

**Part 1           General**

**1.1           ACCESS AND EGRESS**

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

**1.2           USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Contract Administrator to facilitate work as stated.
- .2 Closures: Protect work temporarily until permanent enclosures are completed.
- .3 Facility access shall be provided 24 hours a day, seven days a week.
- .4 Keys or swipe cards shall be provided to Contractor for facility access.
- .5 Secure facilities at end of each workday. When Work extends past public hours, Contractor shall be permitted to arm/disarm the facility alarm system.

**1.3           SPECIAL REQUIREMENTS**

- .1 For listing of contract work to run concurrent in facility during execution of the Work refer to D23.3.
- .2 Total facility shutdown scheduled to occur August 01 to September 28, 2018.
- .3 Main Tank shutdown will continue to December 31, 2018.
- .4 Training Tank and Kiddie Pool to remain open to public during Main Tank shutdown.
- .5 Comply with Critical Stage 1 as set out in D17 Critical Stages.
- .6 Ensure that Contractor’s personnel employed on Site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .7 Keep within limits of work and avenues of ingress and egress.

**1.4           SECURITY CLEARANCES**

- .1 Obtain security clearances as outlined in F - Security Clearance, and submit within two (2) business days of request by the Contract Administrator.
- .2 Contractor to ensure Contractor’s workers on Site have Security Clearances as in 1.4.1

**1.5           BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions.

**Part 2           Products**

**2.1           NOT USED**

- .1 Not Used.

**Part 3           Execution**

**3.1           NOT USED**

- .1 Not Used`

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**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Photographic documentation of:
  - .1    Project site and surrounding properties to record existing conditions prior to start of Work.
  - .2    Project site during course of construction to record construction progress.
  - .3    Project site at final completion of the Work to record completed work.
  - .4    Other specific items as may be requested by Contract Administrator.
- .2    Provide photographic documentation in accordance with procedures and submission requirements specified in this Section.

**1.2            DEFINITIONS**

- .1    Within the content of this Section the term "photograph" shall mean "digital image".
- .2    Digital image is a still picture taken with a digital camera which can be viewed on a computer with photo editing/viewing software.

**1.3            DIGITAL IMAGES**

- .1    Use digital camera with capability of producing digital images at minimum 5.0 megapixels, uncompressed, saved in \*.jpeg or \*.tif format.
- .2    Copy (burn) each set of images onto a Windows formatted CD-Rom disc.
- .3    Identification: identify each disc with name and number of project, date of exposure, set number.

**1.4            DISTRIBUTION**

- .1    Keep one set of photographs on site.
- .2    Provide one set of photographs to Contract Administrator.

**1.5            PRE-CONSTRUCTION PHOTOGRAPHS**

- .1    Provide photographs of existing site features, and surrounding properties to record existing conditions prior to start of construction work.
- .2    Allow for minimum 24 images for each set.
- .3    Number of sets required: three.
- .4    Viewpoints: exterior viewpoints including close ups of specific details in locations as determined by Contract Administrator.

**1.6            CONSTRUCTION PROGRESS PHOTOGRAPHS**

- .1    Provide photographs of project site during progress of the Work to record construction progress.
- .2    Provide photographs of remedial work for items of work identified by Contract Administrator as deficient, incomplete or otherwise non-conforming to contract documents.
- .3    Allow for minimum 24 images for each set.
- .4    Number of sets required: three.

- .5 Number of viewpoints: interior and exterior viewpoints including close ups of specific details, in locations determined by Contract Administrator.
- .6 Frequency: monthly with progress statement and as requested by Contract Administrator.

**1.7 FINAL PHOTOGRAPHS**

- .1 Provide photographs of project site at final completion to record completed work.
- .2 Number of prints required: three.
- .3 Allow for minimum 24 images for each set.
- .4 Number of viewpoints:
  - .1 Each side of building, and other exterior features.
  - .2 Interior of specific rooms as directed by Contract Administrator. Allow for minimum of ten rooms.
  - .3 Close ups of specific details as determined by Contract Administrator.
  - .4 Locations of viewpoints as determined by Contract Administrator.

**1.8 PHOTOGRAPH LABELLING CONVENTION**

- .1 Provide progress digital images to the Contract Administrator monthly and at final completion of work.
- .2 Label each photograph in accordance with the following naming convention example.

Project Descriptor	Element Descriptor (see Legend below)	Month	Year	Numerical Descriptor
PANAM	a-ext	12	2018	00001
God's Lake First Nation	Architectural - Exterior			(five digits)

.3 Legend

.1 Element Descriptor

Architectural - Exterior	a-ext
Architectural - Interior	a-int
Mechanical	m
Electrical	e

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Products**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE**

- .1 Submit to Contract Administrator 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 Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Drawings and Specifications. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Drawings and Specifications stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Drawings and Specifications is not relieved by Contract Administrator's review.
- .10 Keep one reviewed copy of each submission on site.

**1.2 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit Shop Drawings for Contract Administrator's review.
- .2 This review by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Contract Administrator approves the detail design inherent in the Shop Drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of their responsibilities for errors or omissions in the Shop Drawings or of their responsibility for meeting all requirements of the Drawings and Specifications. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of and installation and for co-ordination of the work of all sub-trades.
- .3 The term "Shop Drawings" as defined in C1, are to be provided by Contractor to illustrate details of a portion of Work.
- .4 Shop Drawings that do not include the stamp, date, and signature of the person responsible for reviewing the Shop Drawings before submittal to the Contract Administrator as will be rejected and returned without being examined.
- .5 Submit Shop Drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Manitoba, Canada where specifically requested in the specifications. Shop Drawings not bearing the required Engineer's stamp will be rejected and returned without being examined.
- .6 Indicate materials, methods of and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work.

- .7 Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .8 Adjustments made on Shop Drawings by the Contract Administrator are not intended to change the Contract price. If it is deemed that such adjustments affect the value of Work, state such in writing to the Contract Administrator prior to proceeding with fabrication or the Work.
- .9 Make changes in Shop Drawings that the Contract Administrator may require, consistent with Drawings and Specifications. When resubmitting, notify the Contract Administrator in writing of any revisions other than those requested.
- .10 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 samples.
  - .5 Other pertinent data.
- .11 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 Drawings and Specifications.
  - .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.
- .12 Submit one digital file in Adobe PDF file format of the following submittals:
  - .1 Shop Drawings for each requirement requested in specification sections and as the Contract Administrator may reasonably request.
  - .2 Product data sheets or brochures for requirements requested in Specification sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.

- .3 Test reports for requirements requested in specification sections and as requested by Contract Administrator.
  - .1 Report signed by authorized official of testing laboratory that Material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within three years of date of contract award for project.
- .4 Certificates for requirements requested in specification Sections and as requested by Contract Administrator.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or Material attesting that product, system or material meets Specification requirements.
  - .2 Certificates must be dated after award of project contract, complete with project name.
- .5 Manufacturers' instructions for requirements requested in specification sections and as requested by Contract Administrator.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .6 Manufacturer's field reports for requirements requested in Specification sections and as requested by Contract Administrator.
  - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .13 Delete information not applicable to project.
- .14 Supplement standard information to provide details applicable to project.
- .15 If upon review by the Contract Administrator, no errors or omissions in compliance with the Drawings and Specifications are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If, however, Shop Drawings are rejected, noted copy will be returned and resubmission of corrected Shop Drawings, through the same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .16 No extension of Contract time will be allowed for delays in the Work which may be caused for Contract Administrator's rejection of Shop Drawings.
- .17 Shop Drawings, which contain deviations from the Drawings and Specifications which are not presented to the Contract Administrator in writing will be rejected and returned without being examined.

### **1.3 SAMPLES**

- .1 Submit for review samples for each requirement requested in specification sections and as the Contract Administrator may request.
- .2 Label samples as to identify Material, manufacturer, make/model number, origin and intended use in the Work.
- .3 Deliver samples prepaid to Contract Administrator's business address or as directed.
- .4 Notify the Contract Administrator in writing, at the time of submission of deviations in samples from requirements of Drawings and Specifications.

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

.6 Make changes in samples that the Contract Administrator may require, consistent with Drawings and Specifications.

**1.4 CERTIFICATES AND TRANSCRIPTS**

.1 Prior to commencement of the Work, provide evidence of compliance with worker's compensation legislation at the place of the Work, including payments due thereunder.

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

**Part 2 Products**

**2.1 NOT USED**

.1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

.1 Not Used.

**END OF SECTION**

**1.1 SECTION INCLUDES**

- .1 Requirements and limitations for cutting and patching the Work.
- .2 Selective demolition and removal of existing materials, equipment and finishes; cutting openings in walls, ceiling, floors and roof decks as required to accommodate the new work and finishes.
- .3 Patching and making good existing work and finishes affected by alteration and renovation work.
- .4 Salvage of existing materials and equipment where indicated.

**1.2 RELATED REQUIREMENTS**

- .1 Section 07 84 00 - Firestopping

**1.3 RELATED WORK**

- .1 Patching and making good existing construction and finishes as part of the work of the respective Subcontractors whose work is affected.
- .2 Removal, relocation, of existing mechanical and/or electrical services and equipment.

**1.4 COORDINATION MEETING**

- .1 Prior to start of alteration and renovation work the Contract Administrator will convene a coordination meeting to review construction procedures for alteration and renovation work. Agenda to include:
  - .1 Construction progress schedule.
  - .2 Pre-Construction Facility Condition Report
  - .3 Site Safety.
  - .4 Site security, temporary enclosures, emergency exits.
  - .5 Site access and storage.
  - .6 Start-up and shut down of mechanical and electrical services.
  - .7 Waste management and disposal.
  - .8 Work procedures in occupied spaces.
  - .9 Work procedures when encountering suspected hazardous materials,
- .2 Contract Administrator including senior representatives of The City, Contractor, Site Superintendent, and major Subcontractors are to be in attendance.
- .3 Contract Administrator to establish time and location of meeting and notify all concerned parties within five working days of meeting.
- .4 Contract Administrator will chair meeting and record minutes. Distribute minutes to all attending parties within two working days after meeting.

**1.5 GENERAL PROCEDURES**

- .1 The existing facility will be closed for public use as indicated in D17 Critical Stages and Section 01 14 00 - Work Restrictions. Execute work with least possible interference or disturbance to building occupants.
- .2 Prior to start of any alteration work, arrange with the Contract Administrator a work schedule satisfactory to operational requirements of the existing facility.
- .3 The intent of The City is to vacate only those areas designated for alteration work.
- .4 Confine construction activities to designated work areas. Do not store materials, tools or equipment outside of designated work areas.

- .5 Prevent migration of dust and debris into occupied areas, and areas not scheduled for alterations.
- .6 Establish access routes to and from the work areas. Use only designated access routes for movement of workers, tools, equipment, materials, and construction debris.
- .7 Where work must proceed in occupied areas clean up at the end of each workday. Place tools, equipment, and materials into secure lock-up.
- .8 Provide temporary protection to cut and partially finished surfaces to building occupants and general public from possible injury.

#### **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Comply with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Except for items indicated for salvage, construction waste, abandoned or demolished materials and equipment are the Contractor's responsibility and shall be promptly removed from site.
- .3 Dispose of construction debris, abandoned equipment and materials off site via designated access routes.
- .4 Do not allow demolition debris to accumulate within the building or on site. Remove debris on a regular basis.
- .5 Do not allow waste and debris to block access routes to and from exits, fire lanes, or impede access to the building.
- .6 Do not burn rubbish or debris on site.
- .7 Do not use The City's waste containers for waste removal.
- .8 Provide suitable waste containers. Locate large waste containers on The City's property only in areas acceptable to the Contract Administrator.

#### **1.7 TEMPORARY ENCLOSURES**

- .1 Construct temporary partitions to isolate work areas from occupied areas, and areas not scheduled for alterations. Erect partitions to contain construction debris and prevent unauthorized entry to work areas.
- .2 Prior to erection confirm exact location with Contract Administrator.
- .3 Provide lockable doors to prevent unauthorized access. Provide Contract Administrator with key.
- .4 Where temporary partitions restrict access to emergency exits review security requirements with Contract Administrator prior to erection.
- .5 Construct partitions of steel studs spaced at maximum 400 mm on centre. Cover finished side with plywood.
- .6 Provide continuous dust barrier on inside of 6 mil polyethylene sheet. Seal holes and joints to prevent migration of dust to occupied areas.

#### **1.8 EXISTING MECHANICAL AND ELECTRICAL SERVICES**

- .1 Prior to start of Work identify and confirm the location of all mechanical and electrical services within or passing through construction areas. Confirm their origin and destination.

- .2 Where services are concealed within walls, floors, or ceilings and cannot be visually identified use electronic scanning devices or other acceptable means to locate and identify concealed services.
- .3 Do not shut off, disconnect, or remove existing mechanical and electrical services without prior written notification from the Contract Administrator.
- .4 Where existing service must be shut-down or disconnected, notify Contract Administrator in two days in advance of shut-down or disconnection. Provide schedule indicating which services are affected and duration of shut-down.
- .5 Some services within construction areas may serve other areas of the building not affected by construction work and must remain in service during construction period. Take special precautions to protect and maintain continuance of services that are to remain active to service adjacent areas.
- .6 Include for required connections, temporary or permanent, for continuance of existing services.

#### **1.9 LOOSE FURNISHINGS**

- .1 The City shall remove and relocate loose furnishings and portable equipment such as desks, chairs, telephones and other portable items. Where temporary storage near construction is required and located to the approval of the Contract Administrator provide dust covers. Reinstall of loose furnishings in original locations at completion of work by The City.

#### **1.10 SALVAGE MATERIAL**

- .1 Remove as salvage items as indicated.
- .2 Remove items carefully to prevent damage. Dismantle large items to fit through openings and ease of transport.
- .3 For items indicated for reinstallation store on site until required.
- .4 For items to be turned over to The City transport to storage areas on site as directed by Contract Administrator.

#### **1.11 EQUIPMENT**

- .1 Provide equipment, tools and machinery for proper execution of the Work.

#### **1.12 PREPARATION**

- .1 Structural and load-bearing elements:
  - .1 Obtain Contract Administrator's written approval before cutting, boring or sleeving structural or load-bearing members including roof decks, floor assemblies or load bearing walls and columns.
  - .2 Electronically scan structural elements to confirm location of structural steel and reinforcing before starting work. Record locations on record drawings.
  - .3 Mark out exact locations and dimensions prior to inspection.
  - .4 Do not proceed with the work until the Contract Administrator has reviewed and confirmed proposed work.
- .2 Prevent movement, settlement or damage of structures, and services to remain.
  - .1 Provide bracing, shoring and underpinning as required.
  - .2 Repair damage caused by demolition as directed by Contract Administrator.
- .3 Support affected structures and, if safety of structure being demolished or adjacent structures, or services appears to be endangered, take preventative measures, stop Work and immediately notify Contract Administrator.

**1.13 SELECTIVE DEMOLITION FOR ALTERATION WORK**

- .1 Specialists familiar with the materials affected shall perform selective demolition work.
- .2 Perform in a manner to neither damage nor endanger any part of the existing building or work in progress.
- .3 Demolition work indicated on drawings is schematic only. Verify all dimensions and conditions on site.
- .4 Do not damage or deface existing construction, equipment or finishes indicated to remain or items indicated for salvage.
- .5 Keep cutting to no more than 10% larger than outside dimensions of item penetrating another material.
- .6 Make cuts with clean, true, smooth edges to minimize patchwork and to provide suitable surface for integration of new materials.
- .7 Use concrete saw for cutting concrete and masonry.
- .8 Use diamond core drill for cutting small diameter openings in concrete and masonry.
- .9 Use of pneumatic driven jackhammers inside buildings is not permitted.
- .10 Marking:
  - .1 Each Subcontractor is responsible for marking out locations of all cutting, boring, and demolition required for installation of their respective work.
  - .2 Extra costs for additional cutting and patching required because of errors in marking out of locations of cutting and demolition work shall be paid by the Subcontractor responsible for the error in marking.
- .11 Openings and Recesses:
  - .1 Cut openings and recesses in walls, partitions, ceilings, roofs, floors as required for installation of new work and finishes.
  - .2 Coordinate with mechanical, electrical and other Subcontractors.
  - .3 Contractor is responsible for cutting openings larger than 150 x 150 mm or 150 mm in diameter. Openings smaller than these shall be the responsibility of the Subcontractor requiring the opening.
  - .4 Contractor is responsible for cutting recesses larger than 800 x 800 mm in size. Recesses smaller than these sizes shall be the responsibility of the Subcontractor requiring the recess.
- .12 Walls - Interior and Exterior:
  - .1 Remove or cut openings in walls to accommodate new work.
- .13 Existing ceilings (except Main Tank ceilings):
  - .1 Remove or cut openings in gypsum board and plaster ceilings to accommodate new work and finishes.
  - .2 Remove acoustical tile ceilings to accommodate new work and finishes.
  - .3 Where suspended ceilings are to be completely removed, remove related suspension system and hangers.
  - .4 Removal of suspended acoustical tile ceilings to provide temporary access above ceilings for work of other trades is the responsibility of the acoustical tile ceiling Subcontractor.

**1.14 PATCHING AND MAKING GOOD**

- .1 Patch and make good to the acceptance of the Contract Administrator.
- .2 Patching and making good of existing materials and finishes is the responsibility of the Subcontractor whose work is affected.

- .3 Patch and make good all damage to existing materials and finishes resulting from work of this Contract.
- .4 Patching, unless otherwise noted, shall match existing adjacent surfaces in all respects. Make patchwork inconspicuous in final assembly.
- .5 Patch and repair to standard of construction of surrounding materials, except where indicated otherwise.
- .6 Fit work air tight to pipes, sleeves, ducts, conduit and other penetrations. Seal all penetrations tight with acceptable materials.
- .7 Patch openings, holes, cuts and around pipes, ductwork, conduit and other work passing through fire separations and fire rated assemblies.
  - .1 Use materials and methods to maintain integrity of fire ratings. Use materials meeting Underwriters' Laboratories Canada (ULC) requirements and authorities having jurisdiction. For firestopping requirements refer to Section 07 84 00.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 E2 – Hazardous Materials: For Asbestos Analysis Report and Asbestos Inventory Control.
- .2 Section 02 82 00.01 - Asbestos Abatement Requirements Type 1 Work Procedures.
- .3 Section 02 82 00.02 - Asbestos Abatement Requirements Type 2 Work Procedures

**1.2 DEFINITIONS**

- .1 Environmental Pollution and Damage: Presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: Prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: In accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Contract Coordinator. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .4 Environmental protection plan: include:
  - .1 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.
  - .2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.
  - .3 Name(s) and qualifications of person(s) responsible for training site personnel.
  - .4 Descriptions of environmental protection personnel training program.
  - .5 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
  - .6 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
  - .7 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
  - .8 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
  - .9 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with

Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

- .10 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as clean-up water, disinfection water, hydrostatic test water, and water used in flushing of lines.

#### **1.4 FIRES**

- .1 Fires and burning of rubbish on site permitted only when authorized by Contract Coordinator.
- .2 Where fires or burning permitted, prevent staining or smoke damage to structures, materials, or vegetation that is to be preserved. Restore, clean and return to new condition stained or damaged work.
- .3 Provide supervision, attendance and fire protection measures as directed.

#### **1.5 DISPOSAL OF WASTES**

- .1 Do not bury rubbish and waste materials on site unless authorized by Contract Coordinator.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm, or sanitary sewers.

#### **1.6 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant to local authority's emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

#### **1.7 NOTIFICATION**

- .1 Contract Coordinator will notify Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: After receipt of such notice, inform Contract Coordinator of proposed corrective action and take such action for approval by Contract Coordinator.
- .3 Contract Coordinator will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

#### **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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**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Inspection and testing, administrative, and enforcement requirements.
- .2    Tests.
- .3    Mock-ups.
- .4    Mill tests.
- .5    Equipment/system adjust and balance.

