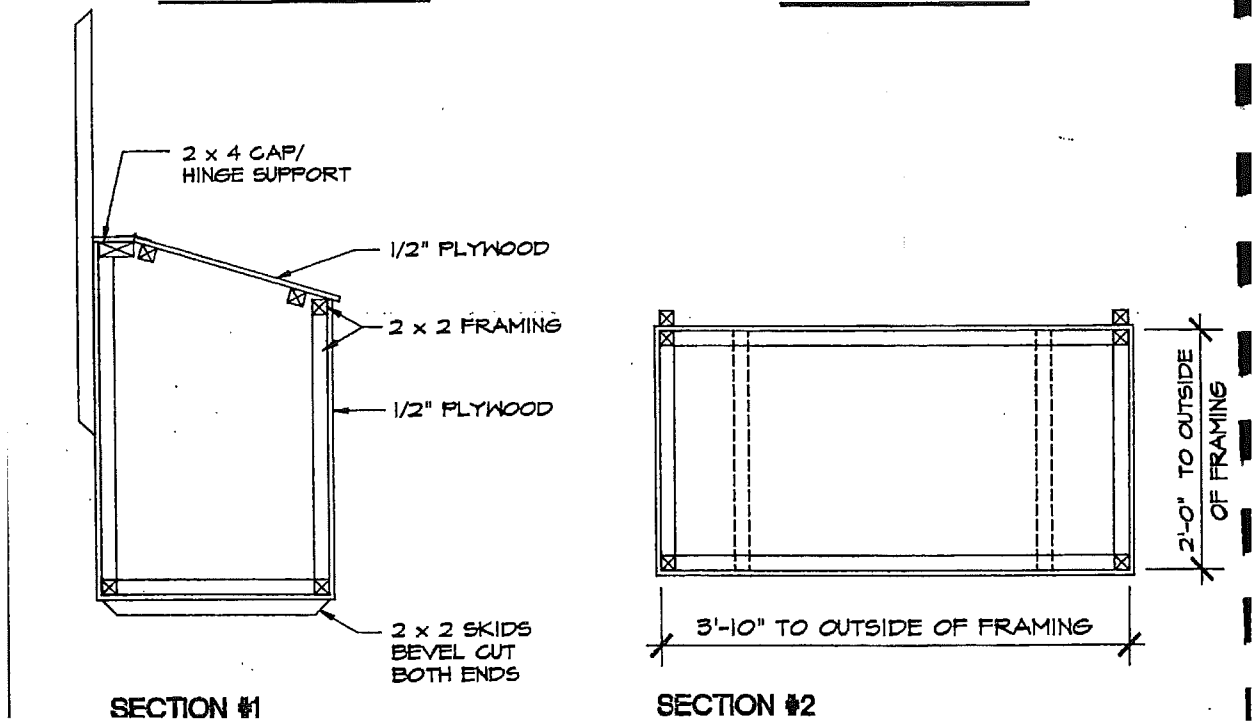


ISOMETRIC



FRONT ELEVATION

SIDE ELEVATION



**SECTION #1**

**SECTION #2**

**Part 1        General**

**1.1            SECTION INCLUDES**

- .1        Residential appliances:
  - .1        Refrigerator, range, dishwasher, washer, dryer, exhaust hood.

**1.2            DESIGN REQUIREMENTS**

- .1        Power: 120 volt.

**1.3            REFERENCES**

- .1        CSA - Appliance Listings.
- .2        ULC - Fire Hazard Classifications.

**1.4            SUBMITTALS**

- .1        Section 01 66 00: Procedures for submittals.
- .2        Product Data: Provide unit dimensions, clearances required from adjacent dissimilar construction, applicable regulatory agency approvals:
  - .1        Plumbing: domestic hot and cold water supply, drainage requirements.
  - .2        Electrical Characteristics: fan heat capacity in kW.
- .3        Shop Drawings: Indicate rough opening dimensions required, exact utility outlet locations required.
- .4        Manufacturer's Installation Instructions: Indicate installation procedures and component installation sequence, clearances and tolerances from adjacent construction, equipment connection requirements.
- .5        Manufacturer's Certificate: Certify that equipment meets or exceeds CSA, requirements.

**1.5            REGULATORY REQUIREMENTS**

- .1        Conform to applicable code for clearances from adjacent materials, and CSA approval.
- .2        Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

**1.6            WARRANTY**

- .1        Submit written warranties.

- .2 Manufacturers Warranty: Two (2) years on equipment and appliances.

**Part 2 Products**

**2.1 COMPONENTS**

.1 Appliances:

- .1 Washer Stacked: Manufacturer General Electric Model Number GTUP270GMWW, stacked type, variable water level control, loose small wash bin, dispenser for powder or liquid soap, dispenser for liquid softener, White colour.
- .2 Dryer Stacked: Manufacturer General Electric Model Number GTUP270GMWW , electric stacked type, interior light, removable lint screen, White colour .
- .3 Refrigerator: Manufacturer Kenmore Model Number 46-42462 , 20.6 cubic capacity, free standing type, self defrosting, double door with freezer compartment over, meat keeper and crisper, white colour.
- .4 Upright Freezer: Manufacturer Kenmore, Model Number 22042, 20.2 cubic foot capacity, free standing type, frost free.
- .5 Range: Manufacturer Kenmore Model Number 223 650 372 10, electric free standing type, four top burners, oven below with top and bottom elements, with [two] chromed steel racks, vision panel, timed convenience outlet, interior oven light, self-cleaning oven, white colour.
- .6 Microwave and Range Hood: Fridgidaire 1.6 cubic foot over the range microwave, stainless steel model CFM164LS, C/W 300 cfm recirculating exhaust fan with grease and charcoal filters.

**2.2 ACCESSORIES**

- .1 Appliances: Power cord to connect to utilities.
- .2 Fasteners and Anchors: Galvanized or stainless steel type, anchors, screws, bolts, expansion shields, set screws; required by the type of construction to which they are attached.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verify that prepared openings are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.
- .2 Verify that proper power supply and fuel source are available.



**3.2           INSTALLATION**

- .1       Install appliances and equipment to manufacturer's instructions and CSA requirements.
- .2       Set and adjust units level and plumb.
- .3       Activate units to confirm correct operation.
- .4       Turn refrigerators on to moderate temperature setting.
- .5       Connect to utilities and make units operational.

**END OF SECTION**

**Part 1            General**

**1.1                SUBMITTALS**

- .1      Submittals: in accordance with Section 01 33 00 - Submittal Procedures .
- .2      Shop drawings; submit drawings stamped and signed by professional engineer registered or licensed in Nunavut, Canada.
- .3      Shop drawings to show:
  - .1          Mounting arrangements.
  - .2          Operating and maintenance clearances.
- .4      Shop drawings and product data accompanied by:
  - .1          Detailed drawings of bases, supports, and anchor bolts.
  - .2          Acoustical sound power data, where applicable.
  - .3          Points of operation on performance curves.
  - .4          Manufacturer to certify current model production.
  - .5          Certification of compliance to applicable codes.
- .5      In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures : use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .6      Closeout Submittals:
  - .1          Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals .
  - .2          Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
  - .3          Operation data to include:
    - .1              Control schematics for systems including environmental controls.
    - .2              Description of systems and their controls.
    - .3              Description of operation of systems at various loads together with reset schedules and seasonal variances.
    - .4              Operation instruction for systems and component.
    - .5              Description of actions to be taken in event of equipment failure.
    - .6              Valves schedule and flow diagram.
    - .7              Colour coding chart.
  - .4          Maintenance data to include:
    - .1              Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    - .2              Data to include schedules of tasks, frequency, tools required and task time.
  - .5          Performance data to include:

- .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
- .2 Equipment performance verification test results.
- .3 Special performance data as specified.
- .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .6 Approvals:
  - .1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.
  - .2 Make changes as required and re-submit as directed by Departmental Representative.
- .7 Additional data:
  - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Site records:
  - .1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
  - .3 Use different colour waterproof ink for each service.
  - .4 Make available for reference purposes and inspection.
- .9 As-built drawings:
  - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  - .2 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).
  - .3 Submit to Departmental Representative for approval and make corrections as directed.
  - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
  - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .10 Submit copies of as-built drawings for inclusion in final TAB report.

## **1.2 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

**1.3 MAINTENANCE**

- .1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals as follows:
  - .1 One set of packing for each pump.
  - .2 One casing joint gasket for each size pump.
  - .3 One head gasket set for each heat exchanger.
  - .4 One glass for each gauge glass.
  - .5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
- .2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals .
- .3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

**Part 2 Products**

**2.1 MATERIALS**

**Part 3 Execution**

**3.1 PAINTING REPAIRS AND RESTORATION**

- .1 Do painting in accordance with Section 09 19 99 – Painting for Minor works .
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

**3.2 CLEANING**

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

**3.3 DEMONSTRATION**

- .1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .2 Trial usage to apply to following equipment and systems:
  - .1 Combi unit.
- .3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

- .4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .5 Instruction duration time requirements as specified in appropriate sections.

**3.4 PROTECTION**

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Pipe, pipe fittings, valves, and connections for piping systems.
  - .1    Sanitary sewer.
  - .2    Domestic water.

**1.2            RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 44 00 - Quality Assurance: Requirements for references and standards.
- .3    Section 01 44 00 - Quality Assurance.
- .4    Section 01 61 00 - Common Product Requirements.
- .5    Section 01 78 10 - Execution Requirements.
- .6    Section 08 31 13 - Access Doors And Frames.
- .7    Section 09 91 10 - Painting.
- .8    Section 23 05 48 - Vibration Isolation.
- .9    Section 23 05 53 - Mechanical Identification.
- .10   Section 23 07 19 - Piping Insulation.
- .11   Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.3            REFERENCES**

- .1    AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- .2    ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- .3    ASME B16.3 - Malleable Iron Threaded Fittings.
- .4    ASME B16.4 - Grey Iron Threaded Fittings.
- .5    ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- .6    ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .7    ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- .8    ASME B16.26 - Copper Alloy Bronze Fittings for Flared Copper Tubes.

- .9 ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- .10 ASME B16.32 - Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.
- .11 ASME B31.1 - Power Piping.
- .12 ASME B31.2 - Fuel Gas Piping.
- .13 ASME B31.9 - Building Services Piping.
- .14 ASME SEC IV - Construction of Heating Boilers.
- .15 ASME SEC IX - Welding and Brazing Qualifications.
- .16 ASTM A47/A47M - Ferritic Malleable Iron Castings.
- .17 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .18 ASTM A74 - Cast Iron Soil Pipe and Fittings.
- .19 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- .20 ASTM B32 - Solder Metal.
- .21 ASTM B42 - Seamless Copper Pipe, Standard Sizes.
- .22 ASTM B43 - Seamless Red Brass Pipe, Standard Sizes.
- .23 ASTM B68 - Seamless Copper Tube, Bright Annealed.
- .24 ASTM B75 - Seamless Copper Tube.
- .25 ASTM B88 - Seamless Copper Water Tube.
- .26 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
- .27 ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .28 ASTM B302 - Threadless Copper Pipe, Standard Sizes.
- .29 ASTM B306 - Copper Drainage Tube (DWV).
- .30 ASTM C4 - Clay Drain Tile and Perforated Clay Drain Tile.
- .31 ASTM C14/C14M - Concrete Sewer, Storm Drain, and Culvert Pipe.
- .32 ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.

- .33 ASTM C443 - Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- .34 ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .35 ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
- .36 ASTM C1053 - Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.
- .37 ASTM D1785 - Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- .38 ASTM D2235 - Solvent Cement for Acrylonitrile - Butadiene - Styrene (ABS) Plastic Pipe and Fittings.
- .39 ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- .40 ASTM D2241 - Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- .41 ASTM D2447 - Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
- .42 ASTM D2466 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- .43 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
- .44 ASTM D2564 - Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- .45 ASTM D2609 - Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
- .46 ASTM D2661 - Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
- .47 ASTM D2662 - Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- .48 ASTM D2665 - Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- .49 ASTM D2666 - Polybutylene (PB) Plastic Tubing.
- .50 ASTM D2683 - Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- .51 ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .52 ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer, Pipe, and Fittings.
- .53 ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.