**1.2            RELATED REQUIREMENTS**

- .1    Submission of samples to confirm product quality, Section 01 33 00 - Submittal Procedures.
- .2    Material and workmanship quality, reference standards, Section 01 61 00 - Common Product Requirements.

**1.3            REVIEW OF THE WORK**

- .1    Allow Contract Administrator 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 Contract Administrator instructions, or law of Place of Work.
- .3    If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4    Contract Administrator will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, The City shall pay cost of examination and replacement.

**1.4            INDEPENDENT INSPECTION AGENCIES**

- .1    Independent inspection/testing agencies will be engaged by The City for the purpose of inspecting and testing portions of Work.
- .2    Costs for independent inspection agencies shall be paid by The City.
- .3    Provide equipment required for executing inspection and testing by the appointed agencies.
- .4    Employment of inspection/testing agencies does not relax the responsibility to perform Work in accordance with the Drawings and Specifications.
- .5    If defects are revealed during inspection and/or testing, the Contract Administrator will request additional inspection and/or testing to ascertain full degree of defect. Correct defects and irregularities as advised by Contract Administrator at no cost to the The City. Pay costs for retesting and re-inspection.

**1.5            ACCESS TO WORK**

- .1    Allow inspection/testing agencies access to the Work, offsite manufacturing, and fabrication plants.
- .2    Cooperate to provide reasonable facilities for such access.

**1.6 PROCEDURES**

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

**1.7 DEFECTIVE WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Contract Administrator as failing to conform to Drawings and Specifications. Replace or re-execute in accordance with Drawings and Specifications.
- .2 Make good Subcontractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Contract Administrator, it is not expedient to correct defective Work or Work not performed in accordance with Drawings and Specifications, The City will deduct from Contract price difference in value between Work performed and that called for by Drawings and Specifications, amount of which will be determined by Contract Administrator.

**1.8 REPORTS**

- .1 Submit four copies of inspection and test reports promptly to the Contract Administrator.
- .2 Provide copies to Subcontractor of work being inspected/tested and manufacturer/fabricator of Material being inspected/tested.

**1.9 TESTS**

- .1 Furnish test results as may be requested.
- .2 The cost of tests and mix designs beyond those called for in the Drawings and Specifications or beyond those required by the Law of the Place of Work shall be appraised by the Contract Administrator and may be authorized as recoverable.

**1.10 MOCK-UPS**

- .1 Prepare mock-ups for Work specifically requested in the specifications. Include for Work of all sections required to provide mock-ups.
- .2 Construct in locations as directed by Contract Administrator or where specified in respective specification sections.
- .3 Prepare mock-ups for Contract Administrator review with reasonable promptness and in an orderly sequence, so as not to cause any delay in the Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.
- .5 If requested, the Contract Administrator will assist in preparing a schedule fixing the dates for preparation.
- .6 Remove mock-ups at conclusion of Work or when acceptable to Contract Administrator, except those designated to remain a part of the finished Work.

**1.11 MILL TESTS**

- .1 Submit mill test certificates as required of the specification Sections and as may be requested.

**1.12 EQUIPMENT AND SYSTEMS**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## General

### 1.1 INSTALLATION AND REMOVAL

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

### 1.2 WATER SUPPLY

- .1 A limited amount of water from the existing building supply will be made available for construction use.
- .2 Provide, install and maintain temporary lines and connections at own expense.
- .3 The City will pay utility charges.

### 1.3 TEMPORARY HEATING AND VENTILATION

- .1 Maintain temperatures of minimum 10°C in areas in which construction is in progress.
- .2 Permanent heating system of building:
  - .1 Permanent heating system of building may be used.
  - .2 If use is permitted:
    - .1 Be responsible for damage to heating system if use is permitted.
    - .2 On completion of Work for which permanent heating system is used, replace filters, replace damaged or worn components, clean equipment, service, lubricate and adjust to new condition.
    - .3 Pay costs for manufacturer's representative to facilitate repairs and maintenance necessary to equipment in order that manufacturer's guarantee period will commence on date of The City's take-over.
- .3 Interior relative humidity:
  - .1 Protect damage to existing finishes, casework and other woodwork due to excessive moisture or drying by maintaining optimum moisture content of wood and optimum interior relative humidity within the ranges prescribed in Architectural Woodwork Institute /Architectural Woodwork Manufacturers Association of Canada (AWI/AWMAC), Architectural Woodwork Standards, Section 2 - Care and Maintenance.
    - .1 For Manitoba:
      - .1 Optimum moisture content of wood: 4 - 9%.
      - .2 Optimum interior relative humidity: 17 - 50%.
  - .2 Maintain optimum interior relative humidity within prescribed range during storage, installation, and after installation for every hour of every day until Substantial Performance of the Work.
  - .3 Avoid uncontrolled extremes such as:
    - .1 Relative humidity above or below prescribed ranges.
    - .2 Sudden changes in the allowable relative humidity, especially when repetitive.
    - .3 Direct contact of moisture on wood - wipe dry immediately.

### 1.4 TEMPORARY POWER AND LIGHT

- .1 Provide and pay for temporary power required during construction for temporary lighting and the operating of power tools.
- .2 Arrange for connection with The City. Pay all costs for installation, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring in excess of the supply required for temporary lighting and power tools is the responsibility of Contractor.

- .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 Contract Administrator provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than three months.

**1.5 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone fax and internet hook up, lines and equipment necessary for own use and use of Contract Coordinator.

**1.6 FIRE PROTECTION**

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used`

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Construction aids.
- .2 Office and sheds.

**1.2 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA-Z321, Signs and Symbols for the Occupational Environment.
  - .2 CAN/CSA-S269.2-16, Access Scaffolding for Construction Purposes.

**1.3 INSTALLATION AND REMOVAL**

- .1 For review and approval of the Contract Administrator, 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 graveled 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 and authority having jurisdiction approval.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms temporary stairs.

**1.5 HOISTING**

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- .2 Hoists and cranes shall be operated by qualified operator.

**1.6 SITE STORAGE/LOADING**

- .1 Confine work and operations of employees by Drawings and Specifications. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

**1.7 CONSTRUCTION PARKING**

- .1 Parking will be provided on Site subject to the approval of the Contract Administrator and provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.

**1.8 CONTRACTOR'S SITE OFFICE**

- .1 Site office location subject to the approval of the Contract Administrator.

- .2 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing lay-down table.
- .3 Provide marked and fully stocked first-aid case in a readily available location.
- .4 Subcontractors to provide their own offices as necessary, subject to the approval of the Contract Administrator. Direct location of these offices.

**1.9 EQUIPMENT, TOOL AND MATERIAL STORAGE**

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

**1.10 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances. Location subject to approval of the Contract Administrator.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Existing facilities not to be used.

**1.11 CONSTRUCTION SIGNAGE**

- .1 No signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Contract Administrator.

**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 Contract Administrator.
- .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 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .8 Dust control: adequate to ensure safe operation at all times.

**Part 2**            **Products**

**2.1**            **NOT USED**

                  .1    Not Used.

**Part 3**            **Execution**

**3.1**            **NOT USED**

                  .1    Not Used.

**END OF SECTION**

**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    Barriers.
- .2    Environmental Controls.
- .3    Traffic Controls.
- .4    Fire Routes.

**1.2            REFERENCE STANDARDS**

- .1    Canadian Standards Association (CSA)
  - .1    CSA-O121, Douglas Fir Plywood
  - .2    CAN/CSA O141 - Softwood Lumber
  - .3    CSA O151 - Canadian Softwood Plywood

**1.3            INSTALLATION AND REMOVAL**

- .1    Provide temporary controls to execute Work expeditiously.
- .2    Remove from site all such work after use and make good to adjacent surfaces and finishes.

**1.4            HOARDING AND SITE FENCING**

- .1    Erect temporary site fence around construction laydown and trailer area to prohibit unauthorized access.
- .2    Use minimum 2 100 mm high chain link or wire mesh fencing with posts at no more than 3 000 mm on centre. Provide lockable truck entrance gate(s) and equip gates with locks and keys.

**1.5            GUARD RAILS AND BARRICADES**

- .1    Provide as recommended by local governing authorities.

**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.
- .3    Confirm locations and installation with Contract Administrator at least three days prior to installation.
- .4    Where screens restrict access to emergency exits review security requirements with Contract Administrator prior to erection.

**1.7            ACCESS TO SITE**

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

**1.8            PUBLIC TRAFFIC FLOW**

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

**1.9 FIRE ROUTES**

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

**1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect adjacent private and public property from damage during the performance of work.
- .2 Be responsible for all damage incurred.

**1.11 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during the performance of work.
- .2 Provide necessary screens, covers and hoardings.
- .3 Confirm locations and installation with Contract Administrator at least five days prior to installation.
- .4 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 SECTION INCLUDES**

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Substitution procedures.
- .4 Quality of Work, coordination and fastenings.
- .5 Prevention of dust and mould contamination of products and materials during delivery, storage and handling.

**1.2 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA Z317.13, Infection control during construction, renovation, and maintenance of health care facilities

**1.3 REFERENCES**

- .1 Within text of each Specification section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in Specifications.
- .3 If there is question as to whether any product or system is in conformance with applicable standards, Contract Administrator reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by The City in event of conformance with Drawings and Specifications or by Contractor in event of non-conformance.
- .5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

**1.4 QUALITY ASSURANCE**

- .1 Products, Materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Contract Administrator based upon requirements of Drawings and Specifications.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout buildings.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

## **1.5 AVAILABILITY**

- .1 Immediately upon receiving Letter of Intent, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of materials, equipment or articles are foreseeable, notify Contract Administrator within two days discovery of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In the event of failure to notify the Contract Administrator at commencement of Work, and should it subsequently appear that Work may be delayed for such reason, the Contract Administrator reserves the right to substitute more readily available products of similar character, at no increase in Contract Price or contract time.

## **1.6 SUBSTITUTIONS**

- .1 The Work is based on the materials and methods specified in the Specifications.
- .2 Substitutions are permitted during Bid period only, make application in accordance with B8 Substitutes

## **1.7 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 sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .5 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.
- .6 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.
- .7 Touch-up damaged factory finished surfaces to Contract Administrator's satisfaction. Use touch-up materials to match original. Do not paint over name plates.
- .8 Comply with CAN/CSA Z317.13 when shipping, handling and storing products susceptible to mould and dust contamination. Protect products from weather; take all precautions to prevent moisture or dust contamination.
  - .1 Wrap products in waterproof covers at plant or distribution centre prior to shipping.
  - .2 Load products in indoor facilities, and ship to project site in enclosed vehicles only. Do not use flat-bed trucks exposed to the elements.
  - .3 Unload products at project site only during dry weather.
  - .4 Store products indoors in dry location, off concrete floors.
  - .5 Products that become damp, wet or contaminated with mould, dust and dirt shall be designated as defective work in accordance with General Conditions and replaced at no additional cost to the Contract.

## **1.8 TRANSPORTATION**

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

- .2 Transportation costs of products supplied by The City will be paid for by The City unless specified otherwise. Unload, handle and store such products, unless otherwise specified.

### **1.9 MANUFACTURERS' INSTRUCTIONS**

- .1 Unless otherwise indicated in the specifications, install or erect all products in accordance with manufacturer's recommendations. Do not rely on labels or enclosures that are provided with products. Obtain instructions directly from manufacturers.
- .2 Notify Contract Administrator in writing of any conflicts between the Specifications and manufacturer's instructions so that the Contract Administrator may establish the course of action to follow.
- .3 Improper installation or erection of products due to failure in complying with these requirements authorizes the Contract Administrator to require any removal and re-installation that may be considered necessary, at no increases in Contract price or Contract time.

### **1.10 QUALITY OF WORK**

- .1 Ensure quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.
- .2 Enforce discipline and good order among workers.
- .3 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site, workers deemed incompetent or careless.
- .4 Decisions as to standard or fitness of quality of Work in cases of dispute rest solely with Contract Administrator, whose decision is final.

### **1.11 COORDINATION**

- .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Ensure Work of various Subcontractors does not conflict or create interference.
- .3 Be responsible for the proper coordination and placement of openings, sleeves, and accessories.
- .4 Supply all items required to be built in as and when required, together with templates, measurements and shop drawings.
- .5 Ensure all workers examine the drawings and specifications covering the Work of others that may affect the performance of their own Work. Examine the Work of others and report to the Contract Administrator, in writing, any defects, or deficiencies that may affect the Work. In the absence of any report, the Contractor shall be held to have waived all claims for damage to or defects in such Work.
- .6 Ensure that components openings that are required for the installation of Work is coordinated. Furnish the necessary information to the sections concerned in ample time to permit allowance for such items. Failure to comply with this requirement does not relieve the party at fault of the cost of cutting or drilling at a later date and subsequent patching.

### **1.12 CONCEALMENT**

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

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

**1.13 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.14 LOCATION OF FIXTURES**

- .1 Consider the location of fixtures, outlets and other mechanical and electrical items indicated on drawings as approximate.
- .2 Inform the Contract Administrator of an impending installation. Install as directed.

**1.15 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour, and finish as adjacent materials, unless otherwise indicated.
- .2 Prevent electrolytic action between dissimilar metal and materials.
- .3 Use non-corrosive hot dip galvanized fasteners and anchors for securing exterior Work, unless stainless steel or other material is specifically requested in the affected Specification section.
- .4 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Plugs of wood or any other organic material 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.

**1.16 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 Type 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.

**1.17 PROTECTION OF WORK IN PROGRESS**

- .1 Protect Work completed or in progress.
- .2 Prevent overloading of any part of the building. Do not cut, drill, or otherwise sleeve any load bearing structural member unless specifically indicated on drawings or in Specifications without written approval of the Contract Administrator.

**1.18 EXISTING UTILITIES**

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

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

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**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 The City 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 The City 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 or products not permitted unless previously approved by Contract Administrator during Bid period.

**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.

**1.4            EXECUTION**

- .1            Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2            Fit several parts together, to integrate with other Work.
- .3            Uncover Work to install ill-timed Work.
- .4            Remove and replace defective and non-conforming Work.
- .5            Remove samples of installed Work for testing.
- .6            Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

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

**1.5 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 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1            General Instructions**

- .1    Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2    Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .3    Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .4    Remove waste materials and debris from the site at regularly scheduled times or dispose of as otherwise directed by the Contract Administrator. Do not burn or bury waste materials or debris on site.
- .5    Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

**1.2            Materials**

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

**1.3            Cleaning During Construction**

- .1    Provide on-site containers for collection of waste materials, and debris.
- .2    Dispose of waste materials and debris off site at regularly scheduled intervals.
- .3    Maintain the Work in tidy condition, free from accumulation of waste products and debris.
- .4    Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .5    Clean interior areas prior to start of finish work; maintain areas free of dust and other contaminants during finishing operations.

**1.4            Final Cleaning**

- .1    When the Work is complete, remove surplus products, tools, construction machinery and equipment. Remove waste products and debris and leave the Work clean and suitable for occupancy by The City and meeting approval of the Contract Administrator.
- .2    Leave the work 'broom clean' before the inspection process commences.
- .3    Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel or baked enamel affected during the work. Replace broken, scratched or disfigured glass damaged during the Work.
- .4    Clean lighting reflectors, lenses, and other lighting surfaces.
- .5    Remove stains, spots, marks, and dirt from existing decorative work, electrical and mechanical fixtures, furniture fittings, walls and floors.
- .6    Clean and dust building interiors affected during the Work, including behind grilles, louvers and screens.
- .7    Clean existing floor finishes affected during the work
- .8    Remove debris and surplus materials from accessible concealed spaces.
- .9    Clean existing equipment and fixtures in areas or the Work to a sanitary condition, clean, replace filters of mechanical equipment.

- .10 Inspect finishes, fitments and equipment and ensure proper workmanship and operation.
- .11 Broom clean and wash exterior walks used during the Work, steps and platforms.
- .12 Broom clean parking lots, pads and paving accessible to vehicle traffic used during the Work.
- .13 Rake clean other surfaces of grounds used during the 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 SECTION INCLUDES**

- .1 Requirements for waste management goals, waste management plan and waste management plan implementation.

**1.2 RELATED REQUIREMENTS**

- .1 Section 02 82 00.01 - Asbestos Abatement Requirements Type 1 Work Procedures: For waste management and disposal for hazardous or designated materials.
- .2 Section 02 82 00 .02 - Asbestos Abatement Requirements Type 1 Work Procedures: For waste management and disposal requirements for hazardous or designated materials.

**1.3 DEFINITIONS**

- .1 Construction Waste: Solid wastes such as building materials, packaging and rubble resulting from construction, paving and infrastructure.
- .2 Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- .3 Recyclable Waste: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- .4 Recycling Facility: A business that specializes in collecting, handling, processing, distributing, or remanufacturing waste materials generated by new construction projects, into products or materials that can be used for this project or by others.
- .5 Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- .6 Salvage and Reuse: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

**1.4 SUSTAINABILITY OBJECTIVES**

- .1 The Contractor shall use all means available to divert the greatest extent practical and economically feasible, construction waste from landfills and incinerators. Develop and implement a demolition waste management plan.
- .2 Establish waste diversion goals for the project by identifying at least five materials both structural and non-structural targeted for diversion.
- .3 Provide the names of the recycling facilities where the material will be taken and how the recycling facility will process the material.
- .4 Collect and record on-going waste diversion rates (landfill and recycled) weights to provide a final waste diversion report.

**1.5 ACTION SUBMITTALS**

- .1 Submit draft waste management plan to the Contract Administrator prior to project start up meeting.

**1.6 INFORMATIONAL SUBMITTALS**

- .1 Waste Reduction Progress Reports: Submit a monthly report to the Contract Coordinator and include the following information:
  - .1 Material category.
  - .2 Generation point of waste.

- .3 Total quantity of waste in tons (tonnes)
  - .4 Quantity of waste salvaged, both estimated and actual in tons (tonnes).
  - .5 Quantity of waste recycled, both estimated and actual in tons (tonnes).
  - .6 Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
  - .7 Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- .2 Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
  - .3 Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations.
  - .4 Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations.
  - .5 Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
  - .6 Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

#### **1.7 WASTE MANAGEMENT PLAN**

- .1 General: Develop a waste management plan according to requirements in this Section and Sections 02 82 00.01 and 02 82 00.02. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- .2 Goals: Establish waste diversion goals for the project by identifying at least five materials targeted for diversion.
- .3 Waste: Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work.
- .4 Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - .1 Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - .2 Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - .3 Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - .4 Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - .5 Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

- .5 Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

- .1 General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- .2 Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

**END OF SECTION**

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**Part 1            General**

**1.1            SECTION INCLUDES**

- .1    As-built, samples, and specifications.
- .2    Equipment and systems.
- .3    Product data, materials and finishes, and related information.
- .4    Operation and maintenance data.
- .5    Spare parts, special tools and maintenance materials.
- .6    Warranties and bonds.
- .7    Warranty Management Plan.

**1.2            SUBMISSION**

- .1    Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3    Copy will be returned after final review, with Contract Administrator's comments.
- .4    Revise content of documents as required prior to final submittal.
- .5    Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three final copies of operating and maintenance manuals in English.
- .6    Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .7    If requested, furnish evidence as to type, source and quality of products provided.
- .8    Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .9    Pay costs of transportation.

**1.3            FORMAT**

- .1    Three hard copy (binders), one electronic format (PDF). Organize data in the form of an instructional manual.
- .2    Binders: vinyl, hard covered, 3 'D' ring, loose leaf, letter size format with spine and face pockets.
- .3    When multiple binders are used, correlate data into related consistent groupings. 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. Bind in with text; fold larger drawings to size of text pages.

#### **1.4 CONTENTS - EACH VOLUME**

- .1 Table of Contents: provide title of project;
  - .1 Date of submission; names,
  - .2 Addresses and telephone numbers of Contract Administrator and Contractor with name of responsible parties;
  - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

#### **1.5 AS-BUILTS AND SAMPLES**

- .1 Maintain at the site for Contract Administrator one record copy of:
  - .1 Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to the Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for review by Contract Administrator.

#### **1.6 RECORDING ACTUAL SITE CONDITIONS**

- .1 Record information on three sets of black line opaque drawings, and within copy of Specifications. Make arrangements of black line opaque copies.
- .2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
  - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .2 Field changes of dimension and detail.
  - .3 Changes made by change orders.
  - .4 Details not on original Contract Drawings.
  - .5 References to related shop drawings and modifications.
- .5 Specifications: legibly mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

## **1.7 EQUIPMENT AND SYSTEMS**

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

**1.8 MATERIALS AND FINISHES**

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications sections.

**1.9 MAINTENANCE MATERIALS**

- .1 Spare Parts:
  - .1 Provide spare parts, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site location as directed; place and store where directed by The City.
  - .4 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .2 Maintenance Materials:
  - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
  - .2 Provide items of same manufacture and quality as items in Work.
  - .3 Deliver to site location as directed; place and store where directed by The City.
  - .4 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
  - .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification section.
  - .2 Provide items with tags identifying their associated function and equipment.
  - .3 Deliver to site location as directed; place and store where directed by The City
  - .4 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- .4 Storage, Handling and Protection:
  - .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
  - .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
  - .3 Store components subject to damage from weather in weatherproof enclosures.
  - .4 Store paints and freezable materials in a heated and ventilated room.
  - .5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

**1.10 WARRANTIES AND BONDS**

- .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
- .2 List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with The City's permission, leave date of beginning of time of warranty until the Date of Total Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

**1.11 WARRANTY MANAGEMENT PLAN**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .1 Submit warranty management plan, 30 days before planned pre-warranty conference, to Contract Administrator for review.
- .2 Warranty management plan to include required actions and documents to assure that The City receives warranties to which it is entitled.
- .3 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .4 Submit, warranty information made available during construction phase, to Contract Administrator for review prior to each monthly pay estimate.
- .5 Assemble approved information in binder and submit upon acceptance of work. 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.
- .6 Except for items put into use with The City's permission, leave date of beginning of time of warranty until Date of Total Performance is determined.
- .7 Conduct joint four-month and nine-month warranty inspection, measured from time of acceptance, by Contract Administrator.
- .8 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 Contractor, Subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and

- commissioned systems such as fire protection, alarm systems, sprinkler systems, lightning protection systems.
- .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .4 Contractor's plans for attendance at four and nine-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.
  - .9 Respond in a timely manner to oral or written notification of required construction warranty repair work.
  - .10 Written verification will follow oral instructions. Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

#### **1.12 PRE-WARRANTY CONFERENCE**

- .1 Meet with Contract Administrator, to develop understanding of requirements of this section. Schedule meeting prior to contract completion, and at time designated by Contract Administrator.
- .2 Contract Administrator will establish communication procedures for:
  - .1 Notification of construction warranty defects.
  - .2 Determine priorities for type of defect.
  - .3 Determine reasonable time for response.
- .3 Provide name, telephone number and address of licensed and bonded company that is authorized to initiate and pursue 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.

**1.13 WARRANTY TAGS**

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Contract Administrator.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES:**

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

**1.2 RELATED REQUIREMENTS**

- .1 Section 01 78 00 - Closeout Submittals

**1.3 ACRONYMS:**

- .1 Cx - Commissioning
- .2 CxA - Commissioning Authority - Contract Administrator
- .3 O&M - Operation and Maintenance
- .4 CVF – Component Verification Form
- .5 FCT – Functional Test
- .6 TAB - Testing, Adjusting and Balancing

**1.4 GENERAL**

- .1 Commissioning is a formal, systematic process of ensuring that building systems perform interactively according to the design intent and The City's operational needs.
- .2 Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
  - .1 Applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted standards and that they receive adequate operational checkout by installing contractors.
  - .2 Proper performance of equipment and systems is documented.
  - .3 O&M documentation left on site is complete.
  - .4 The City's operating personnel are adequately trained.
- .3 The Contractor is responsible for demonstrating equipment and systems, troubleshooting and making adjustments as required to the satisfaction of the CxA.
  - .1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively tested with each other as intended in accordance with Contract Documents and design criteria.
  - .2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

**1.5 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS**

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, the Contractor shall correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the CxA and/or related design authority, to ensure effective performance.
- .2 Contractor costs for corrective work, additional tests, and inspections to ensure proper performance of such items to be borne by Contractor.
- .3 Contractor shall pay for all CxA expenses associated with excessive retesting of systems.

## **1.6 COORDINATION**

- .1 The following are members of the commissioning team:
  - .1 Commissioning Authority (CxA)
  - .2 Contractor
  - .3 Electrical Subcontractor
  - .4 Any other installing Subcontractors or suppliers of equipment.

## **1.7 CONFLICTS (BETWEEN SPECIFICATION SECTIONS)**

- .1 Report conflicts between requirements of this section and other Specification sections to the Contract Administrator before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification (through RFI process) will result in application of the Contract Administrator's intent on the issue.

## **1.8 COMMISSIONING SCHEDULE**

- .1 The Contractor will provide Cx schedule to CxA for review and comment.
- .2 The Contractor will provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
  - .1 Commissioning site visits
  - .2 Component verification completion
  - .3 Startup and pre-functional activities
  - .4 Performance Verification testing dates
  - .5 The City's training.
  - .6 Seasonal or deferred testing.
- .3 All parties are responsible to address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

## **1.9 SYSTEMS TO BE COMMISSIONED**

- .1 The commissioning of the following systems will be included under the oversight of the CxA. The Construction Contractor is also required to comply with contract requirements for systems not included in this list.
  - .1 Mechanical
    - .1 Testing and Balancing
  - .2 Electrical
    - .1 Luminaires
    - .2 Lighting control systems (line voltage and low voltage)
    - .3 Communications system

## **1.10 MEETINGS**

- .1 Commissioning Kickoff Meeting. The CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance.
- .2 Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA at the discretion of the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with Contractor.

**1.11 SUBMITTALS (SHOP DRAWINGS)**

- .1 The CxA requires submittal documentation for facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team.
- .2 These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CxA will review them and provide feedback, where in the opinion of the CxA, correction is required. O&M manuals must be submitted in electronic (PDF) format.

**1.12 COMPONENT VERIFICATION FORMS and INITIAL CHECKOUT**

- .1 The following procedures apply to all equipment to be commissioned.
- .2 Component Verification Forms (CVF). CVF checklists document that the equipment and systems are installed as per the design intent and good practice. CVFs for a given system must be successfully completed prior to Functional Testing.
  - .1 CVFs will be developed in an electronic format (pdf) by the CxA after the award of the construction contract and electronic copies will be provided to the Contractor. The Contractor and Subcontractors are responsible to execute and document the CVF on site, and return to the CxA for inclusion in the final report. The CxA will verify the installation and accuracy of the CVFs using an audit process.
  - .2 CVFs are used to track and document that the proper equipment has been specified, submitted and installed. The forms capture typical maintenance information such as tag #, model, service, location, nameplate data, static submittal data, etc.
- .3 Issues identified during commissioning inspections will be documented by the CxA on the issue tracking log.
  - .1 The Contractor shall respond to issues and ensure correction.
- .4 A sample CVF has been included in Section 01 91 33 for Bid purposes.

**1.13 SYSTEM START-UP**

- .1 Start-up Plan. The Contractor will provide a detailed startup plan for all commissioned equipment for review by the CxA.
- .2 The startup plan will include blank startup forms (provided by manufacturer, or otherwise) for commissioned systems.
  - .1 The CxA may attend startups at their discretion to ensure that startup documentation and procedures are being followed as required.
  - .2 The Contractor and vendors shall execute start-up.
  - .3 Provide the CxA with a signed and dated copy of the completed start-up report.
- .3 Start-up documentation to include:
  - .1 Factory and on-site test certificates for specified equipment.
  - .2 Pre-start-up inspection reports.
  - .3 Signed installation/start-up check lists.
  - .4 Start-up reports,
  - .5 Step-by-step description of complete start-up procedures, to permit Contract Administrator to repeat start-up at any time.
- .4 Submit required startup documentation including, but not limited to:

- .1 Electrical Systems
  - .1 Low voltage lighting system test report
  - .2 Intercom/Paging system verification report

#### **1.14 FUNCTIONAL TESTING**

- .1 Refer to this Section for the list of systems to be commissioned.
- .2 Functional Testing (FCT) demonstrates that each system is operating according to the documented design intent and Contract documents. Each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load). Verifying the sequences of operation is required for all modes. Proper responses to modes and conditions such as power failure, freeze conditions, fire alarm conditions, equipment failure, etc. may also be tested.
- .3 Functional Tests will be developed in an electronic format (pdf) after award of the Contract by the CxA and electronic copies will be provided to Contractor.
- .4 The Component Verification Forms (CVFs) for a given system's equipment must be completed prior to the Functional Test.
- .5 The Contractor and/or vendors shall execute the Functional Tests as a pre-functional test to verify correct system operation and provide the CxA with a signed and dated copy of the completed tests prior to formal Functional Testing with the CxA present.
- .6 Issues identified during Functional Testing will be documented by the CxA on the issue tracking log.
  - .1 The Contractor shall respond to issues and ensure correction.
- .7 A Sample Functional Test has been included in Section 01 91 33 for bid purposes.

#### **1.15 ISSUE TRACKING LOG**

- .1 Contractor shall respond to issues noted on the issue tracking log within seven calendar days indicating the corrective action taken.
- .2 CxA may request the Contractor demonstrate successful resolution of items noted on the tracking log.

#### **1.16 SYSTEMS MANUAL**

- .1 Contractor to provide the following documentation to the CxA for inclusion in the operation and maintenance manual described in Section 01 78 00:
  - .1 As-built architectural drawings (electronic copy)
  - .2 As-built electrical drawings (electronic copy)
  - .3 Operations and Maintenance manuals (electronic copy)
  - .4 Occupancy permit (or equivalent, per Manitoba Hydro Power Smart requirements)

#### **1.17 AUTHORITIES HAVING JURISDICTION**

- .1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for CxA to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
- .2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
- .3 Provide copies to Contract Administrator and CxA within seven calendar days of test.

**Part 2            Products**

**2.1                Not used.**

**Part 3            Execution**

**3.1                Not used.**

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 E2, Hazardous Materials
- .2 Section 01 35 16 - Alteration Project Procedures
- .3 Section 02 81 01.01 - Asbestos Abatement Requirements Type 1 Work Procedures
- .4 Section 02 81 01.01 - Asbestos Abatement Requirements Type 2 Work Procedures

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

**1.3 DEFINITIONS**

- .1 Demolition: rapid destruction of building or parts of building, following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Site Meetings.
  - .1 Convene pre-demolition meeting two weeks prior to beginning work of this Section in accordance with Part D, Article D22, Job Meetings, to:
    - .1 Verify project requirements.
    - .2 Review site conditions, including requirements for photographic documentation of existing conditions.
    - .3 Coordination with other Subcontractors.
  - .2 Arrange for site visit with Contract Administrator to examine existing site conditions adjacent to demolition work, prior to start of Work.
  - .3 Ensure site demolition is on the meeting agenda of regularly scheduled job meetings.
  - .4 Ensure key personnel attend.
  - .5 Provide written report on status of waste diversion activity at each project meeting.
- .2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.
  - .1 Notify Contract Administrator in writing when unforeseen delays occur.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Hazardous Materials:
  - .1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

- .3 Waste Management Plan:
  - .1 Prior to beginning of Work on site submit detailed waste management plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal. Indicate:
    - .1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled and landfilled.
    - .2 Schedule of selective demolition.
    - .3 Number and location of dumpsters.
    - .4 Anticipated frequency of tippage.
    - .5 Name and address of haulers, waste facilities, waste receiving organizations.

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

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Storage and Protection.
  - .1 Protect in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
  - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Contract Administrator and at no cost to Contract.
  - .3 Remove and store materials to be salvaged, in manner to prevent damage.
  - .4 Store and protect in accordance with requirements for maximum preservation of material.
  - .5 Handle salvaged materials as new materials.

## **1.7 SITE CONDITIONS**

- .1 Review asbestos-containing materials Assessment Reports referenced in Sections 02 82 00.01 and 02 82 00.02, and take precautions to protect environment.
- .2 Should material resembling spray or trowel-applied asbestos, lead paint, or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Contract Administrator immediately.
  - .1 Do not proceed until written instructions have been received from Contract Administrator.
- .3 Notify Contract Administrator before disrupting building access or services.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not used.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .2 Notify and obtain approval of Contract Administrator two days before starting demolition.

- .3 Disconnect, cap, plug or divert, as required, existing utilities within the building where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services in the building and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

- .1 Immediately notify Contract Administrator of damage to any utility or service, designated to remain in place.
- .2 Immediately notify the Contract Administrator should uncharted utility or service be encountered and await instruction in writing regarding remedial action.

### **3.2 PROTECTION**

- .1 Prevent movement, settlement, or damage to parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.

### **3.3 EXISTING LOOSE FURNISHINGS AND EQUIPMENT**

- .1 Existing loose furnishings and equipment shall be relocated by The City as indicated in Section 01 35 16.

### **3.4 SALVAGE**

- .1 Refer to demolition drawings and specifications for items to be salvaged for reuse and items to be turned over to The City.
- .2 Items salvaged and reinstalled in Contract:
  - .1 Fire extinguishers: remove existing fire extinguishers in work areas, storage temporarily during construction, and reinstall in locations as later directed by Contract Administrator.
  - .2 Include removal, temporary storage, and reinstallation of existing materials and equipment in Contract.
  - .3 Remove items to be reused, store as directed by Contract Administrator.
  - .4 Coordinate with Electrical Subcontractor for disconnection of electrical services where applicable.
- .3 Provide all labour and transportation equipment such as carts, dollies, and hand trucks to complete the work.
- .4 Prior to start of work in each construction area conduct with Contract Administrator a survey of items requiring removal. Record an inventory of items and provide a copy to Contract Administrator.
- .5 Remove items carefully to prevent damage. Transport items to temporary storage areas as directed by Contract Administrator.
- .6 Surplus items remain the property of The City.

### **3.5 REMOVAL OPERATIONS**

- .1 Remove elements of existing building to permit new construction.
- .2 Perform demolition work in a manner to neither damage nor endanger any part of the existing building or work in progress.

- .3 Demolition work indicated on drawings is schematic only. Verify all dimensions and conditions on site.
- .4 Do not damage or deface existing construction, equipment or finishes indicated to remain or items indicated for salvage.
- .5 Keep cutting to no more than 10% larger than outside dimensions of item penetrating another material.
- .6 Make cuts with clean, true, smooth edges to minimize patchwork and to provide suitable surface for integration of new materials.

### **3.6 REMOVAL OF HAZARDOUS WASTES**

- .1 In accordance with Sections 02 81 01.01 and 02 81 01.02, remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

### **3.7 REMOVAL FROM SITE**

- .1 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.
- .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
  - .1 Written authorization from Contract Administrator is required to deviate from disposal facilities.

### **3.8 RESTORATION**

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

### **3.9 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
  - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

### **3.10 PROTECTION**

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1 Refer to the following information (further referred to herein as the “Assessment Reports”), attached in the Appendix of the Specifications, for information pertaining to asbestos-containing materials (ACMs) that have been identified and may require disturbance during the Work:
  - .1 EMC Labs, Inc. Laboratory Report 0194218 (analytical result for one sample of 2’x2’ ceiling tile panel).
  - .2 City of Winnipeg “Asbestos Inventory Control” for Pan Am Pool (inspection date October 6, 2016, and associated drawings).
- .1 The Assessment Reports indicate that ACMs including, but not limited to, the following are present:
  - .1 ACMs expected to be impacted by the Work:
    - .1 Cement panel ceiling tiles within the main tank area.
    - .2 Vinyl sheet flooring in various offices.
    - .3 Plaster applied to walls and ceilings.
  - .2 ACMs NOT expected to be impacted by the Work, but potentially present in areas of the Work:
    - .1 Insulation on mechanical pipes (straights and fittings) and ducts.
    - .2 Cement (“transite”) pipe.
    - .3 Door jambs (insulated with asbestos-containing insulation).
    - .4 Mastic on pipes and ducts.
    - .5 Exterior stucco.
- .2 Abatement shall be conducted to handle, alter, remove and/or dispose of ACMs as identified in the Assessment Report in accordance with applicable regulations, guidelines, standards and/or best practices for such work, where such identified ACMs will be impacted (handled, altered, damaged, removed) by the Work.
- .3 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of ACMs that will be impacted by the Work of this Contract, and such that appropriate plans and budgets can be included in their overall bids. Inclusion of a particular ACM in this specification is not necessarily confirmation that it will require disturbance, alteration, handling, removal or disposal. The actual methods to be used by the Contractor to complete the general Work of this Project may impact how and to what extent various ACMs will require disturbance, alteration, handling, removal or disposal.
- .4 Unless otherwise determined through risk assessment conducted by the Contractor’s qualified person, comply with requirements of this section when performing Work that would be considered “Type 1” asbestos abatement work as defined in the Safe Work Manitoba 2017 “Guide for Asbestos Management”. For this project, this is expected to include, but may not be limited to, the following:
  - .1 Using hand methods, hand tools and/or power tools equipped with high-efficiency particulate air (HEPA) filtered dust collection systems to move, remove, break, drill, cut or otherwise disturb asbestos-containing cement ceiling tiles.

- .1 If asbestos-containing cement ceiling tiles are no longer maintaining their structural integrity (i.e. if the materials are becoming friable), additional precautions will be required, to be determined through a risk assessment conducted by the Contractor's qualified person, and to maintain compliance with the provisions of the Safe Work Manitoba 2017 "Guide for Asbestos Management".
- .2 Using hand methods, hand tools and/or power tools equipped with HEPA filtered dust collection systems (including task-specific work procedures – such as the use of water, HEPA vacuum and personal protective equipment) to disturb small, localized areas (less than 0.5 square metres total in any room or project area simultaneously) of asbestos-containing plaster, and provided that the removal work can be completed within three hours (expected to be required for penetrating plaster walls for installation of electrical systems, conduit, etc.).
- .5 If the project scope changes and additional removal of ACMs or more significant disturbance to asbestos-containing plaster is required in any particular area, additional precautions (further to those outlined herein) may be necessary.
  - .1 Any proposed changes to the scope for asbestos abatement are to be provided to the Contract Administrator for review/approval. Proposed changes are to be provided in writing by the Contractor's qualified person. Proposed changes should follow the provisions of the Safe Work Manitoba 2017 "Guide for Asbestos Management".

## 1.2 SECTION INCLUDES

- .1 Requirements, applicable procedures and personal protective equipment to be utilized during abatement of ACMs of the types described herein.

## 1.3 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .3 Section 02 82 00.02 - Asbestos Abatement Type 2 Precautions

## 1.4 REFERENCES

- .1 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .2 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .3 Government of Manitoba
  - .1 Manitoba Workplace Safety and Health Act and Regulation, including amendments to date of work.
  - .2 Manitoba Hazardous Waste Regulation MR 55/2003.
- .4 Safe Work Manitoba
  - .1 Guide for Asbestos Management, 2017.