- .54 ASTM D2855 - Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- .55 ASTM D2996 - Filament-Wound 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.
- .56 ASTM D2997 - Centrifugally-Cast 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.
- .57 ASTM D3000 - Polybutylene (PB) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .58 ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .59 ASTM D3262 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Sewer Pipe.
- .60 ASTM D3309 - Polybutylene (PB) Plastic Hot- and Cold-Water Distribution System.
- .61 ASTM D3517 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pressure Pipe.
- .62 ASTM D3754 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe.
- .63 ASTM D3840 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe Fittings for Non-Pressure Applications.
- .64 ASTM E814 - Fire Tests of Through-Penetration Fire Stops.
- .65 ASTM F437 - Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- .66 ASTM F438 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
- .67 ASTM F439 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- .68 ASTM F441 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
- .69 ASTM F442 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe(SDR-PR).
- .70 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .71 ASTM F493 - Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- .72 ASTM F628 - Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core.
- .73 ASTM F679 - Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

- .74 ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- .75 ASTM F1281 - Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
- .76 ASTM F1282 - Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
- .77 AWS A5.8 - Filler Metals for Brazing and Braze Welding.
- .78 AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping Systems.
- .79 AWWA C110 - Ductile - Iron and Gray - Iron Fittings, 3 In. - 48 In. (76 mm - 1219 mm), for Water.
- .80 AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .81 AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.
- .82 AWWA C651 - Disinfecting Water Mains.
- .83 AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe (and Fabricated Fittings), 4 inch - 12 inch (100 mm - 300 mm), for Water Distribution.
- .84 AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water Service.
- .85 AWWA C902 - Polybutylene (PB) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water.
- .86 AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch - 48 inch (350 mm - 1200mm).
- .87 AWWA C950 - Fibreglass Pressure Pipe.
- .88 CAN-3 B281 - Aluminum Drain, Waste, and Vent Pipe and Components.
- .89 CISPI 301 - Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
- .90 CISPI 310 - Joints with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- .91 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- .92 MSS SP-67 - Butterfly Valves.
- .93 MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- .94 MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
- .95 MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

- .96 MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
- .97 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- .98 MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
- .99 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- .100 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- .101 NCPWB - Procedure Specifications for Pipe Welding.
- .102 UL 1479 - Fire Tests of Through-Penetration Firestops.

**1.4 SUBMITTALS FOR REVIEW**

- .1 Section 01 33 00: Procedures for submittals.
- .2 Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

**1.5 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of valves.

**1.6 QUALITY ASSURANCE**

- .1 Perform Work to Territory of Nunavut standards. Maintain one copy on site.
- .2 Valves: Manufacturer's name and pressure rating marked on valve body.
- .3 Welding Materials and Procedures: Conform to ASME SEC IX and applicable provincial labour regulations.
- .4 Welders Certification: To ASME SEC IX and NCPWB Standard Procedure Specifications.
- .5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

**1.7 REGULATORY REQUIREMENTS**

- .1 Perform Work to Territory of Nunavut plumbing code.
- .2 Conform to applicable code for installation of backflow prevention devices.

**1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.

- .2 Accept valves on site in shipping containers with labelling in place. Inspect for damage.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- .5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

### 1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Section 01 61 00: Environmental conditions affecting products on site.
- .2 Do not install underground piping when bedding is wet or frozen.

### 1.10 EXTRA MATERIALS

- .1 Section 01 78 10: Operation and maintenance data.
- .2 Provide two repacking kits for each size valve.

## Part 2 Products

### 2.1 SANITARY SEWER PIPING, ABOVE GRADE

- .1 PVC Pipe: ASTM D2729.
  - .1 Fittings: PVC.
  - .2 Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.
- .2 PVC Pipe: ASTM D2665.
  - .1 Fittings: PVC.
  - .2 Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

### 2.2 WATER PIPING, ABOVE GRADE

- .1 Copper Tubing: ASTM B88M, Type L, hard drawn.
  - .1 Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  - .2 Joints: ASTM B32, solder, Grade 95TA.

### 2.3 FLANGES, UNIONS, AND COUPLINGS

- .1 Pipe Size 80 mm and Under:
  - .1 Ferrous pipe: Class 150 malleable iron threaded unions.
  - .2 Copper tube and pipe: Class 150 bronze unions with soldered joints.
- .2 Pipe Size Over 25 mm:

- .1 Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- .2 Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- .3 Grooved and Shouldered Pipe End Couplings:
  - .1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
  - .2 Sealing gasket: "C" shape composition sealing gasket.
- .4 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## **2.4 PIPE HANGERS AND SUPPORTS**

- .1 Plumbing Piping - Drain, Waste, and Vent:
  - .1 Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.
  - .2 Hangers for Pipe Sizes 15 to 40 mm: Carbon steel, adjustable swivel, split ring.
  - .3 Hangers for Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.
  - .4 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - .5 Wall Support for Pipe Sizes to 80 mm: Cast iron hook.
  - .6 Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.
  - .7 Vertical Support: Steel riser clamp.
  - .8 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - .9 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- .2 Plumbing Piping - Water:
  - .1 Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.
  - .2 Hangers for Pipe Sizes 15 to 40 mm: Malleable iron Carbon steel, adjustable swivel, split ring.
  - .3 Hangers for Cold Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.
  - .4 Hangers for Hot Pipe Sizes 50 to 100 mm: Carbon steel, adjustable, clevis.
  - .5 Hangers for Hot Pipe Sizes 150 mm and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
  - .6 Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
  - .7 Multiple or Trapeze Hangers for Hot Pipe Sizes 150 mm and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
  - .8 Wall Support for Pipe Sizes to 80 mm: Cast iron hook.
  - .9 Wall Support for Pipe Sizes 100 mm and Over: Welded steel bracket and wrought steel clamp.

- .10 Wall Support for Hot Pipe Sizes 150 mm and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
- .11 Vertical Support: Steel riser clamp.
- .12 Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- .13 Floor Support for Hot Pipe Sizes to 100 mm: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
- .14 Floor Support for Hot Pipe Sizes 150 mm and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
- .15 Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

## 2.5 GATE VALVES

- .1 Up To and Including 80 mm:
  - .1 MSS SP-80, Class 125 , bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.
- .2 50 mm and Larger:
  - .1 MSS SP-70, Class 125 , iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 150 mm and larger mounted over 2400 mm above floor.

## 2.6 GLOBE VALVES

- .1 Up To and Including 80 mm:
  - .1 MSS SP-80, Class 125 , bronze body, bronze trim, handwheel, teflon disc, solder or threaded ends.
- .2 50 mm and Larger:
  - .1 MSS SP-85, Class 125 , iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 150 mm and larger mounted over 2400 mm above floor.

## 2.7 BALL VALVES

- .1 Construction, 100 mm and Smaller: MSS SP-110, Class 150, 2760 kPa CWP , bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder or threaded ends with union.

## 2.8 PLUG VALVES

- .1 Construction 65 mm and Larger: MSS SP-78, 1200 kPa CWP , cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

## **2.9 FLOW CONTROLS**

- .1 Construction: Class 150 , Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet , blowdown/backflush drain.
- .2 Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 24 kPa.

## **2.10 SWING CHECK VALVES**

- .1 Up To and Including 80 mm:
  - .1 MSS SP-80, Class 125 , bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.
- .2 50 mm and Larger:
  - .1 MSS SP-71, Class 125 , iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

## **2.11 SPRING LOADED CHECK VALVES**

- .1 Class 125 , iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

## **2.12 WATER PRESSURE REDUCING VALVES**

- .1 MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded double union ends.
- .2 Over 50 mm:
  - .1 MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

## **2.13 RELIEF VALVES**

- .1 Pressure Relief:
  - .1 AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- .2 Temperature and Pressure Relief:
  - .1 AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 98.9 degrees C, capacity ASME SEC IV certified and labelled.

## **2.14 STRAINERS**

- .1 Size 50 mm and Under:
  - .1 Class 150, threaded bronze body 2070 kPa CWP, Y pattern with 0.8 mm1/32 inch stainless steel perforated screen.
- .2 Size 40 mm to 100 mm:

- .1 Class 125, flanged iron body, Y pattern with 1.6 mm stainless steel perforated screen.
- .3 Size 125 mm and Larger:
  - .1 Class 125, flanged iron body, basket pattern with 3.2 mm stainless steel perforated screen.

## 2.15 FIRE STOP SYSTEMS

- .1 General Purpose Fire Stopping Sealant:
  - .1 Water based, nonslumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- .2 General Purpose Vibration Resistant Fire Stopping Sealant:
  - .1 Silicone based, nonslumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.
- .3 DWV Plastic Pipe Systems Fire Stopping Sealant:
  - .1 Silicone based, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479 with metal collars.
- .4 See Section 07 84 00 Fire Stopping.

## Part 3 Execution

### 3.1 EXAMINATION

- .1 Section 01100- Coordination and Meetings: Verification of existing conditions before starting work.
- .2 Verify that excavations are to required grade, dry, and not over-excavated.

### 3.2 PREPARATION

- .1 Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

### 3.3 INSTALLATION

- .1 Install to manufacturer's instructions.
- .2 Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- .3 Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.



- .4 Install piping to maintain headroom, conserve space, and not interfere with use of space.
- .5 Group piping whenever practical at common elevations.
- .6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.
- .7 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.
- .8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.
- .9 Establish elevations of buried piping outside the building to ensure not less than 1.0 m of cover.
- .10 Install vent piping penetrating roofed areas to maintain integrity of roof assembly
- .11 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- .12 Provide support for utility meters to requirements of utility companies.
- .13 Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 91 10.
- .14 Excavate to Sections 31 23 18 and 31 23 23 for work of this Section.
- .15 Backfill to Sections 31 23 16 and 31 23 23 for work of this Section.
- .16 Install bell and spigot pipe with bell end upstream.
- .17 Install valves with stems upright or horizontal, not inverted.
- .18 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- .19 Install water piping to ASME B31.9.
- .20 Sleeve pipes passing through partitions, walls and floors.
- .21 Inserts:
  - .1 Provide inserts for placement in concrete formwork.
  - .2 Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - .3 Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 100 mm.
  - .4 Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

- .5 Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above flush with top of recessed into and grouted flush with slab.

.22 Pipe Hangers and Supports:

- .1 Install to ASTM B31.9 ASTM F708 and MSS SP89.
- .2 Support horizontal piping as scheduled.
- .3 Install hangers to provide minimum 15 mm space between finished covering and adjacent work.
- .4 Place hangers within 300 mm of each horizontal elbow.
- .5 Use hangers with 40 mm minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- .6 Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
- .7 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- .8 Provide copper plated hangers and supports for copper piping sheet lead packing between hanger or support and piping.
- .9 Prime coat exposed steel hangers and supports. Refer to Section 09 91 10. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- .10 Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 23 05 48.
- .11 Support cast iron drainage piping at every joint.

**3.4 APPLICATION**

- .1 Use grooved mechanical couplings and fasteners only in accessible locations.
- .2 Install unions downstream of valves and at equipment or apparatus connections.
- .3 Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- .4 Install gate ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- .5 Install globe ball or butterfly valves for throttling, bypass, or manual flow control services.
- .6 Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- .7 Provide spring loaded check valves on discharge of water pumps.
- .8 Provide flow controls in water recirculating systems where indicated.

**3.5 ERECTION TOLERANCES**

- .1 Section 01 44 00: Tolerances.

- .2 Establish invert elevations, slopes for drainage to 2 one percent minimum. Maintain gradients.
- .3 Slope water piping minimum 0.25 percent and arrange to drain at low points.

### **3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- .1 Disinfect water distribution system to Section 22 05 81.

### **3.7 SERVICE CONNECTIONS**

- .1 Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- .2 Provide new water service complete with approved double check backflow preventer and water meter with by-pass valves pressure reducing valve,
  - .1 Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

### **3.8 SCHEDULES**

- .1 Pipe Hanger Schedule:
  - .1 Metal Piping:
    - .1 Pipe size: 15 to 32 mm:
      - .1 Maximum hanger spacing: 2 m.
      - .2 Hanger rod diameter: 9 mm.
    - .2 Pipe size: 40 to 50 mm:
      - .1 Maximum hanger spacing: 3 m.
      - .2 Hanger rod diameter: 9 mm.
    - .3 Pipe size: 65 to 75 mm:
      - .1 Maximum hanger spacing: 3 m.
      - .2 Hanger rod diameter: 13 mm.
    - .4 Pipe size: 100 to 150 mm:
      - .1 Maximum hanger spacing: 3 m.
      - .2 Hanger rod diameter: 15 mm.
    - .5 Pipe size: 200 to 300 mm:
      - .1 Maximum hanger spacing: 4.25 m.
      - .2 Hanger rod diameter: 22 mm.
    - .6 Pipe size: 350 mm and Over:
      - .1 Maximum hanger spacing: 6 m.
      - .2 Hanger rod diameter: 25 mm.
  - .2 Plastic Piping:
    - .1 All Sizes:

- .1 Maximum hanger spacing: 1.8 m.
- .2 Hanger rod diameter: 9 mm.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1    Floor Drains
- .2    Funnel Floor Drains
- .3    Vents
- .4    Cleanouts.
- .5    Hose bibs.
- .6    Recessed valve box.
- .7    Backflow preventers.
- .8    Water hammer preventer

**1.2                RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 61 00 - Common Product Requirements.
- .3    Section 01 78 10 - Execution Requirements.
- .4    Section 22 10 00 - Plumbing Piping.
- .5    Section 22 42 02 - Plumbing Fixtures.
- .6    Section 22 47 00 - Plumbing Equipment.
- .7    Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.
- .8    Section 33 05 13 - Manholes And Catch Basins.

**1.3                REFERENCES**

- .1    ASME A112.21.1 - Floor Drains.
- .2    ASME A112.21.2 - Roof Drains.
- .3    ASME A112.26.1 - Water Hammer Arrestors.
- .4    ASSE 1011 - Hose Connection Vacuum Breakers.
- .5    ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.

- .6 ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- .7 ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- .8 ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- .9 AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
- .10 PDI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- .11 PDI WH-201 - Water Hammer Arrestors.

**1.4 SUBMITTALS FOR REVIEW**

- .1 Section 01 33 00: Procedures for submittals.
- .2 Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- .3 Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

**1.5 SUBMITTALS FOR INFORMATION**

- .1 Section 01 33 00: Procedures for submittals.
- .2 Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.

**1.6 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- .3 Operation Data: Indicate frequency of treatment required for interceptors.
- .4 Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

**1.7 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

**1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Accept specialties on site in original factory packaging. Inspect for damage.

**1.9 EXTRA MATERIALS**

- .1 Section 01 78 10.
- .2 Supply two loose keys for outside hose bibs, hose end vacuum breakers for hose bibs, service kits for .

**Part 2 Products**

**2.1 FLOOR DRAIN (FD)**

- .1 Floor Drain:
  - .1 Manufacturers:
    - .1 Standard: Zurn Model ZN-415-R.)
    - .2 Substitutions: Refer to Section 01 62 00.
  - .2 ANSI A112.21.1; lacquered galvanized cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.
  - .3 Install new "Trap Guard" on floor drain.

**2.1 FUNNEL FLOOR DRAIN (FFD)**

- .1 Funnel Floor Drain Strainer :
  - .1 Manufacturers:
    - .1 Standard: Zurn Model ZN-415-BE.)
    - .2 Substitutions: Refer to Section 01 62 00.
  - .2 ANSI A112.21.1; lacquered galvanized cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.
  - .3 Install "Trap Guard" on floor drain.

**2.2 VENTS**

- .1 Roof Vents
  - .1 Manufacturers:
    - .1 Heat Line Manufacturing
      - .1 ArcticVent – Electric
      - .2 120V, 75W @ 10C Self Regulating Heating Cable

**2.3 CLEANOUTS**

- .1 Interior Finished Floor Areas (CO):
  - .1 Manufacturers:
    - .1 Zurn Model ZN-1400-HD-BP-NH
    - .2 Substitutions: Refer to Section 01 62 00.

- .2 Galvanized cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- .2 Interior Finished Wall Areas (CO):
  - .1 Manufacturers:
    - .1 Zurn Model ZANB-1460
    - .2 Substitutions: Refer to Section 01 62 00.
  - .2 Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- .3 Exposed cleanout plugs: heavy duty PVC male threaded plug. Neoprene gasket.

## 2.4 HOSE BIBS

- .1 Interior:
  - .1 Manufacturers:
    - .1 Zurn 1341 Wall Faucet
    - .2 Substitutions: Refer to Section 01 62 00.
  - .2 Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with handwheel, vacuum breaker to ANSI/ASSE 1011.

## 2.5 RECESSED VALVE BOX

- .1 Washing Machine:
  - .1 Manufacturers:
    - .1 Oatey Model 38995. 18GA Metal Washing machine outlet box c/w copper sweat valves and water hammer arrestors.
    - .2 Substitutions: Refer to Section 01 62 00.
  - .2 Plastic preformed rough-in box with brass valves with single lever handle, socket for 50 mm waste, slip in finishing cover.

## 2.6 BACKFLOW PREVENTERS

- .1 Reduced Pressure Backflow Preventers:
  - .1 ANSI/ASSE 1013 AWWA C506; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

## Part 3 Execution

### 3.1 INSTALLATION

- .1 Install to manufacturer's instructions.



- .2 Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- .3 Encase exterior cleanouts in concrete flush with grade.
- .4 Install floor cleanouts at elevation to accommodate finished floor.
- .5 Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.
- .6 Pipe relief from backflow preventer to nearest drain.
- .7 Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories sinks washing machine outlets.
- .8 Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 20 mm minimum, and minimum 450 mm long.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1     Bathtubs
- .2     Sinks
- .3     Lavatories
- .4     Toilets

**1.2                RELATED SECTIONS**

- .1     Section 01 33 00 - Administrative Requirements.
- .2     Section 01 44 00 - Quality Assurance.
- .3     Section 01 61 00 - Common Product Requirements.
- .4     Section 01 78 10 - Execution Requirements.
- .5     Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
- .6     Section 23 05 29 - Supports And Anchors.
- .7     Section 22 10 00 - Plumbing Piping.
- .8     Section 22 42 01 - Plumbing Specialties.
- .9     Section 22 47 00 - Plumbing Equipment.
- .10    Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.3                REFERENCES**

- .1     ASME A112.6.1 - (Floor Affixed) Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- .2     ASME A112.18.1 - Plumbing Fixture Fittings.
- .3     ASME A112.19.1 - Enamelled Cast Iron Plumbing Fixtures.
- .4     ASME A112.19.2 - Vitreous China Plumbing Fixtures.
- .5     ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- .6     ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.
- .7     ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

.8 NFPA 70 - National Electrical Code.

**1.4 SUBMITTALS FOR REVIEW**

.1 Section 01 33 00: Procedures for submittals.

.2 Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

**1.5 SUBMITTALS FOR INFORMATION**

.1 Section 01 33 00: Procedures for submittals.

.2 Manufacturer's Instructions: Indicate installation methods and procedures.

**1.6 SUBMITTALS AT PROJECT CLOSEOUT**

.1 Section 01 78 10: Procedures for submittals.

.2 Maintenance Data: Include fixture trim exploded view and replacement parts lists.

.3 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.7 QUALITY ASSURANCE**

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

**1.8 REGULATORY REQUIREMENTS**

.1 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

**1.9 DELIVERY, STORAGE, AND PROTECTION**

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Accept fixtures on site in factory packaging. Inspect for damage.

.3 Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

**1.10 WARRANTY**

.1 Section 01 78 10.

**1.11 EXTRA MATERIALS**

.1 Section 01 78 10.

- .2 Supply two sets of faucet washers, Flush valve service kits, lavatory supply fittings, toilet seats..

## Part 2 Products

### 2.1 LAV -1 - COUNTER MOUNTED SELF-RIMMING - DROP-IN BASIN

- .1 American Standard Boulevard #0641.004, vitreous china, self-rimming - drop-in, rear overflow, faucet ledge, unglazed back of basin.
- .2 American Standard Ceramix #2000.100 Single Lever faucet, chrome plated brass, 5.7 LPM (1.5 GPM) aerator outlet, 117 mm (4-5/8") projection reach, metal lever handle, adjustable hot limit stop.
- .3 McGuire #155AC Open Grid Drain, chrome plated cast brass one piece top, 17 GA. (1.5 mm) tubular 32 mm (1-1/4") tailpiece.
- .4 McGuire #LFH170BV, chrome plated polished brass Faucet Supplies, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, combination V.P. Loose key handle, escutcheon and flexible copper riser.
- .5 Provide P-Trap, 32 mm (1-1/4") size, and escutcheon.

### 2.2 S-1 - DOUBLE BOWL COUNTERTOP MOUNT SINK STAINLESS STEEL

- .1 Kindred 'STEEL QUEEN' #QDLA2233/8/3 Double Bowl Countertop Mount Sink, 3 holes, 8" (203 mm) center, 559 mm (22") x 848 mm (33-3/8") x 203 mm (8") deep, spillway, counter mounted, backledge, grade 18-10, 20 GA. (0.9 mm) type 302 stainless steel, mirror finish rim, satin finish bowls, radius coved bowl corners, mounting kit provided, fully undercoated to reduce condensation and resonance, 89 mm (3-1/2") crumb cup waste assembly with 38 mm (1-1/2") tailpiece.
- .2 American Standard Reliant+ #4205.000 Single Lever faucet, chrome plated cast brass, washerless ceramic disc cartridge, 8.3 LPM (2.2 GPM) aerator outlet, cast brass swing spout 235 mm (9-1/4") projection reach, lever handle.
- .3 McGuire #LFH170BV, chrome plated polished brass Faucet Supplies, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, combination V.P. Loose key handle, escutcheon and flexible copper riser.
- .4 Provide P-Trap, 38 mm (1-1/2") size, and escutcheon.

### 2.3 T-1 - BATH AND SHOWER ACRYLIC

- .1 FIAT #MTS-6310-103L73 Bath and Shower, Bath and shower, high gloss acrylic with fiberglass reinforcement, textured bottom, for below floor rough, left hand drain, factory installed stainless steel curtain rod, 25 mm (1") screw flange, integral accessory shelves, door finish option NA.

- .2 American Standard Ceramix #T000.502/R120SS Bath and Shower Valve, pressure balancing mixing valve, brass body, washerless ceramic drip-free disc valve cartridge, integral hot water limit stop, screwdriver stops with separate checks. Brass wall escutcheon, metal lever handle, 9.5 L (2.5 US Gal) flow per minute VARIO adjustable showerhead, cast brass arm, cast brass tub spout with diverter.
- .3 American Standard #1583.470 Universal Bath Drain, brass tubing and rotary pop-assembly, chrome plated, 1 1/2" (38 mm) cast brass fittings.
- .4 Provide P-Trap.

#### **2.4 WC-1 - TOILET - VITREOUS CHINA - TANK TYPE**

- .1 American Standard H2 Option Dual Flush 381 mm high #2889.516.020 HET Toilet, white vitreous china, Floor Mounted, siphon jet flush action and PowerWash rim siphon flushing system which scrubs bowl with every flush, 6 L (1.6 US Gal) full flush / 3.8 L (1.0 US Gal) partial flush, raised sanitary bar, 229 mm x 203 mm (9" x 8") water surface, two piece, cast rib for china to china assembly, lined tank, unbolted tank cover, flapper-free double flush valve, 'Pilot Valve' water control (without float) for quiet refill, 305 mm (12") rough-in, round front bowl, 51 mm (2") fully glazed internal trapway, floor outlet, bolt caps.
- .2 Centoco #440STS.001 light duty toilet seat, for round bowl closed front, white solid plastic, closed front with cover, stainless steel check hinges, metal flat washers stainless steel posts and nuts.
- .3 McGuire #LFH172BV, chrome plated polished brass Toilet Supply, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") long rigid horizontal integral copper sweat tube nipples, combination V.P. Loose key handle, escutcheon and flexible copper riser.
- .4 Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.