## 1.5 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.

- .3 Asbestos-Containing Materials (ACMs): materials that contain asbestos in amounts as listed below, and are identified under Existing Conditions including fallen materials and settled dust:
  - .1 A friable material containing 0.1% or greater asbestos;
  - .2 A non-friable material containing 1.0% or greater asbestos; and
  - .3 Vermiculite insulation that contains any asbestos.
- .4 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.
- .5 Authorized Visitors: Contract Administrator and representatives of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
  - .1 Is qualified because of knowledge, training and experience to perform the work.
  - .2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
  - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Friable material: means material that:
  - .1 When dry, can be crumbled, pulverized or powdered by hand pressure, or
  - .2 Is crumbled, pulverized or powdered.
- .8 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .9 Occupied Area: any area of the building or work site that is outside the Asbestos Work Area.
- .10 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.

## **1.6 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Provincial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance in accordance with D10.
- .4 Submit proof satisfactory to Contract Administrator that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .5 Submit to Contract Administrator necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.
- .6 Submit proof that all asbestos workers and/or supervisor have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .7 Submit proof satisfactory to Contract Administrator that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

**1.7 QUALITY ASSURANCE**

- .1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time Work is performed.
- .2 Health and Safety:
  - .1 Perform construction occupational health and safety in accordance with applicable provincial occupational health and safety regulations.
  - .2 Safety Requirements: worker protection.
    - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
      - .1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator is to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
      - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.
    - .2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
    - .3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
    - .4 Facilities for washing hands and face shall be provided within or close to the Asbestos Work Area.
    - .5 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing are to be supplied by the Contractor.
    - .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

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**1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials 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 Collect and separate for disposal packaging material in appropriate on-site bins for recycling.
- .4 Separate and place in designated containers recyclable metal and plastic waste.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Fold up metal banding, flatten and place in designated area for metal recycling.
- .8 Disposal of asbestos waste generated by Work activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mil bags or leak proof drums. Label containers with appropriate warning labels.
- .9 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

**1.9 EXISTING CONDITIONS**

- .1 Reports and information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are bound into this specification in Appendices 1 and 2
- .2 Notify Contract Administrator of suspected ACM discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Contract Administrator.

**1.10 SCHEDULING**

- .1 Hours of Work: Work times as indicated in Section 01 14 00 - Work Restrictions.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Drop Sheets:
  - .1 Polyethylene: 0.15 mm thick.
  - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.
- .3 Waste Containers: contain waste in two separate containers.
  - .1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
  - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
  - .3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.
- .4 Slow-drying sealer: non-staining, clear, water-dispersible type that remains tacky on surface for at least eight hours and designed for purpose of trapping residual asbestos fibres.

- .5 Tape: fibreglass-reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.

### **Part 3 Execution**

#### **3.1 PROCEDURES**

- .1 Asbestos abatement work is to be completed in general accordance with the requirements of the Safe Work Manitoba 2017 "Guide for Asbestos Management". Where discrepancies exist between that document and these specifications, the more stringent will apply.
- .2 Do construction in accordance with the provisions of the applicable provincial occupational health and safety regulations.
- .3 Notification to the City of Winnipeg and Manitoba Workplace Safety and Health to be completed prior to work resulting in the potential release of ACMs.
- .4 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
  - .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
  - .2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
  - .3 Do not use compressed air to clean up or remove dust from any surface.
- .5 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
  - .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust (or attic insulation if work is within ceiling spaces) and over flooring/surfaces in Asbestos Work Area where dust and contamination cannot otherwise be safely contained. Drop sheets are not to be reused.
- .6 Wet materials containing asbestos to be abraded, cut, drilled in localized areas, scraped or otherwise disturbed unless wetting creates hazard or causes damage.
  - .1 Use garden reservoir type low-velocity fine-mist sprayer.
  - .2 Perform Work to reduce dust creation to lowest levels practicable.
  - .3 Contamination of surrounding areas indicated by visual inspection by the Contract Administrator will require complete enclosure and clean-up of affected areas.
- .7 Remove ACM ceiling tiles in-tact from support tracking (t-bar grid), where possible. Place into appropriate waste bag before breaking further into more manageable pieces (if possible or necessary)
- .8 Frequently and at regular intervals during Work and immediately on completion of work:
  - .1 Dust and waste to be cleaned up and removed using a vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping (including t-bar grid from which ACM ceiling tiles are removed), and placed in a waste container; and
  - .2 Drop sheets to be wetted and placed in a waste container as soon as practicable.
- .9 Cleanup:
  - .1 Place dust and asbestos-containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags.
  - .2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.

- .3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.
- .4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.
- .10 From beginning of Work until completion of cleaning operations, air monitoring will be required. The City shall retain an independent, competent (as described in the Safe Work Manitoba 2017 "Guide for Asbestos Management") third party (further referred to herein as the "Hazmat Consultant") to take air samples inside and outside of Asbestos Work Area if deemed necessary to establish the effectiveness of work procedures set forth in the Safe Work Manitoba 2017 "Guide for Asbestos Management".
  - .1 Air sample analysis will be conducted by Phase Contrast Microscopy (PCM) using the NIOSH 7400 method: Asbestos and Other Fibers by PCM for airborne asbestos exposure analysis as per regulatory guidelines.
  - .2 Hazmat Consultant will provide report of site inspections and air monitoring results within 24-hours of sample collection.
  - .3 Contractor will be notified to Stop Work and correct procedures if/when PCM measurements indicate airborne fibre concentrations in excess of 0.05 f/cc (when respiratory protection factors are considered).
- .11 If air monitoring shows that areas outside Asbestos Work Area are contaminated, Contractor will be instructed to maintain and clean these areas in same manner as that applicable to Asbestos Work Area
  - .1 Additional cleaning or work of this nature is to be conducted at no additional cost to the Contract.
- .12 Hazmat Consultant will conduct a final visual assessment of the Asbestos Work Area and will provide notification to The City to proceed with demobilization only once acceptable conditions are viewed.

**END OF SECTION**

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**Part 1            General**

**1.1                SUMMARY**

- .1 Refer to the following information (further referred to herein as the "Assessment Reports"), attached in the Appendix of the Specifications, for information pertaining to asbestos-containing materials (ACMs) that have been identified and may require disturbance during the Work:
  - .1 EMC Labs, Inc. Laboratory Report 0194218 (analytical result for one sample of 2'x2' ceiling tile panel).
  - .2 City of Winnipeg "Asbestos Inventory Control" for Pan Am Pool (inspection date October 6, 2016, and associated drawings).
- .2 The Assessment Reports indicate that ACMs including, but not limited to, the following are present:
  - .1 ACMs expected to be impacted by the Work:
    - .1 Cement panel ceiling tiles within the main tank area.
    - .2 Vinyl sheet flooring in various offices.
    - .3 Plaster applied to walls and ceilings.
  - .2 ACMs NOT expected to be impacted by the Work, but potentially present in areas of the Work:
    - .1 Insulation on mechanical pipes (straights and fittings) and ducts.
    - .2 Cement ("transite") pipe.
    - .3 Door jambs (insulated with asbestos-containing insulation).
    - .4 Mastic on pipes and ducts.
    - .5 Exterior stucco.
- .3 Abatement shall be conducted to handle, alter, remove and/or dispose of ACMs as identified in the Assessment Report in accordance with applicable regulations, guidelines, standards and/or best practices for such work, where such identified ACMs will be impacted (handled, altered, damaged, removed) by the Work.
- .4 Contractor is responsible for reviewing plans, specifications and reports such that they understand the locations and amounts of ACMs that will be impacted by the Work of this Contract, and such that appropriate plans and budgets can be included in their overall bids. Inclusion of a particular ACM in this specification is not necessarily confirmation that it will require disturbance, alteration, handling, removal or disposal. The actual methods to be used by the Contractor to complete the general Work of this Project may impact how and to what extent various ACMs will require disturbance, alteration, handling, removal or disposal.
- .5 Unless otherwise determined through risk assessment conducted by the Contractor's qualified person, comply with requirements of this section when performing Work that would be considered "Type 2" asbestos abatement work as defined in the Safe Work Manitoba 2017 "Guide for Asbestos Management". For this project, this is expected to include, but may not be limited to, the following:
  - .1 Using hand methods, hand tools and/or power tools equipped with high-efficiency particulate arresting (HEPA) filtered dust collection systems to create a penetration of less than 0.5 square metres in ACM sheet flooring within a particular room or area (as a single project, without removal of other ACM sheet flooring in the same room or area), where such disturbance is required to complete the Work, and provided that the removal work can be completed within three hours.

- .6 If the project scope changes and removal, breaking, drilling, cutting or otherwise disturbing more ACM sheet flooring in a particular room or area is required (as part of the same project), additional precautions (further to those outlined herein) may be necessary.
  - .1 Any proposed changes to the scope for asbestos abatement are to be provided to the Contract Administrator for review/approval. Proposed changes are to be provided in writing by the Contractor's qualified person. Proposed changes should follow the provisions of the Safe Work Manitoba 2017 "Guide for Asbestos Management."

## **1.2 SECTION INCLUDES**

- .1 Requirements, applicable procedures and personal protective equipment to be utilized during abatement of ACMs as outlined herein.

## **1.3 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 02 82 00.01 - Asbestos Abatement Type 1 Precautions

## **1.4 REFERENCES**

- .1 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .2 Transport Canada (TC)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .3 Government of Manitoba
  - .1 Manitoba Workplace Safety and Health Act and Regulation, including amendments to date of work.
  - .2 Manitoba Hazardous Waste Regulation MR 55/2003.
- .4 Safe Work Manitoba
  - .1 Guide for Asbestos Management, 2017.

## **1.5 DEFINITIONS**

- .1 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .2 Asbestos-Containing Materials (ACMs): materials that contain asbestos in amounts as listed below, and are identified under Existing Conditions including fallen materials and settled dust:
  - .1 A friable material containing 0.1% or greater asbestos;
  - .2 A non-friable material containing 1.0% or greater asbestos; and
  - .3 Vermiculite insulation that contains any asbestos.
- .3 Asbestos Work Area: area where work takes place which will or may disturb ACMs.
- .4 Authorized Visitors: Contract Administrator, and representatives of regulatory agencies.
- .5 Competent worker: in relation to specific work, means a worker who:
  - .1 Is qualified because of knowledge, training and experience to perform the work.

- .2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
- .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .6 Friable Materials: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .7 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
- .8 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .9 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
- .10 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- .11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

## **1.6 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit proof satisfactory to Contract Administrator that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.
- .3 Submit Provincial and/or local requirements for Notice of Project Form.
- .4 Submit proof of Contractor's Asbestos Liability Insurance.
- .5 Submit to Contract Administrator necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.
- .6 Submit proof that all asbestos workers and/or supervisor have received appropriate training from a competent person in the hazards of asbestos exposure, good personal hygiene and work practices while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing. Instruction and training related to respirators includes, at minimum:
  - .1 Fitting of equipment.
  - .2 Inspection and maintenance of equipment.
  - .3 Disinfecting of equipment.
  - .4 Limitations of equipment.
- .7 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration.
- .8 Submit Worker's Compensation Board status and transcription of insurance.

- .9 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
  - .1 Encapsulants.
  - .2 Amended water.
  - .3 Slow drying sealer.
- .10 Submit proof satisfactory to Contract Administrator that employees have respirator fitting and testing. Workers must be fit tested with respirator that is personally issued.

## 1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.
- .2 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with applicable provincial occupational health and safety regulations.
  - .2 Safety Requirements: worker and visitor protection.
    - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
      - .1 Full-facepiece powered, air purifying respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
      - .2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.
    - .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
    - .4 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp

wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.

- .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .7 Visitor Protection:
  - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
  - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
  - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials 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 Collect and separate for disposal packaging material in appropriate on-site bins for recycling.
- .4 Separate for reuse and recycling and place in designated containers steel, metal, and/or plastic waste.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mil bags or leak proof drums. Label containers with appropriate warning labels.
- .9 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

## **1.9 EXISTING CONDITIONS**

- .1 Reports and information pertaining to ACMS to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification in Appendix A, and/or are available from the Contract Administrator.
- .2 Notify Contract Administrator of suspected ACM discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Contract Administrator.

**1.10 SCHEDULING**

- .1 Hours of Work: Work times as indicated in Section 01 14 00 - Work Restrictions.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Drop and Enclosure Sheets:
  - .1 Polyethylene: 0.15 mm thick.
  - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material.
- .3 Waste Containers: contain waste in two separate containers.
  - .1 Inner container: 0.15 mm thick sealable polyethylene bag.
  - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
  - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.
- .4 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
- .5 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
  - .1 Sealer: flame spread and smoke developed rating less than 50.
- .6 Encapsulant: penetrating type conforming to CAN/CGSB-1.205.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Asbestos abatement work is to be completed in general accordance with the requirements of the Safe Work Manitoba 2017 "Guide for Asbestos Management". Where discrepancies exist between that document and these specifications, the more stringent will apply.
- .2 Do construction occupational health and safety in accordance with applicable provincial occupational health and safety regulations.
- .3 Notification to Manitoba Workplace Safety and Health to be completed prior to work resulting in the potential release of ACMs.
- .4 Work Areas:
  - .1 Shut off and isolate air handling and ventilation systems to prevent fibre dispersal to other building areas during work phase. Conduct smoke tests to ensure that duct work is airtight. Seal and caulk joints and seams of active return air ducts within Asbestos Work Area.

- .1 Lock Out Tag Out will be conducted in accordance with applicable regulations and The City's protocols. All affected persons will be notified, including The City's central control, as well as any facility staff, users or contractors present.
- .2 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum equipment.
- .3 The spread of dust from the work area to be prevented by:
  - .1 Using enclosures of polyethylene or other suitable material that is impervious to asbestos (including, if the enclosure material is opaque, one or more transparent window areas to allow observation of the entire work area from outside the enclosure), if the work area is not enclosed by walls.
  - .2 Using curtains of polyethylene sheeting or other suitable material that is impervious to asbestos, fitted on each side of each entrance or exit from the work area.
- .4 Put negative pressure system in operation and operate continuously from time first polyethylene is installed to seal openings until final completion of work including final cleanup. The system to maintain a negative air pressure, relative to the area outside the enclosed area. The system to be inspected and maintained by a competent person prior each use to ensure that there is no air leakage, and if the filter is found to be damaged or defective, it to be replaced before the ventilation system is used.
  - .1 Negative air units are to be dioctyl phthalate (DOP) tested on-site, prior to installation/use, with test results provided to Contract Administrator for review.
- .5 Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.
- .6 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Cover floors first so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting.
- .7 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
- .8 At each access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)".
- .9 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall Authority having jurisdiction.
- .10 Where application of water is required for wetting asbestos containing materials, shut off electrical power, provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.
- .11 After preparation of work areas and Decontamination Enclosure Systems, for the removal of all other asbestos containing materials, remove within work area and dispose of as contaminated waste in specified containers. Spray asbestos debris and immediate work area with amended water to reduce dust, as work progresses.

- .5 Construction of Decontamination Enclosures:
  - .1 Build suitable framing for enclosures or use existing rooms where convenient, and line with polyethylene sheeting sealed with tape.
  - .2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
- .6 Maintenance of Enclosures:
  - .1 Maintain enclosures in tidy condition.
  - .2 Ensure that barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
  - .3 Visually inspect enclosures at beginning of each working period.
  - .4 Use smoke methods to test effectiveness of barriers when directed by Contract Administrator.
- .7 Do not begin Asbestos Abatement work until:
  - .1 Arrangements have been made for disposal of waste.
  - .2 For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.
  - .3 Work area[s] and decontamination enclosures are effectively segregated.
  - .4 Tools, equipment, and materials waste containers are on hand.
  - .5 Arrangements have been made for building security.
  - .6 Warning signs are displayed where access to contaminated areas is possible.
  - .7 Notifications have been completed and other preparatory steps have been taken.

### **3.2 SUPERVISION**

- .1 Minimum of one Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

### **3.3 PROCEDURES**

- .1 Before removing asbestos:
  - .1 Prepare site.
  - .2 Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- .2 Remove saturated asbestos material in small amounts. Do not allow saturated asbestos to dry out. As it is being removed pack material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination area, and store in a holding area pending removal to Unloading Room and outside. Ensure that containers are removed from holding area by workers who have entered from uncontaminated areas dressed in clean coveralls.

- .4 After completion of removal work, wire brush, HEPA vacuum and/or wet-sponge surfaces from which asbestos has been removed to remove visible material.
- .5 Where Contract Administrator decides complete removal of asbestos containing material is impossible due to obstructions such as structural members or major service elements, and provides written direction, encapsulate material as follows:
  - .1 Apply penetrating type sealer to penetrate existing sprayed asbestos surfaces uniformly to substrate.
- .6 After removal of visible asbestos, and after encapsulating asbestos containing material impossible to remove, wet clean entire work area including Equipment and Access Room, and equipment used in process. After 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After second 24 hour period under same conditions, clean these areas and objects again using HEPA vacuum followed by wet cleaning. After inspection by Contract Administrator apply continuous coat of slow drying sealer to surfaces of work area. Allow at least 16 hours with no entry, activity, ventilation, or disturbance other than operation of negative pressure units during this period.
- .7 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .8 Cleanup:
  - .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
  - .2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
  - .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
  - .4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.
  - .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

### **3.4 AIR MONITORING**

- .1 From beginning of Work until completion of cleaning operations, The City will retain an independent, competent (as described in the Safe Work Manitoba 2017 "Guide for Asbestos Management") third party (further referred to herein as the "Hazmat Consultant") to take air samples inside and outside of Asbestos Work Area in accordance with the recommendations set forth in the Safe Work Manitoba 2017 "Guide for Asbestos Management".
  - .1 Air samples will be collected and analyzed in accordance with NIOSH method 7400.
  - .2 Air sample results will be provided to the Contractor within 24-hours of sample collection.

- .3 Analysis will be conducted by qualified persons or laboratories that take part in a documented QA/QC program for such analysis.
- .2 Contractor will be notified to stop Work when airborne fibre measurements exceed 0.05 fiber/cubic centimetre (f/cc), when PPE and protection factors are considered, and to correct procedures.
  - .1 Additional monitoring will be conducted, where possible, to verify procedural corrections were effective.
- .3 If air monitoring shows that areas outside Asbestos Work Area are contaminated as determined by the Hazmat Consultant, Contractor will be notified to maintain and clean these areas in same manner as that applicable to Asbestos Work Area, at no additional cost to the Contract.
- .4 In instances where enclosures are used, post-abatement testing will be completed by the Hazmat Consultant.
  - .1 After Asbestos Work Area has passed visual inspection by the Hazmat Consultant and acceptable coat of lock-down agent has been applied to surfaces within enclosure by the Contractor, and appropriate setting period has passed, the Hazmat Consultant will perform air monitoring within Asbestos Work Area.
    - .1 Final air monitoring results must show fibre levels of less than 0.01 f/cc.
    - .2 If air monitoring results show fibre levels in excess of 0.01 f/cc, Contractor will re-clean work area and apply another acceptable coat of lock-down agent to surfaces, at no additional cost to Contract.
    - .3 Repeat as necessary until fibre levels are less than 0.01 f/cc, at no additional cost to Contract.
  - .2 Contractor will be provided with authorization to remove enclosure structures upon receipt of acceptable air sample results.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in electrical sections.

**1.2                REFERENCE STANDARDS**

- .1        Underwriter's Laboratories of Canada (ULC)
  - .1        ULC-S115, Fire Tests of Firestop Systems.
- .2        National Building Code of Canada (NBC).

**1.3                DEFINITIONS**

- .1        Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through 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 noncombustible construction or have "0" annular space in buildings of combustible construction.
  - .1        Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

**1.4                ACTIONS/INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2        Product data: manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's installation instructions and special handling criteria, installation sequence.
- .3        Shop drawings: show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .4        Samples: submit duplicate 4" x 4" samples showing actual fire stop material proposed for project.

**1.5                QUALITY ASSURANCE SUBMITTALS**

- .1        Submit 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.

- .1 The certification documents must be received by the Contract Administrator prior to the Contract Administrator issuing the certificate for Substantial Performance of the Work.
- .3 Manufacturer's Field Reports: submit to manufacturer's written reports within three days of review, verifying compliance of Work, as described Article 3.5.

## **1.6 QUALITY ASSURANCE**

- .1 Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- .2 Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- .3 A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done in accordance with manufacturer's written recommendations published in their literature and drawing details.
- .4 Qualifications:
  - .1 Company: specializing in fire stopping installations with at least one of the following qualifications:
    - .1 FM 4991 Approved Contractor.
    - .2 UL Approved Contractor.
    - .3 Manufacturer accredited fire stop specialty applicator.
  - .2 Installers: person with not less than 3 years documented experience with fire stop installation and approved/trained by manufacturer.

## **1.7 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 indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Comply with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.9 SITE CONDITIONS**

- .1 Do not use materials that contain flammable solvents.
- .2 Scheduling
  - .1 Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.

- .2 Schedule installation of drop-in firestop devices after placement of concrete but before installation of the pipe penetration. Diameter of sleeved or cored hole to match the listed system for the device
- .3 Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- .3 Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- .4 Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- .5 During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## **Part 2 Products**

### **2.1 FIRE STOP SYSTEMS - GENERAL**

- .1 Use only fire stop materials that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- .2 Provide fire stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience.
- .3 Provide components for each fire stopping system that are needed to install fill material. Use only components specified by the fire stopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- .4 Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.
- .5 Penetrations in Smoke Barriers: Provide fire stopping with ratings determined in accordance with ULC S115.
  - .1 L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- .6 Mould Resistance: Provide penetration fire stopping with mould and mildew resistance rating of 0 as determined by ASTM G21.

### **2.2 MATERIALS**

- .1 Fire stopping and smoke seal systems: in accordance with ULC S115.
  - .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.
- .2 Service penetration assemblies: certified by ULC in accordance with ULC S115 and listed in ULC Guide No. 40 U19.
- .3 Service penetration fire stop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.
- .11 Pre-installed firestop devices for use with non-combustible and combustible pipes (closed and open systems), conduit and/or cable bundles penetrating concrete floors and/or gypsum walls:
  - .1 Cast-in-place firestop device.
  - .2 Tub box kit for use with tub installations.
  - .3 Cast-in-place firestop device for use with noncombustible penetrants.
  - .4 Speed sleeve for use with cable penetrations.
  - .5 Firestop drop-in device for use with noncombustible and combustible penetrants.
  - .6 Firestop block.
- .12 Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls:
  - .1 Speed sleeve with integrated smoke seal fabric membrane.
  - .2 Firestop sleeve
  - .3 Retrofit sleeve for use with existing cable bundles.
  - .4 Gangplate for use with multiple cable management devices.
  - .5 Gangplate cap for use at blank openings in gangplate for future penetrations.
- .13 Sealants or caulking materials for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT):
  - .1 Intumescent firestop sealant.
  - .2 Firestop silicone sealant self-leveling.
  - .3 Fire foam.
  - .4 Flexible firestop sealant.
  - .5 Firestop silicone sealant gun grade.
- .14 Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
  - .1 Firestop silicone sealant gun grade.
  - .2 Flexible firestop sealant.
  - .3 Intumescent firestop sealant.
  - .4 Firestop silicone sealant self-leveling.
- .15 Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
  - .1 Firestop joint spray
  - .2 Firestop silicone sealant gun grade
  - .3 Flexible firestop sealant
  - .4 Firestop silicone sealant self-leveling
- .16 Pre-formed mineral wool designed to fit flutes of metal profile deck; as a backer for spray material.
  - .1 Speed plugs.
  - .2 Speed strips.

- .17 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
  - .1 Intumescent firestop sealant.
- .18 Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
  - .1 Intumescent firestop sealant.
  - .2 Fire foam.
  - .3 Firestop silicone sealant gun grade.
  - .4 Flexible firestop sealant.
- .19 Non curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
  - .1 Firestop putty stick
  - .2 Firestop plug
- .20 Wall opening protective materials for use with cul. / ulc listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
  - .1 Firestop putty pad
  - .2 Firestop box insert
- .21 Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems) tested to 50 pa. Differential, the following products are acceptable:
  - .1 Firestop collar
  - .2 Firestop collar
  - .3 Wrap strips
- .22 Materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - .1 Firestop mortar
  - .2 Firestop block
  - .3 Fire foam
  - .4 Firestop board
- .23 Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
  - .1 Firestop block
  - .2 Firestop board
- .24 Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
  - .1 Firestop joint spray
  - .2 Elastomeric firestop sealant
  - .3 Flexible firestop sealant
  - .4 Self-leveling firestop sealant
- .25 For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
  - .1 Firestop block (for walls and floors)
  - .2 Firestop plug (for walls and floors)
  - .3 Cast-in place firestop device (for floors only)
- .26 For penetrations through a fire separation wall provide a fire stop system with a "f" rating as determined by ULC or cUL as indicated below:

Time	Required ULC or cUL "F" Rating of Firestopping Assembly
30 minutes	20 minutes
45 minutes	45 minutes
1 hour	45 minutes
1.5 hours	1 hour
2 hours	1.5 hours
3 hours	2 hours
4 hours	3 hours

For combustible pipe penetrations through a Fire Separation provide a firestop system with a "F" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.

- .27 For penetrations through a Fire Wall or horizontal Fire Separation provide a firestop system with a "FT" Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.
- .28 Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

### 2.3 IDENTIFICATION

- .1 Provide warning sign or self-adhesive sticker at each fire stop location, containing the following information:
  - .1 The words "Fire Rated Assembly" or similar warning that the opening has been fire stopped.
  - .2 Fire stop system used (ULC or cUL).
  - .3 Fire stop system rating.
  - .4 Product(s) used.
  - .5 Name and phone number of initial installer.
  - .6 Date of initial installation.
  - .7 Date, name and phone number of person or company responsible for re-penetration of assembly (allow several lines).

## Part 3 Execution

### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thickness and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces. Remove stains on adjacent surfaces.

### **3.3 INSTALLATION**

- .1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to a neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.
- .6 Install identification plate or sticker adjacent to each fire stop system assembly. Complete all information using non-erasable ink.

### **3.4 SPECIAL REQUIREMENTS**

- .1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:
  - .1 Non dust generation: at all locations.
  - .2 Movement: 25% at building expansion and control joints.
  - .3 Designed for re-entry, removable at: cable trays.
  - .4 L-rating at non-fire resistance rated smoke separations.
- .2 Acoustically rated fire stop systems:
  - .1 Where fire stopping is required in acoustically (sound) rated walls, partitions, and floor assemblies use fire stopping systems with a sound transmission classification (STC) not less than the classification specified for the assembly.
  - .2 Sound transmission classifications tested and certified to ASTM E 90.

### **3.5 FIELD QUALITY CONTROL**

- .1 Inspections: notify Contract Administrator when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Deficiencies:
  - .1 Prior to Substantial Performance of the Work inspect fire stopping work, prepare a deficiency list and submit to Contract Administrator. Repair deficiencies and request Contract Administrator's review of the Work.
  - .2 Notify Contract Administrator when ready for review and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .3 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.

### **3.6 CLEAN UP**

- .1 Proceed in accordance with Section 01 74 00 - 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.

**3.7 SCHEDULE**

- .1 Fire stop and smoke seal at existing fire separations affected by electrical work:
  - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
  - .2 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
  - .3 Openings and sleeves installed for future use through fire separations.
  - .4 Around mechanical and electrical assemblies penetrating fire separations.
- .2 Smoke seals for smoke separations at existing fire separations affected by electrical work:
  - .1 Use elastomeric sealant (fire stop caulking) to provide smoke seals in smoke separations at:
    - .1 Penetrations (pipes, ducts, conduit, wiring and other penetrations).
  - .2 Apply sealant on both sides of separation where applicable. Elastomeric sealant does require a fire stop system rating, but is required to effectively seal smoke separations from passage of smoke in the event of a fire.

**END OF SECTION**

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**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C423, Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - .2 ASTM E1264, Standard Classification for Acoustical Ceiling Products
- .2 Canadian Standards Association (CSA)
  - .1 CSA B111, Wire Nails, Spikes and Staples.
- .3 Underwriter Laboratories of Canada (ULC)
  - .1 CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

**1.2 ACTION / INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples: provide duplicate 300 x 300 mm size sample of each type acoustical unit.
- .3 Product data: manufacturers' product data for each specified acoustical tile describing physical and performance characteristics, sizes, patterns, colours.
- .4 Shop drawings: indicate panel layouts, location of different colours/fabrics, edge treatment, mounting details.

**1.3 QUALITY CONTROL**

- .1 Mock-ups:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up minimum 10 m<sup>2</sup> minimum to indicate method of assembly, installation and fixing. Construct mock-up on site where directed by Contract Administrator.
  - .3 Allow 24 hours for review of mock-up by Contract Administrator before proceeding with work.
  - .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

**1.4 MAINTENANCE MATERIALS**

- .1 Provide additional acoustical units for maintenance use amounting to two panels of each size required for project.
- .2 Provide sufficient adhesive to install extra material provided.
- .3 Additional materials to be from same production run as installed materials.
- .4 Clearly identify each package of acoustical units including colour and type, and each container of adhesive.
- .5 Deliver to site and store as directed by Contract Administrator. Provide written receipt, signed by Subcontractor, verifying delivery.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Comply with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.6 SITE CONDITIONS**

- .1 Ambient Conditions

- .1 Commence installation after building enclosed and dust generating activities are completed.
- .2 Permit wet work to dry prior to commencement of installation.
- .3 Maintain uniform minimum temperature of 15°C and relative humidity of 20- 40% prior to, during and after installation.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Acoustical construction products must:
  - .1 not require being labelled as poisonous, corrosive, flammable or explosive under the Consumer Chemical and Container Regulations of the Hazardous Products Act.
  - .2 be accompanied by detailed instructions for proper handling and installation so as to minimize health concerns.
- .2 Acoustic Units: to ASTM E1264, Type XII, Form, Pattern E, Class A
  - .1 Acceptable Product: Sound Concepts, Shapes, Euromat
  - .2 Finish: Fine textured.
  - .3 Thickness, 50 mm
  - .4 Flame Spread Rating: 20 or less
  - .5 Smoke Developed: 30 or less.
  - .6 Noise reduction coefficient (NRC): 1.05
  - .7 Light Reflectance: LR 92.5
  - .8 Edge: Square
    - .1 Colour: Selected by Contract Administrator from manufacturer's standard colour range.
    - .2 Size: As indicated on drawings.
    - .3 Shape: Flat
    - .4 Minimum 50% post-consumer recycled core.
- .3 Staples, nails and screws: To CSA B111, non-corrosive finish, type recommended by acoustic unit manufacturer.
- .4 Wall Panel Clips: Two-part, concealed, metal Z-Clips with factory installed impale clips.
  - .1 Acceptable Product: Sound Concepts
- .5 Choose finishes and manufacturers of products with recycling potential and which demonstrate environmental responsibility.
- .6 When repainting or touching up acoustic panels, request from manufacturer appropriate paints to maintain the unit's noise reduction properties and select most environmentally responsible.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Ensure substrate surface is straight to tolerance of plus or minus 3 mm over 3 000 mm.
- .2 Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- .3 Install acoustic units to clean, dry and firm substrate using manufacturers recommended impaling system.
- .4 Install acoustic units plumb and aligned. Arrange units symmetrical on each wall as indicated on drawings.

**3.2 CLEANING**

- .1 Keep acoustic installation and all components clean. Remove blemishes immediately.

**3.3 PROTECTION**

- .1 Use polyethylene to protect finished acoustical wall treatment from damage.
- .2 Remove prior to substantial performance.

**3.4 SCHEDULE**

- .1 See drawings for sizes and locations of panels.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C423, Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - .2 ASTM E1264, Standard Classification for Acoustical Ceiling Products
- .2 Canadian Standards Association (CSA)
  - .1 CSA B111, Wire Nails, Spikes and Staples.
- .3 Underwriter Laboratories of Canada (ULC)
  - .1 CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

**1.2 ACTION / INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples: provide duplicate 300 x 300 mm size sample of each type acoustical unit.
- .3 Product data: manufacturers' product data for each specified acoustical tile describing physical and performance characteristics, sizes, patterns, colours.
- .4 Shop drawings: indicate panel layouts, location of different colours/fabrics, edge treatment, mounting details.

**1.3 QUALITY CONTROL**

- .1 Mock-ups:
  - .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up minimum 10 m<sup>2</sup> minimum to indicate method of assembly, installation and fixing. Construct mock-up on site where directed by Contract Administrator.
  - .3 Allow 24 hours for review of mock-up by Consultant before proceeding with work.
  - .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

**1.4 MAINTENANCE MATERIALS**

- .1 Provide additional acoustical units for maintenance use amounting to two panels of each size required for project.
- .2 Provide sufficient fasteners to install extra material provided.
- .3 Additional materials to be from same production run as installed materials.
- .4 Clearly identify each package of acoustical units including colour and type.
- .5 Deliver to site and store where directed. Provide written receipt, signed by Subcontractor, verifying delivery.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Comply with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.6 SITE CONDITIONS**

- .1 Ambient Conditions
  - .1 Commence installation after building enclosed and dust generating activities are completed.

- .2 Permit wet work to dry prior to commencement of installation.
- .3 Maintain uniform minimum temperature of 15°C and relative humidity of 20- 40% prior to, during and after installation.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Acoustical construction products must:
  - .1 not require being labelled as poisonous, corrosive, flammable or explosive under the Consumer Chemical and Container Regulations of the Hazardous Products Act.
  - .2 be accompanied by detailed instructions for proper handling and installation so as to minimize health concerns.
- .2 Acoustic Units: to ASTM E1264, Type XII, Form, Pattern E, Class A
  - .1 Acceptable Product: Sound Concepts, Shapes, Euromat
  - .2 Finish: Fine textured.
  - .3 Thickness, 25 mm
  - .4 Flame Spread Rating: 20 or less
  - .5 Smoke Developed: 30 or less
  - .6 Noise reduction coefficient (NRC): 1.05
  - .7 Light Reflectance: LR 92.5
  - .8 Edge: Square
    - .1 Colour: Selected by Contract Administrator from manufacturer's standard colour range.
    - .2 Size: As indicated on drawings.
    - .3 Shape: Flat
    - .4 Minimum 50% post-consumer recycled core.
- .3 Staples, nails and screws: to CSA B111, non-corrosive finish, type recommended by acoustic unit manufacturer.
- .4 Panel Clips: Factory installed concealed impale clip.
  - .1 Acceptable Product: Sound Concepts Impalit Clip
- .5 Suspension System: As recommended by manufacturer.
- .6 Choose finishes and manufacturers of products with recycling potential and which demonstrate environmental responsibility.
- .7 When repainting or touching up acoustic panels, request from manufacturer appropriate paints to maintain the unit's noise reduction properties and select most environmentally responsible.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Ensure substrate surface is straight to tolerance of plus or minus 3 mm over 3 000 mm.
- .2 Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- .3 Install acoustic units to clean, dry and firm substrate using manufacturers recommended impaling system.
- .4 Hook-over clip to be used for suspending acoustical ceiling panels.
  - .1 Hook-over clip to be mechanically fastened to impaling system
  - .2 Hook-over clip to be installed on 24 mm T-bar and hanger wire.

- .5 Install acoustic units plumb and aligned. Arrange units symmetrical on each ceiling bay as indicated on drawings.

**3.2 CLEANING**

- .1 Keep acoustic installation and all components clean. Remove blemishes immediately.

**3.3 PROTECTION**

- .1 Use polyethylene to protect finished acoustical ceiling treatment from damage.
- .2 Remove prior to substantial performance.

**3.4 SCHEDULE**

- .1 See drawings for sizes and locations of panels.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCE STANDARDS**

- .1 International Standards Organization (ISO)
  - .1 ISO12944-5:2007, Paints and varnishes -- Corrosion protection of steel structures by protective paint systems -- Part 5: Protective paint systems.
- .2 Master Painters Institute (MPI)
  - .1 Architectural Painting Specifications Manual. (2014)
- .3 Society for Protective Coatings (SSPC)
  - .1 Systems and Specifications Manual, SSPC Painting Manual, Volume Two.
- .4 Environmental Protection Agency (EPA)
  - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
  - .2 SW-846, Test Method for Evaluating Solid Waste, Physical/Chemical Methods.
- .5 American Society for Testing and Materials (ASTM).
  - .1 ASTM D4541-17, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
  - .2 ASTM D4752-10(2015), Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
  - .3 ASTM D7091-13, Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used on project.
- .3 Samples:
  - .1 Submit full range colour sample chips in accordance with Section 01 33 00 - Submittal Procedures. Indicate where colour availability is restricted.
  - .2 Submit duplicate 300 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
    - .1 50 mm concrete block for finishes over concrete or masonry surfaces.
  - .3 When approved, sample panels shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

**1.3 CLOSEOUT SUBMITTALS**

- .1 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 MPI Environmentally Friendly classification system rating.
  - .4 Manufacturer's Material Safety Data Sheets (MSDS).

#### **1.4 QUALITY ASSURANCE**

- .1 The Contractor will have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.
- .3 Conform to latest MPI requirements for painting work including preparation and priming.
- .4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.
- .5 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .6 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Contract Administrator
- .7 Standard of Acceptance:
  - .1 Walls, doors and other vertical surfaces: no defects visible from a distance of 1 m at 90° to surface.
  - .2 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area and shall be acceptable to Contract Administrator.
- .8 Mock-ups:
  - .1 Provide mock-up in accordance with Section 01 45 00 - Quality Control.
  - .2 When requested by Contract Administrator, prepare and paint surface, area, room or item (in each colour scheme) to requirements specified, with specified paint or coating showing selected colours, 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.

#### **1.5 ENVIRONMENTAL PERFORMANCE REQUIREMENTS**

- .1 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

#### **1.6 EXTRA MATERIALS**

- .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Submit one - four litre can of each type and colour of primer and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Deliver to the Contractor and store where directed by Contract Administrator.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Labels shall clearly 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 a well-ventilated area with temperature range 7°C to 30°C.
- .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Contract Administrator After completion of operations, return areas to clean condition to approval of Contract Administrator
- .10 Remove paint materials from storage only in quantities required for same day use.
- .11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .12 Fire Safety Requirements:
  - .1 Provide one 9 kg Type ABC 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.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - /Demolition Waste Management and Disposal, and Waste Reduction Work Plan.
- .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 number of contaminants entering waterways, sanitary/storm drain systems or into 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 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.

## 1.9 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
  - .2 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 °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 Coordinate use of existing ventilation system with the Contractor and ensure its operation during and after application of paint as required.
  - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  - .6 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities shall be provided by the Contractor.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless specifically pre-approved by the Contract Administrator, and the applied product manufacturer, perform no painting work when:
    - .1 Ambient air and substrate temperatures are below 10°C.
    - .2 Substrate temperature is over 32°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 The relative humidity is above 85% or when the dew point is less than 3°C variance between the air/surface temperature.
    - .5 Rain or snow is 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 the maximum moisture content of the substrate exceeds:
    - .1 12% for concrete and masonry (clay and concrete brick/block).
  - .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 surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
  - .1 Apply paint finish only in areas where dust is no longer being generated by related operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
  - .3 Apply paint only when previous coat of paint is dry or adequately cured.
- .4 Additional Interior Application Requirements:
  - .1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
  - .2 Apply paint in occupied facilities in accordance with approved schedule. Schedule operations to approval of the Contract Administrator such that painted surfaces will have dried and cured sufficiently before occupants are affected.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems shall be products of a single manufacturer.