### **Part 3 Execution**

#### **3.1 EXAMINATION AND PREPARATION**

- .1 Section 01 70 00: Verification of existing conditions before starting work.
- .2 Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- .3 Verify that electric power is available and of the correct characteristics.
- .4 Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

### 3.2 PREPARATION

- .1 Rough-in fixture piping connections to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### 3.3 INSTALLATION

- .1 Install each fixture with trap, easily removable for servicing and cleaning.
- .2 Provide chrome plated rigid or flexible supplies to fixtures with loose key screwdriver stops, reducers, and escutcheons.
- .3 Install components level and plumb.
- .4 Install and secure fixtures in place with wall supports wall carriers and bolts.
- .5 Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.
- .6 Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

### 3.4 INTERFACE WITH OTHER PRODUCTS

- .1 Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

### 3.5 ADJUSTING

- .1 Section 01 78 10 - Execution Requirements: Adjusting installed work.
- .2 Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### 3.6 CLEANING

- .1 Section 01 78 10 - Execution Requirements: Cleaning installed work.
- .2 Clean plumbing fixtures and equipment.

### 3.7 PROTECTION OF FINISHED WORK

- .1 Section 01 78 10 - Execution Requirements: Protecting installed work.
- .2 Do not permit use of fixtures.

### 3.8 SCHEDULES

- .1 Fixture Heights: Install fixtures to heights above finished floor as indicated.
  - .1 Water Closet:
    - .1 Standard: 380 mm mm to top of bowl rim.

- .2 Accessible: 455 mm mm to top of seat.
- .2 Water Closet Flush Valves:
  - .1 Standard: 280 mm mm min. above bowl rim.
  - .2 Recessed: 255 mm mm min. above bowl rim.
- .3 Lavatory:
  - .1 Standard: 785 mm mm to top of basin rim.
  - .2 Accessible: 865 mm mm to top of basin rim.
- .4 Shower Heads:
  - .1 Adult Male: 1765 mm mm to bottom of head.
  - .2 Adult Female: 1640 mm mm to bottom of head.
  - .3 Child: 1490 mm mm to bottom of head.
- .2 Fixture Rough-In

Water Closet: (Flush Valve)	25 mm	100 mm	50 mm	
Water Closet: (Tank Type)	15 mm	100 mm	50 mm	
Bidet:	15 mm	15 mm	40 mm	32 mm
Urinal: (Flush Valve)	20 mm	50 mm	40 mm	
Urinal: (Tank Type)	15 mm	50 mm	40 mm	
Lavatory:	15 mm	15 mm	40 mm	32 mm
Sink:	15 mm	15 mm	40 mm	32 mm
Service Sink:	15 mm	15 mm	50 mm	40 mm
Service Sink:	15 mm	15 mm	80 mm	40 mm
Drinking Fountain:	15 mm	32 mm	32 mm	
Bathtub:	15 mm	15 mm	40 mm	32 mm
Shower:	15 mm	15 mm	40 mm	32 mm

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Water storage tanks.
- .2      Effluent storage tank.
- .3      Water pressure pumps.
- .4      Pressure Tanks.
- .5      Indirect-fired water heaters.

**1.2                RELATED SECTIONS**

- .1      Section 01 33 00 - Administrative Requirements.
- .2      Section 01 61 00 - Common Product Requirements.
- .3      Section 01 78 10 - Execution Requirements.

**1.3                REFERENCES**

- .1      ASHRAE 90A - Energy Conservation in New Building Design.
- .2      ASME Section 8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels.
- .3      NFPA 30 - Flammable and Combustible Liquids Code.
- .4      NFPA 54 - National Fuel Gas Code.
- .5      UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.

**1.4                SUBMITTALS FOR REVIEW**

- .1      Section 01 33 00: Procedures for submittals.
- .2      Product Data:
  - .1      Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
  - .2      Indicate pump type, capacity, power requirements.
  - .3      Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
  - .4      Provide electrical characteristics and connection requirements.
- .3      Shop Drawings:



- .1 Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
- .4 Prior to shipping, contractor to set up mock display of security water closet and transfer tank on effluent pump. Run temporary line between the tank and the water closet to determine tank bottom elevation. See detail 4 on drawing M1.2.

## **1.5 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of equipment.
- .3 Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- .4 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

## **1.6 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .2 Provide pumps with manufacturer's name, model number, and rating/capacity identified.
- .3 Ensure products and installation of specified products are to recommendations and requirements of the following organizations:
  - .1 Canadian Standards Association (CSA).
  - .2 American Society of Mechanical Engineers (ASME).
  - .3 National Electrical Manufacturers' Association (NEMA).
  - .4 Underwriters Laboratories Canada (ULC).
- .4 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

## **1.7 REGULATORY REQUIREMENTS**

- .1 Conform to ASME Section 8D NFPA 30 NFPA 31 for pressure tanks.
- .2 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Canada and CSA as suitable for the purpose specified and indicated.

## **1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**1.9 WARRANTY**

- .1 Section 01 78 10.
- .2 Provide five year manufacturer warranty for water storage tanks and pumps.

**1.10 EXTRA MATERIALS**

- .1 Section 01 78 10.
- .2 Provide two of pump seals.

**Part 2 Products**

**2.1 DOMESTIC WATER STORAGE TANKS**

- .1 Tanks to be rotationally moulded seamless polyethylene, self-supporting with tapings, fittings and access cover and made from a material suitable for storage of potable water with no signs of leaking, deformation or surface cracking.
- .2 Tanks to be warranted for a period of two (2) years against material and workmanship defects from date of substantial completion and bear manufacturers name, address and date of manufacture. Tank installation and maintenance instructions are to be secured to each tank.
- .3 Each tank shall be fitted with float switch to activate an outside light when the water level in the tank is approximately 75mm below the top of the tank. Light to turn off when the water level drops 25mm below full level. A second float switch shall activate a second light when the level of the tank drops to within 1500mm of the bottom of the tank. The function of each indicator light is to be clearly indicated with a lamacoid nameplate. Float switches to be Flygt ENM-10 or approved equivalent suitable for domestic water use.
- .4 Standard of acceptance: Equinox E325WS or approved equivalent

**2.2 EFFLUENT STORAGE TANKS**

- .1 Manufacturer: Standard of acceptance for the tank: Equinox G1000LP Insulated Sewage Holding Tank or approved equivalent.
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Or approved equal.
  - .2 Substitutions: Refer to Section 01 62 00.
- .3 Tanks to be fibreglass tank with 100mm of urethane foam insulation and exterior plywood shell, self-supporting with inlet, vent, suction pipe with vortex plate, manhole access and made from material suitable for storage of sewage with no signs of leaking, deformation or surface cracking even under induced pressure from sewage pumpout truck. Tanks are to be heat traced with hydronic heating systems. Inside tank surface to have a minimum service life of 25 years.

- .4 Tanks to be warranted for a period of two (2) years against material and workmanship defects from date of substantial completion and bear manufacturers name, address and date of manufacture. Tank installation and maintenance instructions are to be secured to each tank
- .5 Each tank shall be fitted with float switch to activate an outside light when the level in the tank is approximately 75mm below the top of the tank. The function of the indicator light is to be clearly indicated with a lamacoid nameplate. Float switches to be Flygt ENM-10 or approved equivalent suitable for sewage use. Lead weight is not acceptable as a float switch component.

### **2.3 WATER PRESSURE PUMPS, P-5a, 5b**

- .1 Manufacturer: Armstrong 4700-VMS-03-04.
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Or approved equal
  - .2 Substitutions: Refer to Section 01 62 00.
- .3 Vertical multi-stage pump, all components 304 stainless steel. Gravity feed water inlet.
- .4 Pump to be placed in vertical configuration. Contractor to provide stand (metal) for pump brace. Pumps to be mounted as flooded at all times. Bottom feed storage tank
- .5 Pumps to be controlled by weekly timer, i.e. pumps operate alternately every week.
- .6 Performance:
  - .1 Flow: 15 USgpm at 120 ft head.
  - .2 Motors: 1 hp.
  - .3 Electrical Characteristics:
    - .1 230 volts, single phase, 60 Hz.

### **2.4 PRESSURE TANK**

- .1 Manufacturer: Expanflex AFX300 Water Tank.
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Or approved equal.
  - .2 Substitutions: Refer to Section 01 62 00.
- .3 400 Litre, pre-charged, replaceable butyl bladder, charging valve, system connection.
- .4 ASME Section VIII construction.

### **2.5 INDIRECT FIRED WATER HEATER**

- .1 Manufacturer: Weil McLain Aqua Plus Model 45.
- .2 Other acceptable manufacturers offering equivalent products.

- .1 Or approved equal.
- .2 Substitutions: Refer to Section 01 62 00.
- .3 150 Litre, 316L welded stainless steel tank, replaceable anode, 150psi T&P relief valve,, dedicated recirculation tapping.
- .4 Rating: at 180F boiler water, continuous supply of 200GPH at 140F.
- .5 Compatible with glycol water mix.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install equipment to manufacturer's instructions.
- .2 Coordinate with plumbing piping and related electrical work to achieve operating system.
- .3 Pumps:
  - .1 Provide air cock and drain connection on horizontal pump casings.
  - .2 Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
  - .3 Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes <100 mm><<4 inches >> and over.
  - .4 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
  - .5 Align and verify alignment of base mounted pumps prior to start-up.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1    Expansion tanks.
- .2    Air vents.
- .3    Air separators.
- .4    Strainers.
- .5    Glycol specialties.

**1.2                RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 61 00 - Common Product Requirements.
- .3    Section 01 78 10 - Execution Requirements.
- .4    Section 22 42 01 - Plumbing Specialties: Backflow Preventers.
- .5    Section 23 21 00 - Hydronic Piping.
- .6    Section 23 25 00 - Chemical Treatment For Piping: Pipe Cleaning.

**1.3                REFERENCES**

- .1    ASME - SEC 8D - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.

**1.4                SUBMITTALS**

- .1    Section 01 33 00: Procedures for submittals.
- .2    Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model [and dimensions].
- .3    Submit inspection certificates for pressure vessels from [authority having jurisdiction.]
- .4    Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

**1.5                PROJECT RECORD DOCUMENTS**

- .1    Section 01 78 10: Submittals for project closeout.

**1.6 OPERATION AND MAINTENANCE DATA**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

**1.7 QUALIFICATIONS**

- .1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum [three] years [documented] experience.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- .5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

**1.9 MAINTENANCE SERVICE**

- .1 Provide service and maintenance of glycol system for [one] year from date of substantial completion.
- .2 Visit to make glycol fluid concentration analysis on site with refractive index measurement instrument. Detail findings with maintenance personnel in writing of corrective actions needed including analysis and amounts of glycol or water added.

**1.10 EXTRA MATERIALS**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide [one] extra [4] L drum of glycol.

**Part 2 Products**

**2.1 DIAPHRAGM-TYPE EXPANSION TANKS**

- .1 Manufacturers:
  - .1 Watts Model ETA-15.
- .2 Construction: Welded steel, tested and stamped to ASME SEC 8-D; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible butyl diaphragm sealed into tank, and steel support stand.

- .3 Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to [80] [ ] kPa.
- .4 Automatic Cold Water Fill Assembly: Pressure reducing valve, double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.
- .5 Size:
  - .1 Capacity: 7.5 Gal.
  - .2 Acceptance capacity: 2.5 Gal
  - .3 Diaphragm suitable for 240 F operating temperature.

## 2.2 AUTOMATIC AIR VENTS

- .1 Standard float vent: brass body and NPS connection

## 2.3 AIR SEPARATORS – EXPANSION TANK FITTING

- .1 Complete with adjustable vent tube and built in manual vent valve

## 2.4 STRAINERS

- .1 Size 50 mm and Under:
  - .1 Screwed brass or iron body for 1200 kPa working pressure, Y pattern with 0.8 mm stainless steel perforated screen.

## 2.5 GLYCOL SYSTEM

- .1 Glycol System Tanks and Pump
  - .1 Manufacturers:
    - .1 Axiom MF300.
    - .2 Substitutions: [Refer to Section 01 62 00.]
  - .2 System shall include 65 litre (17 U.S. gallon) storage/mixing tank with molded-in level gauge, 125 mm (5") fill/access opening and cover; pump suction hose with inlet strainer and check valve; pressure pump with fuse protection; low fluid level pump cut-out float switch; manual diverter valve for purging air and agitating contents of storage tank; pressure switch with snubber and two sets of SPST dry contacts, each individually adjustable from 115kPa (10 psig) to 170 kPa (25 psig) cut-out pressure; factory cut-out pressure set to 115 kPa (17psig); and liquid filled pressure gauge. Unit to be c/w UL listed and fused power supply adapter with LED power indicator light, 115/60/1 to 24 VDC 50 watts AC, supplied loose for field installation.
  - .3 Feeder shall be compatible with glycol solutions of up to 50% concentration. Pump shall be capable of running dry without damage. The second set of contacts in the pressure switch shall be wired to a terminal strip for use as low pressure alarm contacts for remote alarm circuit supplied by others. Unit shall be completely assembled.
- .2 Glycol Solution

- .1 Manufacturers:
  - .1 Dowfrost HD Propylene Glycol.
  - .2 Substitutions: Not permitted
- .2 Inhibited propylene glycol and water solution mixed 50 percent glycol – 50 percent water, suitable for operating temperatures from -40 degrees C to 121 degrees C.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install specialties to manufacturer's instructions.
- .2 Where large air quantities can accumulate, provide enlarged air collection standpipes.
- .3 Provide manual air vents at system high points and as indicated.
- .4 For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- .5 Provide air separator on suction side of system circulation pump and connect to expansion tank.
- .6 Provide valved drain and hose connection on strainer blow down connection.
- .7 Provide pump suction fitting on suction side of base mounted centrifugal pumps [where indicated]. Remove temporary strainers after cleaning systems.
- .8 Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps [where indicated].
- .9 Support pump fittings with floor mounted pipe and flange supports.
- .10 Provide radiator valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil units.
- .11 Provide radiator balancing valves on water outlet from terminal heating units such as radiation, unit heaters, and fan coil units.
- .12 Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
- .13 Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- .14 Pipe relief valve outlet to nearest floor drain.
- .15 Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.



- .16 Clean and flush glycol system before adding glycol solution. Refer to Section 23 25 00.
- .17 Feed glycol solution to system through make-up line with pressure regulator, venting system high points. [Set to fill at 80 kPa.] [Pressure system cold at 35 kPa.]
- .18 Perform tests determining strength of glycol and water solution and submit written test results.

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1    Pipe and pipe fittings.
- .2    Valves.
- .3    Fuel oil storage tanks.
- .4    Accessories.

**1.2                RELATED SECTIONS**

- .1    Section 01 10 13 - Summary of Work
- .2    Section 01 20 13 - Price and Payment Procedures
- .3    Section 01 33 00 - Administrative Requirements.
- .4    Section 01 61 00 - Common Product Requirements.
- .5    Section 01 78 10 - Execution Requirements.
- .6    Section 08 31 13 - Access Doors And Frames.
- .7    Section 09 91 10 - Painting.
- .8    Section 23 05 16 - Piping Expansion Compensation.
- .9    Section 23 05 29 - Supports And Anchors.
- .10   Section 23 05 53 - Mechanical Identification.
- .11   Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.
- .12   Section 31 23 18 - Trenching.
- .13   Section 31 23 23 - Backfilling.

**1.3                REFERENCES**

- .1    ACT 100 - Fabrication of FRP Clad/Composite Underground Storage Tanks.
- .2    ANSI B31.1 - Power Piping.
- .3    ANSI B31.4 - Liquid Petroleum Transportation Piping Systems.
- .4    ANSI B31.9 - Building Service Piping.

- .5 API Spec 12P - Fibreglass Reinforced Plastic Tanks.
- .6 API 650 - Welded Steel Tanks for Oil Storage.
- .7 API 1615 - Installation of Underground Petroleum Storage Systems.
- .8 API 1632 - Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems.
- .9 API 2000 - Venting Atmospheric and Low Pressure Storage Tanks.
- .10 ASME - Boiler and Pressure Vessel Code.
- .11 ASME SEC IX - Welding and Brazing Qualifications.
- .12 ASME B16.3 - Malleable Iron Threaded Fittings.
- .13 ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings.
- .14 ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
- .15 ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
- .16 ASME B36.10 - Welded and Seamless Wrought Steel Pipe.
- .17 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .18 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- .19 ASTM B88 - Seamless Copper Water Tube.
- .20 ASTM D2310 - Machine-Made Fibre Glass' (Glass Fibre-Reinforced Thermosetting Resin) Pipe.
- .21 ASTM D2996 - Filament-Wound Fibre Glass' (Glass Fibre-Reinforced Thermosetting Resin) Pipe.
- .22 ASTM D4021 - Glass-Fibre-Reinforced Polyester Underground Petroleum Storage Tanks.
- .23 AWS A5.8 - Filler Metals for Brazing and Braze Welding.
- .24 AWWA C105 - Polyethylene Encasement for Ductile Iron Pipe Systems.
- .25 CSA B139 – Installation Code for Oil-burning Equipment.
- .26 NFPA 30 - Flammable and Combustible Liquids Code.
- .27 NFPA 31 - Installation of Oil-Burning Equipment.
- .28 STI -P3 - Cathodically Protected Steel Underground Storage Tanks.

- .29 UL 80 - Steel Tanks for Oil-Burner Fuel.
- .30 UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids.
- .31 UL 1316 - Glass Fibre Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol Gasline Mixtures.

**1.4 SUBMITTALS FOR REVIEW**

- .1 Section 01 33 00: Procedures for submittals.
- .2 Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- .3 Shop Drawings: Indicate tanks, system layout, pipe sizes, location, and elevations. For fuel oil tanks, indicate dimensions and accessories including manholes and hold down straps.

**1.5 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Procedures for submittals.
- .2 Project Record Documents: Record actual locations of piping system, storage tanks, and system components.
- .3 Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- .4 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.6 QUALITY ASSURANCE**

- .1 Welding Materials and Procedures: Conform to ASME Code.
- .2 Welders Certification: To ASME SEC IX.
- .3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .4 Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.
- .5 Valves: Manufacturer's name and pressure rating marked on valve body.

**1.7 REGULATORY REQUIREMENTS**

- .1 Conform to applicable for installation of fuel oil system.
- .2 Conform to CSA B139 for installation of fuel oil piping and tanks.

- .3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of fuel oil system.
- .4 Products Requiring Electrical Connection: Listed and classified by CSA/ULC as suitable for the purpose specified and indicated.

## **1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

## **1.9 WARRANTY**

- .1 Section 01 78 10.
- .2 Provide thirty year manufacturer warranty for the fuel oil tank.

## **1.10 EXTRA MATERIALS**

- .1 Section 01 78 10.
- .2 Provide two repacking kits for each size valve.

## **Part 2 Products**

### **2.1 ABOVE GROUND PIPING**

- .1 Steel Pipe: ASTM A53 or ASME B36.10, Schedule 40 black.
  - .1 Fittings: ASTM B16.3, malleable iron, or ASTM A234/A234M, wrought carbon steel and alloy steel welding type.
  - .2 Joints: NFPA 30, threaded or welded to ANSI B31.1 ANSI B31.4 ANSI B31.9.

### **2.2 PIPE HANGERS AND SUPPORTS**

- .1 Conform to NFPA 31 ANSI B31.1 ANSI B31.4.
- .2 Hangers for Pipe Sizes 15 to 40 mm: Carbon steel, adjustable swivel, split ring.
- .3 Hangers for Pipe Sizes 50 mm and Over: Carbon steel, adjustable, clevis.
- .4 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- .5 Wall Support for Pipe Sizes to 80 mm: Cast iron hook.
- .6 Vertical Support: Steel riser clamp.
- .7 Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

### 2.3 FLANGES, UNIONS, AND COUPLINGS

- .1 Pipe Size 50 mm and Under:
  - .1 Ferrous pipe: 1034 kPa malleable iron threaded unions.
  - .2 Copper tube: 1034 kPa bronze unions with brazed joints.
- .2 Pipe Size Over 50 mm:
  - .1 Ferrous pipe: 1034 kPa forged steel slip-on flanges; 1.6 mm thick preformed neoprene gaskets.
  - .2 Copper tube: 1034 kPa slip-on bronze flanges; 1.6 mm thick preformed neoprene gaskets.

### 2.4 GATE VALVES

- .1 Manufacturer: Toyo Fig 298.
- .2 Other acceptable manufacturers offering equivalent products:
  - .1 Substitutions: Refer to Section 01 62 00.
- .3 MSS SP-80, Class 150, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, threaded ends.

### 2.5 BALL VALVES

- .1 MSS SP-110, Class 150, 2760 kPa CWP , bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded ends with union.

### 2.6 SWING CHECK VALVES

- .1 MSS SP-80, Class 125 , bronze body and cap, bronze swing disc, threaded ends.

### 2.7 RELIEF VALVES

- .1 Bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated at maximum 400 kPa, UL listed for fuel oil, capacities ASME certified and labelled.

### 2.8 STRAINERS

- .1 Threaded brass body for 1200 kPa CWP, Y pattern with 0.8 mm stainless steel perforated screen.

### 2.9 FLEXIBLE CONNECTORS

- .1 Bronze inner hose and braided exterior sleeve, suitable for minimum 1380 kPa CWP and 121 degrees C.

### 2.10 FUEL OIL PUMP

- .1 Manufacturer: Danfoss

- .2 Other acceptable manufacturers offering equivalent products:
  - .1 Substitutions: Refer to Section 01 62 00.
- .3 If required to compensate for boiler/tank elevation difference.

### **2.11 DEAERATOR**

- .1 Manufacturer: Tiger Loop
- .2 Other acceptable manufacturers offering equivalent products:
  - .1 Substitutions: Refer to Section 01 62 00.
- .3 Suitable for boiler pump system.

### **2.12 ABOVEGROUND FUEL STORAGE TANKS, T-3, T-4, T-5**

- .1 Manufacturer: Vilco Model D252 Double wall fiberglass fuel storage tank with polyethylene outlet protector, and fiberglass gauge protector.
- .2 Tank to be mounted on steel stand see drawings for details.
- .3 Other acceptable manufacturers offering equivalent products:
  - .1 Substitutions: Refer to Section 01 62 00.
- .4 Tank: ULC 80, fiberglass, oval with fiberglass saddle stand, tappings for accessories, threaded connections.
- .5 Fibreglass outer tank that can hold 110 percent of the primary tank. Seamless fibreglass inner tank.
- .6 Accessories: Code approved: tank fill, gauge, vent, vent alarm, leak indicator, and outlet connections, weatherproof vent cover, spill containment box.
- .7 Gauge: Remote reading, electronic, for two wire, 24 volt power, with wall mounted direct reading gauge.
- .8 Capacity: 1000 L.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Section 01 10 13: Verification of existing conditions before starting work.
- .2 Verify that excavations are to required grade, dry, and not over-excavated.