### **2.2 COLOURS**

- .1 Contract Administrator will provide Colour Schedule after receipt of product data.
- .2 Contract Administrator will select colours and determine total number of colours to be used on project and their locations.
- .3 Selection of colours may be from several different manufacturers. Match colour samples exactly regardless of manufacturer.
- .4 Second coat in a 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 Contract Administrator's written permission.
- .2 Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- .4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Contract Administrator
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

### **2.4 GLOSS/SHEEN RATINGS**

- .1 Paint gloss is defined as sheen rating of applied paint.

- .2 Gloss levels in accordance with MPI Architectural Painting Specifications Manual, defined as follows:

Gloss Level	Description	Gloss @ 60°	Sheen @ 85°
G1	traditional matte finish - flat	Max. 5 units	Max. 10 units
G2	high hide sheet flat - 'velvet-like'	Max. 10 units	10 - 35 units
G3	traditional 'eggshell-like'	10 - 25 units	10 - 35 units
G4	'satin-like'	20 - 35 units	Min. 35 units
G5	traditional semi-gloss	35 - 70 units	
G6	traditional gloss	70 - 85 units	
G7	high gloss	< 85 units	

**2.5 INTERIOR PAINTING SYSTEMS**

**2.6 SPECIAL FINISHES**

- .1 Existing Concrete Surfaces:
- .1 Two coats, one component, acrylic epoxy eggshell coating.
    - .1 Acceptable Product: Pitt-Glaze 16-310 Waterbased epoxy as manufactured by PPG. Industries Inc.

**Part 3 Execution**

**3.1 GENERAL**

- .1 Perform preparation and operations for painting in accordance with MPI Painting Specifications Manual requirements, except where indicated otherwise.
- .2 Apply paint materials in accordance with paint manufacturers' written application instructions.
- .3 Paint all new work, except prefinished items or where indicated otherwise.

**3.2 EXISTING CONDITIONS**

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Contract Administrator 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 Contract Administrator
- .3 Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

**3.3 PROTECTION**

- .1 Protect building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Contract Administrator.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Remove electrical cover plates, light fixtures, surface hardware on doors, signs and signage, bath accessories and other surface mounted equipment, fittings and fastenings

prior to undertaking any painting operations. Store items and re-installed after painting is completed.

- .5 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Contract Administrator.

### **3.4 CLEANING AND PREPARATION**

- .1 Prepare existing concrete surfaces in accordance with manufacturer's recommendations
- .2 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - .1 Powerwash to remove any soluble salts, dust and dirt.
  - .2 Allow surfaces to drain completely and allow to dry thoroughly.
  - .3 Use trigger operated spray nozzles for water hoses.
- .3 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.
- .4 Do not apply paint until prepared surfaces have been accepted by Contract Administrator.

### **3.5 APPLICATION**

- .1 Method of application shall be acceptable to Contract Administrator.
- .2 Apply paint by brush, roller, airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
- .3 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.
  - .5 Remove runs, sags and brush marks from finished work and repaint.
- .4 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 all runs and sags.
  - .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .5 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

- .6 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .7 Painting coats specified are intended to cover surface completely. If necessary apply additional coats until satisfactory coverage is obtained. Provide additional coats at not additional cost to Contract.
- .8 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .9 Sand and dust between coats to remove visible defects.
- .10 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.
- .11 Apply one coat of primer sealer to wall surfaces to receive wall surfaces concealed behind acoustical walls.
- .12 Finish wall surfaces that will be concealed behind wall hung fixtures and equipment such as cabinets and visual display boards. Use same finish formula specified for visible portion of wall.
- .13 Do not paint nameplates, signage, fire labels, or other markers or signs indicated to remain.
- .14 Clean shop applied paint surfaces that become marked. Touch up with primer and paint as required.

### **3.6 RESTORATION**

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

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

### **3.8 PROTECTION**

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

**3.9 SITE TESTS/INSPECTIONS**

- .1 Application of the epoxy coating system, c as specified in Article 2.6 Special Finishes, to be inspected by a NACE certified inspection agency.
- .2 Frequency and timing of testing and inspections as follows:
  - .1 Epoxy Coating: minimum 14 days after application.
- .3 Acceptable Testing Agency:
  - .1 Canadian Quality Inspections (CQI); 125 Higgins Avenue Winnipeg, MB R3B 0B6. Contact: Jeff Wyness. Tel: 204-663-7775. Email: [jwyness@cqinspections.ca](mailto:jwyness@cqinspections.ca).
- .4 Testing and inspection to include:
  - .1 Primer and epoxy coating system:
    - .1 Surface preparation
    - .2 Visual inspection
    - .3 Adhesion Testing - ASTM D4541
    - .4 Dry Film Thickness (DFT) – SSPC PA2 and ASTM D7091
    - .5 Cure Test- ASTM D4752
    - .6 Environmental conditions as specified in determined by the coating manufacturers coating system
- .5 Cost for inspection and testing shall be paid by Contractor.

**END OF SECTION**

**PART 1 General**

**1.1 GENERAL**

- .1 This Section covers items common to Sections of Division 26. This section supplements requirements of Division 01.

**1.2 CODES AND STANDARDS**

- .1 Do complete installation in accordance with the current edition of the Canadian Electrical Code, Provincial, Municipal, and other codes, rules and regulations and requirements of local authorities having jurisdiction.
- .2 Install overhead and underground systems in accordance with CSA C22.3 No.1 (current edition).

**1.3 VOLTAGE RATINGS**

- .1 Operating voltages: to the current edition of CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

**1.4 PERMITS, FEES AND INSPECTION**

- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay associated fees.
- .3 Contract Administrator will provide drawings and specifications required by Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Contract Administrator of changes required by Electrical Inspection Department prior to making changes.
- .5 Furnish Certificates of Acceptance from authorities having jurisdiction on completion of work to Contract Administrator.

**1.5 SHOP DRAWINGS**

- .1 Submit shop drawings, product data and samples in accordance with Division 01. The submission shall be reviewed, signed and processed as described in Division 01.
- .2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
- .3 Where applicable, include wiring, line and schematic diagrams. Include wiring drawings or diagrams showing interconnection with work of other Sections.
- .4 Content
  - .1 Shop drawings submitted title sheet.

- .2 Data shall be specific and technical.
- .3 Identify each piece of equipment.
- .4 Advertising literature will be rejected.
- .5 The project and equipment designations shall be identified on each document.
- .5 Coordination
  - .1 Where electrical equipment requires support or backing by other trades or mechanical connections, the shop drawings shall also be circulated through the other "services" Contractor(s) prior to submission to the Contract Administrator.

## **1.6 DRAWINGS AND MEASUREMENTS**

- .1 Drawings are generally diagrammatic, are intended to indicate the scope and general arrangement of work and are not detailed installation drawings. Do not scale the drawings.
- .2 Consult the architectural drawings and details for exact locations of fixtures and equipment. Obtain this information from the Contract Administrator where definite locations are not indicated.
- .3 Take field measurements, where equipment and material dimensions are dependent upon building dimensions.

## **1.7 PROJECT COORDINATION**

- .1 Check drawings of all trades to verify space and headroom limitations for work to be installed. Coordinate work with all trades and make changes to facilitate a satisfactory installation. Make no deviations to the design intent involving extra cost to the City, without the Contract Administrator's written approval.
- .2 The drawings indicate the general location and route to be followed by the electrical services. Where details are not shown on the drawings or only shown diagrammatically, the services shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All services in the ceiling shall be kept as tight as possible to beams or other limiting members at high level. All electrical services shall be coordinated in elevation to ensure that they are concealed in the ceiling or structural space provided unless detailed otherwise on drawings.
- .3 Work out jointly all interference problems on the site and coordinate all work before fabricating, or installing any material or equipment. Where necessary, produce interference/coordination drawings showing exact locations of electrical systems or equipment within service areas, shafts and the ceiling space. Distribute copies of the final interference/coordination drawings to the Contract Administrator and all affected parties.
- .4 Ensure that all materials and equipment fit into the allotted spaces and that all equipment can be properly serviced and replaced, if and when required. Advise the Contract Administrator of space problems before installing any material or equipment. Demonstrate to the Contract Administrator on completion of the work that all equipment installed can be properly, safely serviced and replaced, if and when required.

## **1.8 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:

- .1 Lamacoid 3 mm thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .3 Allow for average of twenty-five (25) letters per nameplate.
- .4 Identification to be English.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

**1.9 WIRING IDENTIFICATION**

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

**1.10 CONDUIT AND CABLE IDENTIFICATION**

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

**1.11 WIRING TERMINATIONS**

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

**1.12 MANUFACTURERS AND CSA LABELS**

- .1 Visible and legible, after equipment is installed.

**1.13 WARNING SIGNS**

- .1 As specified and to meet requirements of Electrical Inspection Department and Contract Administrator.
- .2 Minimum size 175 x 250 mm.

**1.14 WARRANTY**

- .1 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the Division 01.
- .2 Take note of any extended warranties specified.
- .3 Furnish a written warranty stating that all work executed under this Division will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance.
- .4 Promptly investigate any electrical or control malfunction, and repair or replace all such defective work, and all other damages thereby which becomes defective during the time of the warranty.

**1.15 EXAMINATION**

- .1 Examine the documents for details of work included. Obtain a written clarification in the event of conflict within the specification, between the specification and the drawing, in the drawing, or between drawings and/or specifications of different divisions. Obtain written clarification from the Contract Administrator if work affecting the installation is not clear. Where this is not done in advance, allow in the bid sum for providing the most costly alternative.
- .2 Prior to commencing with work, check and examine site conditions including existing services, obtain and confirm site and building dimensions. Notify the Contract Administrator, in writing, of any and all matters, which could prejudice the proper execution of work. Commencement of Work, or any part thereof, constitutes acceptance of site conditions and indicates that dimensions and conditions have been verified and are acceptable. Layout main lines and levels of work in relation to designated reference points and bench marks. Be responsible for movement and/or damage of reference points and benchmarks.

**1.16 RESPONSIBILITIES**

- .1 Ensure that equipment does not transmit noise and/or vibration to other parts of the building, as a result of poor installation practice.
- .2 Where the Contract Documents do not contain sufficient information for the proper selection of equipment for bidding, notify the Contract Administrator during the bidding

period. If clarification is not obtainable, allow for the most expensive arrangement. Failure to do this shall not relieve the Contractor of responsibility to provide the intended equipment.

- .3 Protect equipment and material from the weather, moisture, dust and physical damage.
- .4 Cover equipment openings and open ends of conduit, piping and pullboxes as work progresses. Failure to do so will result in the Trade being required to adequately clean or replace materials and equipment at no extra cost to the City.
- .5 Protect all existing services encountered. Obtain instructions from the Contract Administrator when existing services require relocation or modification.
- .6 Restore damaged or marred factory finish to factory quality.
- .7 The specifications and drawings form an integral part of the Contract Documents. Neither the drawings nor the specifications shall be used alone. Work omitted from the drawings but mentioned or reasonably implied in the specifications, or vice versa, shall be considered as properly and sufficiently specified and shall be provided. Misinterpretation of any requirement of either plans or specifications shall not relieve this Contractor of the responsibility of properly completing his/her trade to the approval of the Contract Administrator.

#### **1.17 STANDARD OF ACCEPTANCE**

- .1 Standard of Acceptance means that item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.
- .2 Where two or more manufacturers are listed, the manufacturer's name shown first or underlined or shown with a model name and/or number was used in preparing the base design. Bids may be based on any one of those named, provided that they meet every aspect of the base design and every aspect of the drawings and specifications.
- .3 Where other than the first named or the underlined manufacturer or scheduled/specified manufacturer is selected or approved, include for the cost of any resulting work (both under this Division and other Divisions) and any necessary redesign of installation or structure.
- .4 A visible manufacturer's nameplate shall indicate manufacturer's name, model number, serial number, capacity data, electrical characteristics and approval stamps.

#### **1.18 OPERATION AND MAINTENANCE DATA**

- .1 Provide operation and maintenance data for incorporation into maintenance manual specified in Division 01 and as follows:
- .2 Include in operations and maintenance data:
  - .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.
  - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

- .3 Wiring and schematic diagrams.
- .4 Names and addresses of local suppliers for items included in maintenance manuals.
- .3 Include in the manual the following major sections:
  - .1 Title page (in plastic cover).
  - .2 Comprehensive description of the operation of the systems, including the function of each item of equipment within the system.
  - .3 Detailed instructions for the normal maintenance of all systems and equipment installed including procedures and frequency of operational checks and service and trouble shooting instructions.
  - .4 Local source of supply for each item of equipment.
  - .5 Wiring and control diagrams.
  - .6 Spare parts list.
  - .7 Copies of guarantees and certificates.
  - .8 Manufacturer's maintenance brochures and shop drawings.
- .4 The manual information shall be bound in a three "D-ring" hard back reinforced vinyl covered ("bar lock" post type where more than 50mm rings required) binder c/w index tab separators to divide the different sections.
- .5 Submit a draft copy to the Contract Administrator for approval thirty (30) days prior to start up of the systems and equipment.
- .6 Submit three (3) copies in the final approved form.

#### **1.19 PROJECT RECORD DRAWINGS**

- .1 Provide project record documents as specified in Division 01 as further called for in this Division.
- .2 During the construction period, keep on Site a clean set of drawings marked up to reflect the "As-Built" state, for examination by the Contract Administrator on a regular basis. Include elevations and detailed locations of buried services, empty conduit systems and junction and pull boxes.

### **PART 2 Products**

#### **2.1 MATERIALS AND EQUIPMENT**

- .1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Department.
- .2 Factory assemble control panels and component assemblies.

#### **2.2 SPRINKLER PROOF REQUIREMENTS**

- .1 All equipment and wiring systems shall be sprinklerproof standard where sprinkler fire protection systems are installed.
- .2 In rooms where electrical equipment is installed surface mounted, electrical equipment contained in these rooms to be protected by non-combustible driphoods, shields, and

gasketed doors as applicable to inhibit water ingress into electrical equipment. Exposed conduits connected to equipment to utilize watertight connectors. Top entry to be avoided where possible

### **2.3 FINISHES**

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
  - .1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1-1955.
  - .2 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.
- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

## **PART 3 Execution**

### **3.1 WORKMANSHIP**

- .1 Workmanship shall be in accordance with well established practice and standards accepted and recognized by the Contract Administrator and the Trade.
- .2 The Contract Administrator shall have the right to reject any item of work that does not conform to the Contract Documents and accepted standards of performance, quietness of operation, finish and appearance.

### **3.2 LOCATION OF OUTLETS**

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

### **3.3 MOUNTING HEIGHTS**

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify with Contract Administrator before proceeding with installation.
- .3 Confirm mounting heights of new electrical equipment, unless specifically indicated.

### **3.4 FIELD QUALITY CONTROL**

- .1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks -

the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

- .2 The work of this division to be carried out by a Contractor who holds a valid Master Electrical Contractor license as issued by the Province that the work is being constructed.
- .3 Conduct and pay for following tests:
  - .1 Circuits originating from branch distribution panels.
  - .2 Lighting and its control.
  - .3 Systems: public address.
- .4 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .5 Insulation resistance testing.
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .3 Check resistance to ground before energizing.
- .6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .7 Submit test results for Contract Administrator's review.

### **3.5 CLEANING**

- .1 Do final cleaning in accordance with Division 01.
- .2 At time of final cleaning, clean lighting reflectors, lenses and other lighting surfaces that have been exposed to construction dust and dirt. Remove finger prints from reflective surfaces.
- .3 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .4 Clean and prime paint exposed non-galvanized hangers, racks, fastenings to prevent rusting. Coordinate finish painting with Division 09.

### **3.6 CARE, OPERATION AND START-UP**

- .1 Instruct operating personnel in the operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

**END OF SECTION**

- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

**END OF SECTION**

**PART 1 General**

**1.1 SECTION INCLUDES**

- .1 Materials and installation for wire and box connectors.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-C22.2No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  - .2 CSA C22.2No.65, Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .3 National Electrical Manufacturers Association (NEMA)

**PART 2 Products**

**2.1 MATERIALS**

- .1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of suitable material sized to fit conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors as required to: CAN/CSA-C22.2No.18.

**PART 3 Execution**

**3.1 INSTALLATION**

- .1 Remove insulation carefully from ends of conductors and:
  - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
  - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.
  - .3 Install fixture type connectors and tighten. Replace insulating cap.

**END OF SECTION**

**PART 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

**1.2 REFERENCES**

- .1 CSA C22.2 No .0.3, Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No. 131, Type TECK 90 Cable.

**PART 2 Products**

**2.1 BUILDING WIRES**

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

**2.2 TECK CABLE**

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors:
  - .1 Grounding conductor: copper.
  - .2 Circuit conductors: copper, size as indicated.
- .3 Insulation:
  - .1 Type: ethylene propylene rubber.
  - .2 Chemically cross-linked thermosetting polyethylene rated type RW90, 600 V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: interlocking aluminum.
- .6 Overall covering: polyvinyl chloride material.
- .7 Fastenings:
  - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  - .2 Channel type supports for two or more cables.
  - .3 Threaded rods: 6 mm dia. to support suspended channels.
- .8 Connectors:
  - .1 Watertight, approved for TECK cable.

**PART 3 Execution**

**3.1 INSTALLATION OF TECK CABLE 0 -1000 V**

- .1 Install cables.
  - .1 Group cables wherever possible on channels.
- .2 Install cable in trenches in accordance with Section 26 05 44.
- .3 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - 0 - 1000 V.

**END OF SECTION**

**PART 1      General**

**PART 2      Products**

**2.1          JUNCTION AND PULL BOXES**

- .1      Welded steel construction with screw-on flat covers for surface mounting.
- .2      Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

**2.2          CABINETS**

- .1      Type E: sheet steel, hinged door and return flange overlapping sides, handle, lock and catch, for surface mounting.
- .2      Type T: sheet steel cabinet, with hinged door, latch, lock, 2 keys, containing 19 mm plywood backboard for surface mounting.

**PART 3      Execution**

**3.1          JUNCTION, PULL BOXES AND CABINETS INSTALLATION**

- .1      Install pull boxes in inconspicuous but accessible locations.
- .2      Mount cabinets with top not higher than 2 m above finished floor.
- .3      Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

**3.2          IDENTIFICATION**

- .1      Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2      Install size 2 identification labels indicating system name voltage and phase.

**END OF SECTION**

**PART 1 General**

**1.1 REFERENCES**

- .1 CSA C22.1, Canadian Electrical Code, Part 1.

**PART 2 Products**

**2.1 OUTLET AND CONDUIT BOXES GENERAL**

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.

**2.2 SHEET STEEL OUTLET BOXES**

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
- .3 102 mm square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished walls.

**2.3 CONDUIT BOXES**

- .1 Cast FS or FD boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

**2.4 FITTINGS - GENERAL**

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

**2.5 SERVICE FITTINGS**

- .1 'High tension' receptacle fitting made of 2 piece die-cast aluminum with brushed aluminum housing finish for two duplex receptacles. Bottom plate with two knockouts for centered or offset installation.

**PART 3 Execution**

**3.1 INSTALLATION**

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.