### **3.2 PREPARATION**

- .1 Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

### **3.3 INSTALLATION**

- .1 Install to manufacturer's instructions and CSA B139.
- .2 Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install to NACE RP-01-69.
- .3 Route piping in orderly manner and maintain gradient.
- .4 Install piping to conserve building space and not interfere with use of space.
- .5 Group piping whenever practical at common elevations.
- .6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- .7 Provide clearance for installation of insulation and access to valves and fittings.
- .8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.
- .9 Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- .10 Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 09 91 10.
- .11 Identify piping systems including underground piping. refer to Section 23 05 53.
- .12 Install valves with stems upright or horizontal, not inverted.
- .13 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

### **3.4 FUEL TANK INSTALLATION**

- .1 Install tanks to manufacturer's instructions and CSA B139.
- .2 Install Tank on Stand with concrete base
- .3 Clean and flush tanks prior to delivery to site. Seal until pipe connections are made.
- .4 Backfill steel tanks to NFPA 30 and 31.
- .5 Provide piping connections to tanks with unions and swing joints. Provide venting to CSA B139.
- .6 Mount aboveground tanks on steel support saddles and stands as indicated.



- .7 Provide weather-proof covers for all vents and openings.
- .8 Seal all piping through exterior wall to be weatherproof.
- .9 Provide protection to outside piping from physical damage due to foot traffic, vehicles, and snow and ice damage.
- .10 Fill tanks at project turn-over with full tank of appropriate fuel.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Boilers.
- .2    Controls and boiler trim.
- .3    Hot water connections.
- .4    Fuel connection.
- .5    Collector, draft hood, and chimney connection.
- .6    Circulator.

**1.2            RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 44 00 - Quality Assurance.
- .3    Section 01 61 00 - Common Product Requirements.
- .4    Section 01 78 10 - Execution Requirements.
- .5    Section 23 05 20 - Hydronic Specialties.
- .6    Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.3            REFERENCES**

- .1    ASME SEC 4 - Boiler and Pressure Vessel Codes - Rules for Construction of Heating Boilers.
- .2    ASME SEC 8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels.
- .3    HI (Hydronics Institute) - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
- .4    NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- .5    NFPA 31 - Installation of Oil-Burning Equipment.
- .6    NFPA 54 (AGA Z223.1) - National Fuel Gas Code.
- .7    NFPA 58 - Liquefied Petroleum Gas Code.
- .8    UL 726 - Oil-Fired Boiler Assemblies.

- .9 UL - Gas and Oil Equipment Directory.
- .10 CAN/CSA-B139, Installation Code for Oil Burning Equipment
- .11 CAN/CSA-B140.0, General Requirements for Oil-burning Equipment
- .12 CSA C22.1 Canadian Electrical Code

#### **1.4 SUBMITTALS FOR REVIEW**

- .1 Section 01 33 00: Procedures for submittals.
- .2 Product Data: Provide data indicating general layout, dimensions, and size and location of water, gas, and vent connections, and electrical characteristics and connection requirements.
- .3 Section 01 33 00: Submittals for information.
- .4 Submit manufacturer's installation instructions.
- .5 Manufacturer's Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.
- .6 Section 01 78 10: Submittals for project closeout.
- .7 Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

#### **1.5 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

#### **1.6 REGULATORY REQUIREMENTS**

- .1 Conform to applicable code for internal wiring of factory wired equipment.
- .2 Conform to ASME SEC 4 and SEC 8D for boiler construction.
- .3 Units: CSA labeled.
- .4 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Canada Inc., as suitable for the purpose specified and indicated.

#### **1.7 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.

**1.8 WARRANTY**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide a ten year warranty for cast iron boiler sections.

**Part 2 Products**

**2.1 MANUFACTURERS**

- .1 Weil MacLean Model Ultra Oil High Efficiency boiler UO-4E.
- .2 Substitutions: [Refer to Section 01 62 00.]

**2.2 MANUFACTURED UNITS**

- .1 Hot Water Boilers: Suitable for natural draft with insulated jacket, sectional cast iron heat exchanger, fuel oil burning system, refractory, controls, and boiler trim including circulator and fill system consisting of diaphragm type expansion tank, fill and check valve, and automatic air vent.
- .2 Electrical Characteristics:
  - .1 115 volts, single phase, 60 Hz.
  - .2 Refer to Section 26 05 80.

**2.3 HOT WATER BOILER TRIM**

- .1 ASME rated pressure relief valve, 200 kPa 30 psig.
- .2 Combination water pressure and temperature gauge.
- .3 Low water cut-off to prevent burner operation when boiler water falls below safe level.
- .4 Electronic operating temperature controller:
  - .1 NEMA 250 Type 1 enclosure with full cover for wall mounting.
  - .2 Ambient temperature range - -34 to 66 degrees C.
  - .3 Adjustable reset ratio of outside air temperature change to discharge control point change 1:2 to 100:1.
  - .4 Integral set point adjustment 27 to 110 degrees C.
  - .5 Electronic primary and outdoor sensors.
  - .6 Suitable for on-off switching of pilot duty single throw double pole relays.
- .5 High limit temperature controller with manual reset for burner to prevent boiler water temperature from exceeding safe system temperature.
- .6 Boiler air vent.

## **2.4 FUEL BURNING SYSTEM**

- .1 Burner Operation: Modulating with low fire position for ignition.
- .2 Oil Burner: High pressure atomizing type for No. 2 fuel oil with combustion air blower, fuel pump, hinged flame inspection port, cadmium sulphide flame sensor, electrodes, ignition transformer, and oil nozzle.
- .3 Oil Burner Safety Controls: Energize burner motor and electric ignition, limit time for establishment of main flame, monitor flame continuously during burner operation and stop burner on flame failure with manual reset necessary, solenoid oil delay valve opens after burner motor energized and closes when de-energized.
- .4 Controls: Pre-wired, factory assembled electronic controls in control cabinet with flame scanner or detector, programming control, relays, and switches. Provide pre-purge and post-purge ignition and shut-down of burner in event of ignition pilot and main flame failure with manual reset.

## **2.5 PERFORMANCE**

- .1 Performance rating to be to HI - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
- .2 Rating: See Schedule

## **2.6 AUXILIARY EQUIPMENT**

### **2.7 CIRCULATOR, P1a, P1b, P1c, P1d, P3a, P3b**

- .1 Manufacturers:
  - .1 Bell & Gossett Model ecocirc XL 20-35.
  - .2 Other acceptable manufacturers offering equivalent products.
  - .3 Substitutions: [Refer to Section 01 62 00.]
- .2 Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in line mounting, oil lubricated, for 860 kPa maximum working pressure.
- .3 Performance:
  - .1 Flow capacity: L/sec 17 gal/min.
  - .2 Head: 15 feet.
- .4 Electrical Characteristics:
  - .1 1/12 hp.
  - .2 115 volts, single phase, 60 Hz.
  - .3 1.3 amperes.
  - .4 Refer to Section 26 05 80.

### **2.8 CIRCULATOR, P4**

- .1 Manufacturers:

- .1 Bell & Gossett Model ecocirc vario.
- .2 Other acceptable manufacturers offering equivalent products.
- .3 Substitutions: [Refer to Section 01 62 00.]
- .2 Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in line mounting, oil lubricated, for 860 kPa maximum working pressure.
- .3 Performance:
  - .1 Flow capacity: L/sec 1 gal/min.
  - .2 Head: 10 feet.
- .4 Electrical Characteristics:
  - .1 60W.
  - .2 115 volts, single phase, 60 Hz.
  - .3 1.3 amperes.
  - .4 Refer to Section 26 05 80.
  - .5
- .5 **Zone Controllers**
  - .1 Weil MacLean Zone Valve Controllers.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Install to manufacturer's instructions.
- .2 Install to CSA B139.
- .3 Install boiler on concrete housekeeping base, sized minimum 100 mm larger than boiler base. Refer to Section 03 30 00.
- .4 Provide connection of fuel oil service to CSA B139.
- .5 Provide piping connections and accessories as indicated; refer to Section 23 05 20.
- .6 Provide piping connections and accessories as indicated; refer to Section 23 22 26.
- .7 Pipe relief valves to nearest floor drain.
- .8 Install circulator and diaphragm expansion tank on boiler.
- .9 Provide for connection to electrical service. Refer to Section 26 05 80.

#### **3.2 MANUFACTURER'S FIELD SERVICES**

- .1 Prepare and start systems to Section 01 44 00.

- .2 Instruct operating personnel in operation and maintenance of units.

**3.3 SCHEDULES**

	<b>B-1</b>	<b>B-2</b>
Location	Mechanical Room	Mechanical Room
Manufacturer	Weil-MacLain	Weil-MacLain
Model	UO-4E	UO-4E
Fuel	Oil	Oil
Input at Sea Level	168 Mbh	168 Mbh
DOE Heating Capacity	148 Mbh	148 Mbh
DOE Seasonal Efficiency (AFUE)	87%	87%
Working Pressure		
Auxiliary equipment	Circulators, expansion tanks, zone controllers	Circulators, expansion tanks, zone controllers

**END OF SECTION**

**Part 1            General**

**1.1                SECTION INCLUDES**

- .1    Plate type heat exchangers.
- .2    Accessories and trim.

**1.2                RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 61 00 - Common Product Requirements.
- .3    Section 01 78 10 - Execution Requirements.
- .4    Section 23 05 20 - Hydronic Specialties.
- .5    Section 23 21 00 - Hydronic Piping.

**1.3                REFERENCES**

- .1    ASME SEC 8 - Boilers and Pressure Vessels Code.

**1.4                SUBMITTALS FOR REVIEW**

- .1    Section 01 33 00 - Administrative Requirements: Procedures for submittals.
- .2    Product Data: Provide data with dimensions, locations, and size of tappings and performance data.
- .3    Shop Drawings: Indicate dimensions, locations, and size of tappings and performance data.

**1.5                SUBMITTALS FOR INFORMATION**

- .1    Section 01 33 00: Submittals for information.
- .2    Design Data: Indicate in sufficient detail to verify that heat exchangers meet or exceed specified requirements.
- .3    Test Reports: Indicate tube bundle pressure tests.
- .4    Certificates: Certify that Products meet or exceed specified requirements.
- .5    Manufacturer's Instructions: Indicate installation and support requirements.

**1.6                SUBMITTALS AT PROJECT CLOSEOUT**

- .1    Section 01 78 10: Submittals for project closeout.



- .2 Operation and Maintenance Data: Include start up and shut down instructions, assembly drawings, and spare parts lists.
- .3 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owners name and registered with manufacturer.

**1.7 REGULATORY REQUIREMENTS**

- .1 Conform to ASME Boilers and Pressure Vessels Code, SEC 8 for manufacture of plate and frame type heat exchangers.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Protect internals from entry of foreign material by temporary caps on flanged openings.

**1.9 WARRANTY**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide five year manufacturer warranty for HE.

**1.10 EXTRA MATERIALS**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide two sets of replacement gaskets.
- .3 Provide one set of wrenches for disassembly of plate type heat exchangers.

**Part 2 Products**

**2.1 PLATE AND FRAME TYPE HEAT EXCHANGER**

- .1 Manufacturer: Weil McLain Model WMBP1-14E.
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Substitutions: [Refer to Section 01 62 00.]
- .3 Frames: Carbon steel with baked epoxy enamel paint, [stainless steel] side bolts and shroud.
- .4 Plates: Stainless steel Type 316 with pure copper brazing..
- .5 Performance:
  - .1 Required Heat Transfer Rate: 5000 Btu/hr.
  - .2 Heated Media: 50% glycol/water
    - .1 Flow rate: 1-2 gpm.

- .2 Pressure drop: 0.3 psi.
- .3 Entering temperature: 100 degrees F.
- .4 Leaving temperature: 130 degrees F.
- .3 Heating Media: 50% glycol/water
  - .1 Flow rate: 1-2 gpm.
  - .2 Pressure drop: 1.8 psi.
  - .3 Entering temperature: 180 degrees F.
  - .4 Leaving temperature: 160 degrees F.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Install to manufacturer's instructions.
- .2 Install to permit removal of plates with minimum disturbance to installed equipment and piping.
- .3 Support heat exchangers on welded steel pipe and angle floor stand from structure.
- .4 Pitch shell to completely drain condensate.
- .5 Pipe relief valves to nearest floor drain.
- .6 Pipe drain valves to nearest floor drain.