**END OF SECTION**

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**PART 1      General**

**1.1      REFERENCES**

- .1 Canadian Standards Association (CSA)
  - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
  - .2 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
  - .3 CSA C22.2 No. 83, Electrical Metallic Tubing.
  - .4 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

**PART 2      Products**

**2.1      CONDUITS**

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .2 Rigid pvc conduit: to CSA C22.2 No. 211.2.
- .3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

**2.2      CONDUIT FASTENINGS**

- .1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits.
- .4 Threaded rods, 6 mm dia., to support suspended channels.

**2.3      CONDUIT FITTINGS**

- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
- .2 Factory "ells" where 90E bends are required for 25 mm and larger conduits.

**2.4      FISH CORD**

- .1 Polypropylene.

**PART 3      Execution**

**3.1      INSTALLATION**

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

- .3 Use electrical metallic tubing (EMT) except in cast concrete.
- .4 Use rigid pvc conduit underground and in cast concrete.
- .5 Use flexible metal conduit for connection to motors.
- .6 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .7 Minimum conduit size: 19 mm.
- .8 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .9 Mechanically bend steel conduit over 19 mm dia.
- .10 Install fish cord in empty conduits.
- .11 Run 2-50 mm spare conduits up to ceiling space and 2-50 mm spare conduits down to ceiling space below, basement, or crawlspace (as applicable) from each flush panel. Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type box.
- .12 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .13 Dry conduits out before installing wire.

**3.2 SURFACE CONDUITS**

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended channels.
- .5 Do not pass conduits through structural members except as permitted by the Contract Administrator.
- .6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

**3.3 CONCEALED CONDUITS**

- .1 Run parallel or perpendicular to building lines.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCES**

- .1    American National Standards Institute (ANSI)
  - .1    ANSI C82.1, Electric Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
  - .2    ANSI C82.4, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.
- .2    American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  - .1    ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.

**1.2                SHOP DRAWINGS AND PRODUCT DATA**

- .1    Submit shop drawings in accordance with Section 26 05 01 – Common Work Results - Electrical.
- .2    Light fixtures shop drawings shall include, but not be limited to the following information:
  - .1    Luminaire voltage
  - .2    Luminaire lumens
  - .3    Luminaire dimensions
  - .4    Construction materials
  - .5    Mounting methods
  - .6    Fixture dimensions
  - .7    Luminaire power consumption (in watts, including driver / ballast losses)
  - .8    Luminaire photometry
  - .9    Luminaire warranty
- .3    In addition to Section 1.2.4 of this specification, LED light fixture shop drawing shall include, but not be limited to the following information:
  - .1    LED color temperature
  - .2    Anticipated fixture lifespan based on L80
- .4    Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for approval by Contract Administrator.
- .5    Photometric data to include: spacing criterion.

**1.3                MANITOBA HYDRO POWER SMART**

- .1    Submit all required information to complete initiated by the Contract Administrator Manitoba Hydro Power Smart Commercial Lighting Program or equivalent Province of Manitoba program application on behalf of City.
- .2    Coordinate with MB Hydro or other applicable agency for pre-approval prior to purchase of any lighting products.
- .3    Advise Contract Administrator if any lighting is deemed by MB Hydro or other applicable agency to be ineligible.

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**Part 2 Products**

**2.1 LAMPS AND LIGHT SOURCES**

- .1 All new luminaires shall be complete with lamps where applicable.
- .2 All LED light sources shall be 4000K and minimum 80 CRI unless noted otherwise.
- .3 Correlated Color Temperature of LEDs in LED fixtures shall be in compliance with ANSI C78.377-2015.

**2.2 BALLASTS AND DRIVERS**

- .1 LED driver:
  - .1 Integral with luminaire, unless otherwise indicated or approved by Contract Administrator.
  - .2 Where remote drivers are used, confirm acceptable location prior to rough-in.

**2.3 LUMINAIRES**

- .1 Provide luminaires in accordance with the Luminaire Schedule.
- .2 Coordinate fixture mounting methods with reflected ceiling plan and drawing details. Include all necessary hardware to mount fixtures at locations indicated on the drawings. Confirm exact luminaire locations where not clearly shown.
- .3 Where indicated on the drawings, provide a mockup installation of the luminaires to demonstrate performance and ease of access for servicing. Make adjustments to the installation as directed by the Contract Administrator. Provide mockup sufficiently early to allow for adequate time for any necessary design adjustments and subsequent fabrication and delivery of materials to the site in time to maintain the project schedule.
- .4 Where lighting fixtures are controlled by low voltage lighting control system, fixtures shall be complete with necessary hardware to connect directly to the lighting control system. Ensure compatibility of luminaire drivers with lighting control prior to ordering materials.
- .5 Luminaires including drivers to be covered by a 10-year manufacturer warranty.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Locate and install luminaires and controls as indicated on electrical and interior design drawings.

**3.2 WIRING**

- .1 Connect luminaires and light controls to lighting circuits.

**3.3 LUMINAIRE SUPPORTS**

- .1 For suspended ceiling installations support luminaires from ceiling structure in accordance with local inspection requirements.

**3.4 LUMINAIRE ALIGNMENT**

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

**END OF SECTION**

**Part 1            General**

**1.1                SCOPE OF RESPONSIBILITY**

- .1    The Electrical Subcontractor is to provide a complete and functional operating sound system for the pickup, amplification, distribution, and reproduction of voice and/or other audio material.
- .2    The system shall be a centralized networked system to accommodate required service and future expansion.
- .3    All equipment, materials, and labour required to fulfill the above work shall be supplied regardless of whether they are specifically detailed herein or on the drawings.
- .4    The complete audio system shall be balanced and tuned to the satisfaction of the City of Winnipeg prior to final acceptance.
- .5    All terminations, Panels and controls shall be suitably labeled and documented. All room curves, tuned room curves and all interconnection and control setting documentation shall be included in the operating manuals.
- .6    Work under this Contract shall include all labour, materials, equipment, tools, and services required for and incidental to the completion of a Sound System as specified including, but not limited to the following:
  - .1    Supply, installation, testing and adjustment of all sound system components including but not limited to loudspeakers, amplifiers, signal processing, all other electronics, microphones, cable, wiring, terminal strips, switching gear, outlet jacks, etc.
  - .2    Supply and installation of approved framing/support systems for loudspeakers and loudspeaker components.
  - .3    Maintaining site records and preparing shop drawings, record drawings, and Operating and Maintenance Manuals.
  - .4    Removal and disposal of the existing main pool speaker array, the 35 spherical ceiling speakers above the pool tank, and all other existing PA equipment and associated wiring throughout the building that will no longer be in use upon completion of installation of the new PA system.
  - .5    All existing paging speakers will be replaced, unless otherwise noted.
- .7    Provide a suitably sized UPS to power the sound system.

**1.2                SYSTEM REQUIREMENTS**

- .1    The Building Paging System will be a Networked (Dante) audio system comprised of seven (7) zone-able speaker groups + All Call.
- .2    Paging will be initiated from a networked paging microphone to be located at the Lobby Reception desk.
- .3    All existing paging speakers will be replaced, unless otherwise noted.
- .4    Speakers will be added to areas as required to ensure pages can be heard and understood in all spaces.

- .5 The audio system will have an input available for a City supplied background music source.
- .6 The audio system will have the capability of muting upon receipt of a control input from the FACP (Fire Alarm Control Panel)
- .7 All background music and local audio will be muted during an All Call page.
- .8 The system will be capable of intelligible paging as well as reproduction of background music and foreground music.
- .9 The Main Pool deck will be provided with six (6) networked connection points that will facilitate the connection of Dante audio I/O modules.
- .10 These modules will provide both mic and line level inputs as well as audio output.
- .11 The speaker system for the Main Pool area will be distributed to ensure intelligibility and even coverage.
- .12 The Shallow End of the Main Tank, Training Tank and Kiddie Pool Speakers will remain and be incorporated into the new system via a Dante connection to the central system.
- .13 The user interface for the Audio system will be a Crestron 3 SERIES control system with 10" Touchscreen.
- .14 The system will include a rack-mountable CD/Network Player equipped with a USB input and a Bluetooth receiver. The player will be capable of playing audio files in all common formats, compact discs, and online streams from mobile devices and network sources.

### **1.3 SUBMITTALS**

- .1 Submit equipment shop drawings for Contract Administrator's review.

### **1.4 SUPPORT SERVICES**

- .1 Not applicable.

## **Part 2 Products**

### **2.1 MATERIALS**

#### **.1 LOUDSPEAKERS**

- .1 Type 1- Flush mount speaker assembly -Washrooms, corridors, meeting rooms, washrooms, change rooms, front lobby.
  - .1 Dual cone, 25 watt 8" (205mm) loudspeaker with a 10oz. (260g) ceramic magnet, a curvilinear, treated paper cone for lower harmonic distortion, a 1" diameter copper voice coil with a black anodized aluminum former, a factory installed 25/70.7V line matching transformer with tap selections ranging from .25 to 5 watts.
  - .2 Speaker is to operate within a frequency response range of 45Hz - 19kHz (nominal) with a sensitivity of 97dB and a dispersion angle of 105°.

- .3 The speaker assembly to include a factory installed CRS baffle with concealed loudspeaker mounting studs and screw mount hardware.
- .4 The Speaker enclosure is to be furnished with four combination conduit knockouts 1/2" – 3/4" (13-19mm), four J-clips and two flexible perforated mounting straps. One-piece CRS construction, undercoated, patch-jute lined, and finished in epoxy.
- .5 The tile bridge is to be constructed of 24-gauge CRS with an electrogalvanized rust-resistant finish.
- .6 The flush speaker shall be: Atlas SD722WKit or approved equal in accordance with B6.
- .2 Type 2- 8" Surface Mount Square Speaker Assembly
  - .1 8" Speaker Diameter-8"
    - .1 Depth-2 3/4"
    - .2 Magnet weight-6 Oz.
    - .3 Frequency response-±6dB 100 - 16 kHz 1" 1K
    - .4 Voice coil diameter Dispersion-1K - 6dB angle 98°
    - .5 Impedance-8 Ohms
    - .6 Sensitivity (1 watt/1 meter)- 89dB ±3dB 1W 1M
    - .7 Power handling-15 watts/RMS
  - .2 Transformer Model Number-ET10
    - .1 Watts/RMS-10
    - .2 Primary Voltage-70/25V
    - .3 Primary Taps in Watts - 70V .31, .62, 1.25, 2.5, 5, 10 .31, .62, 2.5, 5, 10
  - .3 Insertion Loss-1.3dB
  - .4 Frequency Response-60 to 15kHz
  - .5 EBB8SS 8 inch square surface mount backbox
  - .6 12 7/8 inches X 12 7/8 inches X 4 inches, White
  - .7 ETBS T-bar support bars 23 3/4 inches 3/4 inch
  - .8 The speaker assembly shall be: Enforcer E86CWT10SABB speaker assembly or approved equal in accordance with B6.
- .3 Type 3-Paging Horns
  - .1 The weatherproof unit shall be double re-entrant type design with audio power capability of 15 Watts. Frequency response shall be 400Hz–6kHz (±5dB)
  - .2 Sound pressure level shall be 103
  - .3 dB measured at 1 watt / 1 meter. Sound dispersion shall be 80 degrees. Models shall be equipped with a 25V/70.7V transformer having impedance selection via a seven-position switch.
  - .4 Model GA-15T shall have power taps of: .5, 1, 2, 4, & 8 on 25V line and 1, 2, 4, 8 & 15 on 70.7V line.
  - .5 A multi-position surface mounting bracket shall allow for adjustment on the vertical and horizontal planes. Unit shall be constructed of high-impact plastic and finished in gray.
  - .6 The paging horn shall be: Atlas GA15T or approved equal in accordance with B6.
- .4 Type 4-8" Flush Ceiling Speaker, Waterproof

- .1 8" in-ceiling coaxial loudspeaker with 70.7v 8-watt transformer, baffle, and hydrophobic treatment coating
  - .2 Speaker Type-treated paper
  - .3 Sensitivity-98 dB @ 1 watt/1 mtr
  - .4 Frequency Response-70Hz-15K Hz
  - .5 Power Taps-1,2,4,8 watts
  - .6 Dispersion-120 degrees
  - .7 Depth-2 7/8"
  - .8 Diameter-8"
  - .9 Safety Listed 1480, 2043
  - .10 Baffle-62-8 style CRS baffle
  - .11 Back Box- CS95-8 enclosure
  - .12 The speaker shall be: Atlas DD87W-HC or approved equal in accordance with B6
- .5 Type 5-3 Way Weatherproof Sound Reinforcement Speaker
- .1 The loudspeaker system shall be a horn-loaded, three-way, full-range triaxial design with two 12" Ferrofluid-cooled woofers treated with moisture repellent on a bass horn, one 2" exit Ferrofluid-cooled midrange compression driver with a nonmetallic diaphragm and one 1" exit HF driver with a titanium diaphragm mounted on respective fiberglass horns built within the bass horn.
  - .2 Drivers shall be connected to an integral crossover with crossover frequencies of 600 Hz and 3.5 kHz and integral multi-stage, self-resetting, over-current protection circuitry using a combination of a fast-acting relay, solid state thermal limiting circuit and high positive current coefficient resistors.
  - .3 The input connection shall be one 16-2 12-foot (4m) SJOW Cable with stripped ends.
  - .4 The loudspeaker enclosure shall be an integral double-wall weather-sealed white fiberglass bell with a three-layer weather-resistant grille. The marine-grade aluminum grille shall be powder coated with a zinc-rich epoxy dual-layer powder coating process, color to match the enclosure.
  - .5 The system shall have an IEC 60529 IP rating of IP55W (with a minimum 5° downward aiming angle).
  - .6 There shall be five 1/2"-13 threaded mounting points.
  - .7 The system shall have an amplitude response of 70 Hz to 16.5 kHz, input capability of 40V RMS, 103 dB sensitivity at 1W/1m and 4 ohms nominal impedance.
  - .8 The nominal dispersion shall be 60°H x 60°V from 1250 Hz to 10 kHz.
  - .9 The speaker shall be: Community R2077Z or approved equal in accordance with B6.
- .6 Type 6-Coaxial Surface Mt, Weatherproof Sound Reinforcement Speaker
- .1 Transducers: LF - 1 x 6.5" carbon ring cone; coaxial HF - 1 x 1.25" exit compression driver
  - .2 Operating Range: 90 Hz - 16 kHz
  - .3 Sensitivity (1W/1m): 94 dB
  - .4 Power Handling: 150W continuous @ 8 ohms
  - .5 Continuous Max Output: 117 dB (123 dB Peak)
  - .6 70V/100V Autoformer: 120W, 60W, 30W, 15W (@ 70V only)

- .7 Nominal Beamwidth (H x V): 100° x 100° (conical)
- .8 Finish: White ABS matte plastic, paintable with dual-layer powder-coated steel with NeverWet™ treated grille
- .9 The speaker shall be Community R.15 COAX or approved equal in accordance with B6
- .7 Type 7-Pendant Speaker
  - .1 Transducers: LF -1 x 8", HF - 1 x 1.25" exit compression driver
  - .2 Operating Range: 60Hz – 22 kHz
  - .3 Sensitivity (1W/1m): 95 dB
  - .4 Power Handling: 150W continuous @ 8 ohms
  - .5 Continuous Max Output: 117 dB (123 dB Peak)
  - .6 70V/100V Autoformer: 120W, 60W, 30W, 15W (@70V only)
  - .7 Nominal Beamwidth (H x V): 115° Conical
  - .8 Finish: white paintable ABS matte plastic, dual-layer powder-coated steel grille
  - .9 The pendant speaker shall be: Community DP8-B or approved equal in accordance with B6
- .8 Type 8-Weatherproof Exterior Paging Horn
  - .1 Power rating: 30W
  - .2 Frequency response: 350Hz–7.5kHz (±5dB)
  - .3 Sensitivity SPL (1w/1m): 106dB
  - .4 Dispersion: 60°
  - .5 Power Taps: 25 Volts: 1, 2, 4, 8, & 15; 70.7V Volts: 2, 4, 8, 15, & 30
  - .6 The horn shall be Atlas GA-30T or approved equal in accordance with B6
- .2 POWER AMPLIFICATION – MAIN POOL
  - .1 The power amplifier(s) shall provide eight discrete channels of amplification. Each channel shall be capable of independently driving either low-impedance or high-impedance (70V/100V) loads.
  - .2 The output circuit topology shall be Class D, with up to over 90% efficiency.
  - .3 The amplifier shall draw 250 W or less at 1/8 rated power into 4 ohms.
  - .4 The amplifier shall have a function of Double Power mode, which doubles output of each channel when low-impedance connections are used.
  - .5 The amplifier shall support the Audinate's digital audio network Dante.
  - .6 Maximum total output of all eight channels shall be 2,240W.
  - .7 Each channel shall deliver maximum continuous output power as follows: 280W into 8 ohms; 280W into 4 ohms; 560W into 8 ohms in Double Power mode; 560W into 4 ohms in Double Power mode; or 250W into a high impedance (70V/100V) load.
  - .8 The voltage gain shall be as follows: 31.7dB into 8 ohms; 34.7dB into 8 ohms in Double Power mode; 38.2dB at 100V line; 35.2dB at 70V line.
  - .9 The amplifier shall be capable of meeting the following performance criteria: Input sensitivity shall be +4dBu (1.23V) into 8 ohms; Signal-to-noise ratio shall be greater than 100dB; Total harmonic distortion (THD+N) shall be less than 0.2% at 1kHz, half power; Frequency response shall be 20Hz to 20kHz, +1.0/-1.0dB at 1W into 8 ohms or a high impedance (100V/70V) load; Maximum input level shall be +24dBu; Inputs shall be electronically balanced, with a minimum impedance of 20 kilohms balanced and 10 kilohms unbalanced.