#### **3.2 WATER TO WATER HEAT EXCHANGER TRIM**

- .1 Water Inlets and Outlets: Thermometer wells, pressure gauge tappings.
- .2 Heated Water Outlet: Thermometer well for temperature regulator sensor, ASME rated pressure and temperature relief valve, valved drain; refer to Section 23 05 20.

**END OF SECTION**

**PART 1      GENERAL**

**1.1            SECTION INCLUDES**

- .1      Heat Recovery Ventilators.

**1.2            RELATED SECTIONS**

- .1      Section 01 33 00 – Submittal Procedures.
- .2      Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3      Section 01 78 00 – Closeout Submittals.
- .4      Section 23 33 00 – Air Duct Accessories.
- .5      Section 23 33 15 – Dampers - Operating.

**1.3            REFERENCES**

- .1      American Bearing Manufacturer's Association (ABMA)
  - .1      ANSI/ABMA 9 Load Ratings and Fatigue Life for Ball Bearings.
  - .2      ANSI/ABMA 11 Load Ratings and Fatigue Life for Roller Bearings.
- .2      Air Movement and Control Association (AMCA)
  - .1      AMCA 210, Laboratory Method of Testing Fans for Aerodynamic Performance Rating (ASHRAE).
  - .2      AMCA 300 Reverberant Room Method for Sound Testing of Fans.
- .3      American National Standards Institute/Air-Conditioning and Refrigeration Institute (ANSI/ARI)
  - .1      ANSI/ARI 430, Central Station Air Handling Units.
- .4      American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - .1      ASHRAE 68, Laboratory Method of Testing to Determine the Sound Power in a Duct.
  - .2      ASHRAE 84, Method of Testing Air-to-Air Exchangers.
- .5      Canadian General Standards Board (CGSB)
  - .1      CAN/CGSB 1.181, Ready-Mixed Organic Zinc-Rich Coating.
- .6      Canadian Standards Association (CSA)
  - .1      CSA B52 Mechanical Refrigeration Code.
- .7      National Electrical Manufacturer's Association (NEMA)

- .1 NEMA MG1 Motors and Generators
- .2 NEMA ICS 7-1 Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
- .8 Provincial Boiler, Pressure Vessel and Compressed Gas Regulations.
- .9 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).

#### **1.4 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate following: fan, fan curves showing point of operation, motor drive, bearings, filters, mixing box, dampers, VAV, coil, include performance data.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Include following: fan, bearings, motor, damper, VAV control, air volume, total cooling, sensible cooling, EDB, EWB, OAT.

#### **1.6 EXTRA MATERIALS**

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide one spare set of filters.
- .3 Provide list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.
- .4 Spare filters: in addition to filters installed for startup and commissioning. Immediately prior to acceptance by Owner's Representative, supply 1 complete set of filters for each filter unit or filter bank.

### **PART 2 PRODUCTS**

#### **2.1 HEAT RECOVERY VENTILATORS**

- .1 Manufacturer: Fantech SHR3205RD.
  - .1 Nuair NU305.
- .2 Substitutions: [Refer to Section 01 62 00.]

**2.2 GENERAL**

- .1 Two speed. 240cfm at 0.4"WC.
- .2 Non-negative pressure defrost system.
- .3 Minimum 60% efficiency.
- .4 Unit to be self contained with all necessary controls and wiring to facilitate a single point connect. Provide disconnect and vibration isolators.
- .5 Controls: Provide two controllers to allow activation of high speed fan from either residential unit.

**2.3 CABINET, FANS AND FILTERS**

- .1 Casing: galvanized, pre-painted steel with foil faced insulation. Double wall construction.
- .2 Provide full size access doors to allow for periodic maintenance and inspection. Door construction, same as unit with compression type handles and resilient gaskets.
- .3 Drain pans to be formed sections, recessed, fabricated from 1.2 mm stainless steel 304. Piped to nearest floor drain.
- .4 Fans: centrifugal type with double blowers and motors rated for single phase 208 V. Separate Motor for the supply and exhaust fan.
- .5 Filers: medium efficiency in the supply and exhaust air streams.
- .6 Minimum 55% effectiveness in heating.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- .1 Install units in accordance with manufacturer's instructions and as indicated.
- .2 Ensure adequate clearance for servicing and maintenance.
- .3 Continuous operation at low speed. High speed to be triggered by either of two controllers (one in each suite).

**END OF SECTION**



**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Baseboard radiation.
- .2    Unit heaters.

**1.2            RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 44 00 - Quality Assurance.
- .3    Section 01 61 00 - Common Product Requirements.
- .4    Section 01 78 10 - Execution Requirements.
- .5    Section 23 05 13 - Motors.
- .6    Section 23 05 20 - Hydronic Specialties.
- .7    Section 23 21 00 - Hydronic Piping.
- .8    Section 25 90 00 - Sequence Of Operation.
- .9    Section 26 05 80 - Equipment Wiring:
  - .1    Electrical characteristics and wiring connections.
  - .2    Installation of room thermostats.
  - .3    Electrical supply to units.

**1.3            SUBMITTALS FOR REVIEW**

- .1    Section 01 33 00: Procedures for submittals.
- .2    Product Data: Provide typical catalogue of information including arrangements.
- .3    Shop Drawings:
  - .1    Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - .2    Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
  - .3    Indicate mechanical and electrical service locations and requirements.,

**1.4            SUBMITTALS FOR INFORMATION**

- .1    Section 01 33 00: Submittals for information.

- .2 Manufacturer's Instructions: Indicate installation instructions and recommendations.

## **1.5 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
- .3 Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- .4 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owners name and registered with manufacturer.

## **1.6 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

## **1.7 REGULATORY REQUIREMENTS**

- .1 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Canada Inc.as suitable for the purpose specified and indicated.

## **1.8 WARRANTY**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide [five] year manufacturer's warranty.

## **Part 2 Products**

### **2.1 BASEBOARD RADIATION**

- .1 Manufacturer: Weil-McLain Model High Trim Fin tube baseboard.
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Substitutions: [Refer to Section 01 62 00.]
- .3 Heating Elements: 20 mm ID copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins, one tube end belled.
- .4 Enclosure: Minimum 0.75 mm steel with 225 mm high back and top of one piece; front panel, end panel, end caps, corners, and joiner pieces to snap together, with front panel easily removable. Provide full length damper.
- .5 Finish: Factory applied baked enamel of white colour [as selected].



- .6 Capacity: As shown in drawings, based on 18 degree C entering air temperature, 82 degree C average water temperature.

## 2.2 UNIT HEATERS

- .1 Manufacturer: Modine Model HSB/HC.
- .2 Other acceptable manufacturers offering equivalent products.
- .1 Substitutions: [Refer to Section 01 62 00.]
- .3 Coils: Seamless copper tubing, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.
- .4 Casing: 1.2 mm steel with threaded pipe connections for hanger rods.
- .5 Finish: Factory applied baked [enamel of [ ] colour [as selected]].
- .6 Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings; vertical models with grease lubricated ball bearings.
- .7 Air Outlet: Adjustable pattern diffuser on projection models and [two] [four] way louvres on horizontal throw models.
- .8 Motor: Permanently lubricated sleeve bearings on horizontal models, grease lubricated ball bearings on vertical models. [Refer to Section 23 05 13.]
- .9 Control: Local [multi-speed] disconnect switch.
- .10 Capacity: 2000W, based on 18 degree C entering air temperature, 82 degree C average water temperature.
- .11 Electrical Characteristics:
- .1 Fractional motor.
- .2 115 volts, [single] phase, 60 Hz.
- .3 Refer to Section 26 05 80.

## Part 3 Execution

### 3.1 INSTALLATION

- .1 Install to manufacturer's instructions.
- .2 Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.
- .3 Protection: Provide finished cabinet units with protective covers during balance of construction.

- .4 Baseboard Radiation: Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated. Centre elements under windows. [Where multiple windows occur over units, divide element into equal segments centred under each window.] Install end caps where units butt against walls.

### 3.2 CLEANING

- .1 After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- .2 Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials provided by manufacturer.

### 3.3 SCHEDULES

- .1 Radiation:

Drawing Code	A – 2ft section	B-3ft section	C -4ft section
Manufacturer	Weil-McLain	Weil-McLain	Weil-McLain
Model	High Trim Fin tube baseboard	High Trim Fin tube baseboard	High Trim Fin tube baseboard
Fin Type	Aluminum	Aluminum	Aluminum
Enclosure Type	High Trim	High Trim	High Trim
Rows			
Heat Output: 700W per metre at 3.8Lpm and 82C (720Btu/h per lineal foot at 1GPM and 180F)	422W @ 0.6m (1440Btuh@2ft)	633W @ 0.9m (2160Btuh@3ft)	844W @ 1.2m (2880Btuh@4ft)

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Glycol coils.

**1.2            RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 61 00 - Common Product Requirements.
- .3    Section 01 78 10 - Execution Requirements.
- .4    Section 23 05 20 - Hydronic Specialties.
- .5    Section 23 07 19 - Piping Insulation.
- .6    Section 23 31 00 - Duct Work: Installation of duct coils.
- .7    Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.3            REFERENCES**

- .1    ARI 410 - Forced-Circulation Air-Cooling and Air- Heating Coils.
- .2    SMACNA - HVAC Duct Construction Standards, Metal and Flexible.

**1.4            SUBMITTALS FOR REVIEW**

- .1    Section 01 33 00: Procedures for submittals.
- .2    Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
- .3    Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

**1.5            SUBMITTALS FOR INFORMATION**

- .1    Section 01 33 00: Submittals for information.
- .2    Certificates: Certify that coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.

**1.6            SUBMITTALS AT PROJECT CLOSEOUT**

- .1    Section 01 78 10: Submittals for project closeout.

- .2 Warranty: Submit manufacturer warranty and ensure forms have been completed in Owners name and registered with manufacturer.

**1.7 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

**1.8 REGULATORY REQUIREMENTS**

- .1 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Canada Inc or CSA as suitable for the purpose specified and indicated.

**1.9 DELIVERY, STORAGE, AND HANDLING**

- .1 Section 01 61 00: Transport, handle, store, and protect products.
- .2 Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.
- .3 Protect coils from entry of dirt and debris with pipe caps or plugs.

**1.10 WARRANTY**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Provide five (5) year manufacturer warranty .

**Part 2 Products**

**2.1 GLYCOL HEATING COILS, HC-1,2**

- .1 Manufacturer: Greenheck
- .2 Other acceptable manufacturers offering equivalent products.
  - .1 Daikin
  - .2 Substitutions: [Refer to Section 01 62 00.]
- .3 Tubes: 5/8 inch (16 mm) OD seamless copper or brass arranged in parallel or staggered pattern, expanded into fins, brazed joints.
- .4 Fins: Aluminum [or copper] [continuous plate type with full fin collars] [or] [individual helical finned tube type wound under tension].
- .5 HC-1 To provide 5000W (17kBtuh) heat transfer to 250cfm in HRV fresh air intake duct.
- .6 HC-2 To provide 2000W (4kBtuh) heat transfer to 250 cfm in HRV fresh air supply duct.
- .7 50% glycol water, maximum 1.5-2.0 GPM, temperature drop across coil 180F to 160F.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install to manufacturers written instructions.
- .2 Install in ducts and casings to SMACNA HVAC Duct Construction Standards, Metal and Flexible.
  - .1 Support coil sections independent of piping on steel channel or double angle frames and secure to casings.
  - .2 Provide frames for maximum three coil sections.
  - .3 Arrange supports to avoid piercing drain pans.
  - .4 Provide airtight seal between coil and duct or casing.
  - .5 Refer to Section 23 31 00.
- .3 Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- .4 Install coils level. [Install cleanable tube coils with 1:50 pitch.]
- .5 Make connections to coils with unions and flanges.
- .6 Hydronic Coils:
  - .1 Hydronic Coils: Connect water supply to leaving air side of coil (counterflow arrangement).
  - .2 Provide shut-off valve on supply line and lockshield balancing valve [with memory stop] on return line.
  - .3 Locate water supply at bottom of supply header and return water connection at top.
  - .4 Provide [manual] [float operated automatic] air vents at high points complete with stop valve.
  - .5 Ensure water coils are drainable and provide drain connection at low points.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Sequence of operation:
  - .1    Boiler
  - .2    Oil tank and pump.
  - .3    Hot Water Tank
  - .4    Heat recovery ventilator
  - .5    HRV preheat coil/reheat coil
  - .6    Radiators
  - .7    Sewage hydronic trace heat
  - .8    Unit Heater
  - .9    Water Pressure System.

**1.2            RELATED SECTIONS**

- .1    Section 01 33 00 - Administrative Requirements.
- .2    Section 01 44 00 - Quality Assurance.
- .3    Section 01 61 00 - Common Product Requirements.
- .4    Section 01 78 10 - Execution Requirements.
- .5    Section 25 30 00 - Instruments And Control Elements.
- .6    Section 25 50 01 - Analog Control Equipment.
- .7    Section 25 50 02 - Digital Control Equipment.
- .8    Section 26 05 80 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.3            SYSTEM DESCRIPTION**

- .1    This section defines the manner and method by which controls function.
- .2    Requirements for each type of control system operation are specified.
- .3    Equipment, devices, and system components required for control systems are specified in other Sections.

**1.4            SUBMITTALS FOR REVIEW**

- .1    Section 01 33 00: Procedures for submittals.
- .2    Shop Drawings: Indicate mechanical system controlled and control system components.

- .1 Label with settings, adjustable range of control and limits. Include written description of control sequence.
- .2 Include flow diagrams for each control system, graphically depicting control logic.
- .3 Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

### **1.5 SUBMITTALS AT PROJECT CLOSEOUT**

- .1 Section 01 78 10: Submittals for project closeout.
- .2 Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

## **Part 2 Products**

### **2.1 Not Used**

- .1 Not Used

## **Part 3 Execution**

### **3.1 BOILER**

- .1 Two oil-fired hot water boiler operating at 180F, providing hot water to two hot water heaters, 6 heating zones, and a brazed plate heat exchanger. Primary loop to maintain constant circulation. On a call for heat from any of the secondary components, a loop valve shall open. Each zone to be controlled by thermostats: heating zones by radiator thermostats, hot water heater by water heater thermostat, heat exchanger by septic tank thermostat. Domestic hot water to be given priority.
- .2 Boiler Loop Control
  - .1 When outdoor temperature is 10C (adjustable) or lower, enable boilers. Control heating water supply temperature at 82 degrees C.
  - .2 Alternate use of boilers – every Wed at 12 noon and every Sunday at midnight. If one boiler fails, then switch to the other boiler and generate an alarm.
  - .3 Boiler loop to run continuously when boiler in operation.
- .3 Primary Loop control
  - .1 Primary loop pump operates continuously.
  - .2 Flow control valve will open and close to maintain primary loop temperature at 82 degrees C.
  - .3 Flow switch in heating pump discharge provides on/off indication.
- .4 Zone Loop control
  - .1 On call for heat from zone thermostat, control valve will open and allow water from primary loop to circulate through zone loop. When call for heat is satisfied, control valve will close.

- .2 Flow switch in heating water circuit on no flow conditions indicates alarm.
- .3 On outside temperatures above 10 degrees C, de-energize loop pumps for septic tank and suppress alarm.

### 3.2 HOT WATER TANK

- .1 Boiler provides heat to indirect-fired water heater at 180F. Water heater thermostat connected to boiler's zone controls for hot water heater. On a call for heat at the hot water heater, the boiler zone controls shall circulate boiler hot glycol through the hot water tank until the desired temperature is achieved.

### 3.3 HEAT RECOVERY VENTILATORS

- .1 A heat recovery ventilator is used to provide fresh air to the both units. The HRV supplies and exhausts 240cfm to and from various rooms via dedicated ductwork, as shown in the drawings.
- .2 The heat recovery ventilator will run continuously at low speed to provide fresh air and exhaust. High speed can be triggered by a humidistat signal from either unit's bathroom. Low speed, High speed and Off options will also be controllable via a controller located in the mechanical room.

### 3.4 HRV HYDRONIC PREHEAT COIL

- .1 The HRV unit will have a hydronic glycol in-duct coil located in the outdoor air intake for defrost, to ensure 100% ventilation at all times. This hydronic coil will be cycled on off as enabled from a duct air temperature sensor to maintain outdoor air temperature of -5 degrees C air temperature, and will have a failsafe air switch (sail switch) to keep the coil from heating should the air system fail.

### 3.5 HRV HYDRONIC REHEAT COIL

- .1 The HRV unit will have a hydronic glycol in-duct coil located in the fresh air supply, to ensure tempered air is provided to the space. This hydronic coil will be cycled on off as enabled from a duct air temperature sensor to maintain a supply air temperature of 20 degrees C air temperature, and will have a failsafe air switch (sail switch) to keep the coil from heating should the air system fail.

### 3.6 RADIANT BASEBOARD HEATERS

- .1 Each zone contains a thermostat to maintain constant space temperature by controlling zone hydronic flow. Further comfort adjustments can be made by moving radiator dampers and adjusting individual radiator valves.

### 3.7 SEPTIC TANK HEATING LOOP

- .1 A hydronic glycol line will run from the heat exchanger to the septic tank and associated piping. Sensors in the septic tank and in the wrapped piping will cause a call for heat in the loop when their temperatures drop below 5C. When the outdoor temperature is greater than 5C, the loop circulator for the septic system will be disabled.



**3.8 UNIT HEATERS – MECHANICAL ROOM**

- .1 Single temperature electric room thermostat maintains constant space temperature of 20 degrees C by cycling hydronic flow to unit heater and unit fan motor.

**3.9 DOMESTIC WATER PRESSURE SYSTEM**

- .1 Pressure pump to operate until pressure tank is pressurized. Pressure pump to cycle on at 30psi and off at 50psi.

**END OF SECTION**

## **PART I: GENERAL**

### 1.1 GENERAL

- .1 All drawings and all specifications including any addenda or change notices shall form an integral part of this section and should be read in conjunction herewith.
- .2 All electrical work shall be carried out by qualified, competent and licensed tradespersons who are familiar with the type and scope of work required.
- .3 All electrical work shall be installed under an electrical permit, and in accordance with the local and national electrical codes.

### 1.2 SCOPE OF WORK

- .1 Provide labour, materials, equipment and services necessary for, and incidental to the supply and installation of the electrical systems shown on the drawings and described in this specification.
- .2 This work shall include:
  - .1 Supplying and shipping all required material to site.
  - .2 Roughing and finishing the duplex residence as per drawings.
  - .3 Installing electrical service and arranging for connection.
  - .4 Wiring and connecting (including control wiring) all components of the heating, air handling and water supply systems.
  - .5 Arranging and paying for all permits, inspections and required certification.
- .3 All workmanship shall be of the highest quality common to the industry. All work to be done in a neat and professional manner. Cable and conduit runs to be run parallel to building lines. Wall devices and equipment to be installed square and plumb.
- .4 The electrical contractor shall carefully examine all drawings and specifications relating to the work to be certain that the work under this contract can be satisfactorily carried out. Prior to the submission of tender, the contractor shall report at once to the engineer, any defect, discrepancy, omission, or interference affecting the work of this section or the guarantee of the same. Refer to mechanical drawings for control wiring and equipment locations.
- .5 Provide all wiring and terminations for telephone, data, and TV to ensure complete and operating systems unless noted otherwise.

## **PART II: PRODUCTS**

### 2.1 MATERIALS, EQUIPMENT, WIRING AND DEVICES:

- .1 Provide all new materials and equipment as shown and as required. All components shall be CSA certified.

- .2 Where no CSA certified equipment is available, obtain special local approvals from the appropriate Authorities Having Jurisdiction.
- .3 Use only copper conductors for all power circuits. Size conductors to match equipment requirements, and to keep voltage drop within the limits set by the Canadian Electrical Code.
- .4 Use only copper conductors, minimum 18 gauge Type FAS-105-LVT/FT-6 multi-conductor cable for low voltage control circuits.

## 2.2 LABELS AND SIGNS

- .1 Provide lamacoid labels mounted with screws or rivets for all HVAC components.
- .2 The manufacturer's labels and nameplates shall be clearly visible after the equipment is installed.
- .3 Provide warning and information signs on equipment as required by the applicable codes and/or as directed by the Authorities Having Jurisdiction.

## 2.3 CONTROL WIRING

- .1 All power and control wiring, including interlock wiring, required for the equipment supplied by Division 15, except where noted otherwise, shall be performed by the electrical contractor. Provide any components necessary for complete and operational systems.
- .2 Class 2 low voltage control wiring shall be securely attached to structural elements, electrical conduits or similar systems capable of providing adequate support. Use nylon tie wraps to secure wiring. Electrical tape will not be acceptable. Wiring shall be secured at close intervals so as to avoid drooping. Run wiring parallel or perpendicular to the building lines.
- .3 In addition to the requirement for conduit, all wiring supplied under this section shall conform to the most stringent of the requirements and the local codes for quality and materials. In the case of conflicting specifications, use the most stringent requirements.
- .4 All temperature control wiring at 50 volts or greater, shall be a minimum of #14 gauge. All temperature control wiring at less than 50 volts shall be a minimum of #18 gauge.
- .5 Low Voltage Control Cables:
  - .1 Type: LVT, plenum rated FT6.
  - .2 Conductors: Solid copper #18 AWG.
  - .3 Insulation: Thermoplastic, colour-coded.
  - .4 Configuration:
    - .1 Three or more conductors: twisted.
  - .5 Voltage Rating 30V.
  - .6 Outer jacket: Thermoplastic.
  - .7 Certification: CSA C22.22 No. 35.

## 2.4 CONDUIT

- .1 Wiring to be concealed throughout residences and in mechanical where possible.

- .2 All surface wiring in mechanical rooms to be installed in E.M.T. AC-90 may be used where connecting to equipment.

## 2.5 MOTORS, STARTERS, DISCONNECTS

- .1 Provide all motors, starters, disconnects, etc for all mechanical equipment for a complete and fully operative system. Refer to mechanical drawings for exact motor locations and further control information.

## 2.6 PANEL

- .1 Size: 200A, 120/240V, 1PH, 3W, minimum 60 circuits
- .2 Surface mounted.
- .3 Provide branch circuit breakers to suit.
- .4 Acceptable Product: Square D, Siemens

## **PART III: INSTALLATION**

- 3.1 Switches, counter receptacles, pull stations, and controls shall be mounted 1200mm to top above finished floor unless otherwise noted on drawings. Receptacles shall be mounted 400mm to top A.F.F.
- 3.2 Receptacles on opposite sides of a wall shall be staggered. Do not mount back to back.
- 3.3 The drawings show the general arrangement and extent of the work to be carried out, but the exact location and arrangement of all parts shall be determined as the work progresses. Coordinate work with all trades and make changes to facilitate a satisfactory installation.
- 3.4 Circuit information and directory on these drawings show a suggested layout of circuits, though their primary purpose is for depicting circuits required, and circuit loading. Adapt circuitry in the field to ensure an efficient installation, giving attention to proper balancing of phases and meeting the requirements of all codes. Circuits sharing a neutral shall be fed from adjacent breakers. Provide type-written directory for panel. At the completion of the project, obtain and present to the Owner a Certificate of Acceptance from the Authorities Having Jurisdiction.
- 3.5 Warranty provisions of the main contract shall apply to all Division 16 work.
- 3.6 Provide instructions to the Owner's representative on the operation of all new and modified equipment and systems.
- 3.7 Provide one set of reproducible record drawings at the completion of the project.

\*\*\*\*\* END OF SECTION 26000 \*\*\*\*\*