- .10 The following controls and indicators shall be provided on the front panel of the amplifier. An AC power switch shall be provided for power on/off. A rotary encoder and a FUNCTION button shall be provided to change the operation mode. A MUTE button shall be provided for muting on/off. The LED indicators shall indicate POWER, ALERT, Dante signals (PRIMARY, SECONDARY, SYNC) and PANEL LOCK. SELECT buttons and additional LED indicators shall be provided for each channel, which indicate PROTECTION, LIMIT, SIGNAL and MUTE.
  - .11 The following connectors and controls shall be provided on the rear panel of the amplifier. The input connectors shall be electronically balanced, 6-pin Euroblock connectors. The speaker output connectors shall be barrier strip screw connectors. The Network connector shall be a 100BASE-TX Ethernet connector that allows the amplifier to be connected to a computer via an Ethernet cable. Two RJ45 connectors with the Dante format shall be provided for digital input/output and network that allow the amplifier to be connected via a standard Ethernet cable to another Dante-equipped device such as mixing consoles, processors, additional amplifiers or output expanders. Two 3-pin Euroblock connectors shall be provided for a REMOTE connector and a FAULT OUTPUT connector. The Rotary switch shall be provided for specify the UNIT ID that identifies each unit individually when multiple devices such as amplifiers and processors are connected. The DIP-switches shall be provided for device setup (UNIT ID, LED DIMMER, PANEL LOCK, IP SETTING or START UP MODE) and output setting (Low-impedance, High-impedance or Double Power mode).
  - .12 The power supply shall be a universal type (AC line input between 100V and 240V at 50Hz or 60Hz) and shall be equipped with Power Factor Correction, which ensures harmonic control and decrease the amount of current draw while maintaining the same output power. The built-in protection circuitry shall monitor heat, voltage and current levels to minimize potential damage from overloads.
  - .13 The speaker output shall be muted if the heat sink of the amplifier section exceeds 90°C or the impedance falls below rated, which restored automatically.
  - .14 The analog circuits shall be shut down if the power supply section exceeds 100°C.
  - .15 The amplifier shall be cooled by two temperature-controlled, 3-step speed fans for minimum acoustic noise, with air flow from front-to-back.
  - .16 The amplifier shall be approved for use as specified by CE, UL and the FCC.
  - .17 The amplifier shall conform to the latest EU RoHS hazardous substances and WEEE directives.
  - .18 The amplifier shall be the Yamaha XMV8280-D.
- .3 POWER AMPLIFICATION - DISTRIBUTED BUILDING PAGING
- .1 The power amplifier(s) shall provide eight discrete channels of amplification. Each channel shall be capable of independently driving either low-impedance or high-impedance (70V/100V) loads.
  - .2 The output circuit topology shall be Class D, with up to over 90% efficiency.
  - .3 The amplifier shall draw 250 W or less at 1/8 rated power into 4 ohms.
  - .4 The amplifier shall have a function of Double Power mode, which doubles output of each channel when low-impedance connections are used.
  - .5 The amplifier shall support the Audinate's digital audio network Dante.
  - .6 Maximum total output of all eight channels shall be 2,240W.
  - .7 Each channel shall deliver maximum continuous output power as follows: 280W into 8 ohms; 280W into 4 ohms; 560W into 8 ohms in Double Power mode; 560W

- into 4 ohms in Double Power mode; or 250W into a high impedance (70V/100V) load.
- .8 The voltage gain shall be as follows: 31.7dB into 8 ohms; 34.7dB into 8 ohms in Double Power mode; 38.2dB at 100V line; 35.2dB at 70V line.
  - .9 The amplifier shall be capable of meeting the following performance criteria: Input sensitivity shall be +4dBu (1.23V) into 8 ohms; Signal-to-noise ratio shall be greater than 100dB; Total harmonic distortion (THD+N) shall be less than 0.2% at 1kHz, half power; Frequency response shall be 20Hz to 20kHz, +1.0/-1.0dB at 1W into 8 ohms or a high impedance (100V/70V) load; Maximum input level shall be +24dBu; Inputs shall be electronically balanced, with a minimum impedance of 20 kilohms balanced and 10 kilohms unbalanced.
  - .10 The following controls and indicators shall be provided on the front panel of the amplifier. An AC power switch shall be provided for power on/off. A rotary encoder and a FUNCTION button shall be provided to change the operation mode. A MUTE button shall be provided for muting on/off. The LED indicators shall indicate POWER, ALERT, Dante signals (PRIMARY, SECONDARY, SYNC) and PANEL LOCK. SELECT buttons and additional LED indicators shall be provided for each channel, which indicate PROTECTION, LIMIT, SIGNAL and MUTE.
  - .11 The following connectors and controls shall be provided on the rear panel of the amplifier. The input connectors shall be electronically balanced, 6-pin Euroblock connectors. The speaker output connectors shall be barrier strip screw connectors. The Network connector shall be a 100BASE-TX Ethernet connector that allows the amplifier to be connected to a computer via an Ethernet cable. Two RJ45 connectors with the Dante format shall be provided for digital input/output and network that allow the amplifier to be connected via a standard Ethernet cable to another Dante-equipped device such as mixing consoles, processors, additional amplifiers or output expanders. Two 3-pin Euroblock connectors shall be provided for a REMOTE connector and a FAULT OUTPUT connector. The Rotary switch shall be provided for specify the UNIT ID that identifies each unit individually when multiple devices such as amplifiers and processors are connected. The DIP-switches shall be provided for device setup (UNIT ID, LED DIMMER, PANEL LOCK, IP SETTING or START UP MODE) and output setting (Low-impedance, High-impedance or Double Power mode).
  - .12 The power supply shall be a universal type (AC line input between 100V and 240V at 50Hz or 60Hz) and shall be equipped with Power Factor Correction, which ensures harmonic control and decrease the amount of current draw while maintaining the same output power. The built-in protection circuitry shall monitor heat, voltage and current levels to minimize potential damage from overloads.
  - .13 The speaker output shall be muted if the heat sink of the amplifier section exceeds 90°C or the impedance falls below rated, which restored automatically.
  - .14 The analog circuits shall be shut down if the power supply section exceeds 100°C.
  - .15 The amplifier shall be cooled by two temperature-controlled, 3-step speed fans for minimum acoustic noise, with air flow from front-to-back.
  - .16 The amplifier shall be approved for use as specified by CE, UL and the FCC.
  - .17 The amplifier shall conform to the latest EU RoHS hazardous substances and WEEE directives.
  - .18 The amplifier shall be the Yamaha XMV8280-D.
- .4 DIGITAL SIGNAL PROCESSOR (DSP)

- .1 The matrix processor shall provide eight balanced mic/line inputs on Euroblock connectors, two stereo unbalanced line inputs on RCA connectors, and eight balanced line outputs on Euroblock connectors.
- .2 The mic inputs shall have 48V phantom power.
- .3 The processor shall provide digital inputs and digital outputs via YDIF and Dante network audio on RJ45 connectors.
- .4 The digital I/O shall allow sharing of digital audio with additional processors, amplifiers, I/O expanders and other Dante equipped audio devices.
- .5 All analogue inputs and outputs shall have 24bit/48kHz/44.1kHz AD/DA converters and all internal processing shall be digital (DSP).
- .6 The processor shall have digital audio card slot to make it compatible with other audio formats.
- .7 The processor shall have an SD card slot for playback of MP3/WAV files.
- .8 The processor shall have GPI I/O ports, RS232C and Ethernet port to allow remote control.
- .9 Software shall be provided for connecting and configuring DSP system components within each hardware unit and shall be used to create the system with amplifiers, I/O expanders and remote controllers.
- .10 Available system components shall include matrix mixers, equalizers, gates, compressors, auto gain control, feedback suppressor, priority processors, ducker, speaker processor and reverb/echo.
- .11 Ethernet communications shall be utilized for software control and configuration. Software shall be operated on a PC computer with network card installed, running Windows 7 or above. After initial programming, processors may be controlled via dedicated wall mount controller DCP series, PC software, 3rd party control systems and smart devices.
- .12 The NC rating of the processor shall be 23 and the heat dissipation shall be maximum 55.9 kcal/h.
- .13 The product shall conform to the latest EU RoHS hazardous substances and WEEE directives.
- .14 The Audio Processor shall be Yamaha MTX5-D.
- .5 DANTE I/O PLATES
  - .1 2 gang, 2-in, 2-Out I/O Interface
  - .2 2 channels (in and out) of Dante audio to an existing Dante-based networked audio system.
  - .3 **Inputs:** XLR input with switchable mic/line gain and switchable phantom power on the inputs. Choice of unbalanced input (RCA or 3.5mm stereo jack) selectable by software.
  - .4 **Outputs:** Balanced XLR output (Ch. 1 only) and unbalanced 3.5mm stereo jack (Ch. 1 & 2).
  - .5 **Control:** Audio flow assignment, input gain, phantom power and unbalanced input selection are all controllable via the Dante network connection.
- .6 EQUIPMENT RACK
  - .1 19-inch gangable equipment rack.
  - .2 Model: WRK-\_44-27.
- .7 DANTE PAGING MICROPHONE
  - .1 Dante network support

- .2 8 buttons can be assigned to any functions
- .3 PoE powered
- .4 Yamaha PGM1
- .8 CONTROL PROCESSOR
  - .1 3-Series™ Control Engine
  - .2 Modular programming architecture
  - .3 Onboard 512MB RAM & 4GB Flash memory
  - .4 Expandable storage up to 1TB
  - .5 Rear panel memory card slot
  - .6 High-speed USB 2.0 host port
  - .7 Ethernet and Cresnet® wired communications
  - .8 XPanel with Smart Graphics™ computer and Web based control
  - .9 iPhone®, iPad®, Android™, and Samsung Smart TV® control app support
  - .10 Crestron Fusion™ Enterprise Management Software support
  - .11 SNMP support
  - .12 One RS-232/422/485 COM port with hardware and software handshaking
  - .13 Two RS-232 COM ports with software handshaking only
  - .14 8 IR/serial, 8 relay, and 8 Versiport I/O ports
  - .15 Hardware level security using 802.1x authentication
  - .16 1-space rack-mountable
- .9 TOUCHSCREEN
  - .1 10.1" widescreen active-matrix color display, 1280 x 800 WXGA display resolution.
  - .2 Capacitive touch screen technology.
  - .3 Multi-touch capable
  - .4 Auto-brightness control
  - .5 H.264 or MJPEG streaming video display
  - .6 Single-wire Ethernet connectivity
  - .7 PoE or PoE+ network powered
  - .8 Wall box mounting
- .10 CD/NETWORK PLAYER
  - .1 Compatible media: CD Media, USB flash memory, USB HDD, iPod/iPhone.
  - .2 Playable formats, file systems:
    - .1 CD: CD-DA (CD TEXT), CD-ROM (ISO9660)
    - .2 USB: FAT16/FAT32/HFS+
    - .3 WAV: 16 and 24 bit resolution, 96, 48, and 44.1 kHz sampling frequency
    - .4 AIFF: AIFF and AIF extension, 16 and 24 bit resolution, 96, 48, and 44.1 kHz sampling frequency
    - .5 MP3: M4A extension, AAC-LC compression, 64-320 kbps and VBR bit rate, 48 and 44.1 kHz sampling frequency
  - .3 Number of channels: 2 stereo, 1 mono.

- .4 Audio frequency characteristics: 20 Hz – 20 kHz.
- .5 S/N ratio: above 105 dB.
- .6 Total harmonic distortion: less than 0.005%.
- .7 Dynamic range: more than 105 dB (for 24 bit WAV playback).
- .8 Channel separation: less than -106 dB.
- .9 Variable pitch width: -16% - +16%
- .10 Variable output trim adjustment width: +/- 2.0 dB
- .11 Outputs:
  - .1 Balanced analog out L/R
  - .2 Unbalanced analog out L/R
  - .3 Balanced digital out
  - .4 Unbalanced digital out
  - .5 Headphone out
- .12 Maximum storage capacity: 2 TB.
- .13 Operating temperature: 5 – 35° C.
- .14 Operating humidity: 25 – 85%
- .15 Denon DN-501C or approved equal in accordance with B6.
- .11 INTERNET RADIO PLAYER
  - .1 Grace Digital GDI-IRBM20 or approved equal in accordance with B6.
- .12 BLUETOOTH RECEIVER
  - .1 Atterotech unBT2A or approved equal in accordance with B6, installed in a suitable enclosure.

**Part 3 Execution**

**3.1 SYSTEM COORDINATION**

- .1 Confirm exact location of PA equipment prior to rough-in. Provide backing for adequate equipment support as required.

**3.2 INSTALLATION**

- .1 Install PA equipment in accordance with manufacturer's instructions and recommended practices at locations indicated on the drawings. In case of a conflict between manufacturer's recommendations and Contract Documents, notify the The City prior to proceeding.
- .2 All work shall be supervised at all times by a responsible and qualified supervisor. The same supervisor shall be employed throughout the entirety of the project from start to finish to ensure continuity of the work.
- .3 All work shall be performed in accordance with standard and recommended practices.
- .4 All materials shall be of NEW construction.
- .5 All microphone and line input/output panels, and equipment and controls shall be properly identified with Lamacoid labels.

- .6 All connectors and cabling shall be properly identified using reinforced vinyl film markers to facilitate the operation, maintenance, and trouble-shooting of the sound system.
- .7 All rack wiring and cabling shall be properly dressed and secured with standard hook & strap fasteners (Velcro® or equivalent) in strict adherence to standard broadcast practices.
- .8 All connectors and cable splices shall be fitted with heat shrinkable tubing. General use heat shrinkable tubing shall be irradiated polyolefin. Where a flexible boot or cover is required, or where specified, the heat shrinkable tubing shall be irradiated neoprene rubber.
- .9 All solder connections shall be made with solder having a 3% silver content.
- .10 All equipment including but not limited to loudspeakers, amplifiers, and cables shall be firmly fixed in place except where equipment is specified to be shock-mounted and decoupled from the mounting structure, or where equipment is specified to be portable. Fastenings and supports shall be capable of supporting equipment plus a minimum factor of three (3) times the equipment force load.
- .11 The Electrical Subcontractor shall use caution and take all steps necessary to guard against electromagnetic and electrostatic interference or “hum” within the cabling system.
- .12 The Electrical Subcontractor shall take all steps necessary to ensure that proper ventilation is supplied to equipment areas.
- .13 The Electrical Subcontractor shall take all steps necessary to ensure the integrity of the equipment grounding system.

### **3.3 GROUNDING**

- .1 The sound system shall be complete with an isolated ground bus (master ground bus) complete with #8 AWG to the main building distribution.
- .2 The sound system shall be grounded utilizing a star topology from the master ground bus location.
- .3 The Electrical Subcontractor shall ensure the integrity of the sound grounding system is maintained and isolated. The Subcontractor shall not make or allow any connection from sound equipment to any other ground system.
- .4 The Electrical Subcontractor shall verify the integrity of the sound grounding system at the discretion of the City of Winnipeg and the Contract Administrator.

### **3.4 TESTING**

- .1 The Electrical Subcontractor shall provide all tools and test instrumentation required to perform all tests as specified herein.
- .2 The sound system installation shall be tested in the presence of the Contract Administrator.

- .3 All tests and measurements shall be performed in accordance with industry standard test and measurement procedures.
- .4 Tests conducted shall include but not be limited to:
  - .1 Complete sound system operational check.
  - .2 Loudspeaker phasing.
  - .3 Loudspeaker uniformity of coverage.
  - .4 High frequency / low frequency crossover points.
  - .5 High frequency / low frequency power balance.
  - .6 Check for hum, noise, parasitic oscillation and RF interference at the output of each amplifier.
  - .7 The unequalized house curve with the measurement microphone.
  - .8 The equalized house curve with the measurement microphone.
  - .9 The equalized house curve with the sound system microphone.
  - .10 House curve frequency equalization.
  - .11 Removal of feedback or ring modes.
  - .12 Acoustical gain before feedback.
  - .13 Plotted frequency response at nine (9) specified points in the room.
  - .14 Plotted A-Weighted level measurements at the same nine (9) points (as specified in .13).
  - .15 Subjective listening tests.

### **3.5 FIELD QUALITY CONTROL**

- .1 Submit written report confirming compliance of Work with Contract Documents as a part of the Operations and Maintenance manual.
- .2 Submit a test report as a part of the Operations and Maintenance manual. Test report shall include a brief description of all tests, test results (pass / fail), name and signature of Contract Administrator, names of the City representative(s) in attendance (if applicable), and any notes / observations made during testing.

### **3.6 INSTRUCTION OF OPERATING STAFF**

- .1 Provide trained personnel to instruct staff on maintenance, adjustment and operation of systems and equipment and on maintenance of finishes.
- .2 Provide instruction during regular workweeks prior to acceptance and turnover to staff for regular operation. Allow for three (3) 1-hour long training sessions for different staff teams at a time convenient to the City, including daytime and nighttime sessions. Provide a video recording of a training session for future reference.
- .3 Document attendance at each session and provide list of attendees to the City and the Contract Administrator.

**END OF SECTION**

## **APPENDIX 1**

Asbestos Analysis Report 0194218 PLM EMC Labs Inc.,

Oct 11, 2017

Ceiling Above Main Tank

# EMC LABS, INC.

9830 S. 51st Street, Suite B109, Phoenix, AZ 85044  
Phone: 800-362-3373 or 480-940-5294 - Fax: (480) 893-1726

Laboratory Report  
**0194218**

## Bulk Asbestos Analysis by Polarized Light Microscopy

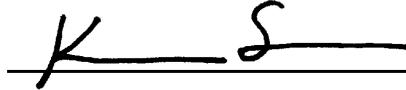
NVLAP#101926-0

Client:	AMEC ENV. & INFRASTRUCTURE	Job# / P.O. #:	WX17950.287	WX17950.287
Address:	440 DOVERCOURT DRIVE	Date Received:	11/10/2017	
	WINNIPEG, MANITOBA R3Y1N4	Date Analyzed:	11/10/2017	
Collected:	11/09/2017	Date Reported:	11/10/2017	
Project Name:	25 POSEIDON BAY PI-13	EPA Method:	EPA 600/R-93/116	
Address:		Submitted By:	ROB HOCHKIEVICH	
		Collected By:		

Lab ID Client ID	Sample Location	Layer Name / Sample Description	Asbestos Detected	Asbestos Type (%)	Non-Asbestos Constituents
0194218-001 1	SOUTHWEST POOL	2' x 2' Ceiling Tile Panel, Gray	Yes	Chrysotile 12%	Cellulose Fiber 3% Carbonates Gypsum Quartz Binder/Filler 85%



Analyst - Kurt Kettler



Signatory - Lab Manager - Ken Scheske

Distinctly stratified, easily separable layers of samples are analyzed as subsamples of the whole and are reported separately for each discernible layer. All analyses are derived from calibrated visual estimate and measured in area percent unless otherwise noted. The report applies to the standards or procedures identified and to the sample(s) tested. The test results are not necessarily indicated or representative of the qualities of the lot from which the sample was taken or of apparently identical or similar products, nor do they represent an ongoing quality assurance program unless so noted. These reports are for the exclusive use of the addressed client and that they will not be reproduced wholly or in part for advertising or other purposes over our signature or in connection with our name without special written permission. The report shall not be reproduced except in full, without written approval by our laboratory. The samples not destroyed in testing are retained a maximum of thirty days. The laboratory measurement of uncertainty for the test method is approximately less than 1 by area percent. Accredited by the National Institute of Standards and Technology, Voluntary Laboratory Accreditation Program for selected test method for asbestos. The accreditation or any reports generated by this laboratory in no way constitutes or implies product certification, approval, or endorsement by the National Institute of Standards and Technology. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Polarized Light Microscopy may not be consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials.

## **APPENDIX 2**

Asbestos Inventory Control - 25 Poseidon Bay,  
The City of Winnipeg,  
January 24, 2018

# ASBESTOS INVENTORY CONTROL



Planning, Property and Development Department  
Municipal Accommodations Division  
4th Floor - 185 King Street • Winnipeg, MB • R3B 1J1

<b>Building Name:</b>	Pan Am Pool - Building	<b>Inspection Date:</b>	January 24, 2018
<b>Building Code:</b>	PI-13	<b>Inspected By:</b>	Will Deller & Ryan Matthews
<b>Building Address:</b>	25 Poseidon Bay	<b>Construction Date:</b>	1967

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
	<b>All Plaster Walls &amp; Ceilings Contain Asbestos</b>		Good	TESTED		1-10	
	<b>All pre Existing Door jams are Insulated with Asbestos Containing Insulation.</b>		Good	TESTED	May'12	20	
	<b>All Red Duct Mastic Contains Asbestos</b>		Good	TESTED	Jan/'18	3	
	<b>Drywall Compound Contains Asbestos in North and South Basement Stairwells</b>		Good	TESTED	Jan/'18	4	
<b>Basement</b>							
	<b>All ACM from Pre-2016 Boilers Removed Prior to Demolition.</b>						
Boiler Room	Duct Insulation	DI	Good	TESTED		40-50	
	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good	TESTED		20-50	
	Pipe Insulation Yellow	PI	Good	TESTED	Jan/'11	65-80	
	Boiler Tanks Inspections Holes	TI	Removed/16	TESTED	Aug/11	3-40	
	Tank Insulation ( Hot Water Tanks )	TI	Removed /11	TESTED	Dec/11	60-75	
	Tank Gasket	TI	Removed/16	TESTED	Aug/11	0	
	Valve - Strainer Gasket	GA	Removed/16	TESTED	Feb'16	75	
	Duct Insulation (Breeching Wrap)	DI	Removed/16	TESTED	Apr/'16	85	
	Boiler Gaskets		Good	TESTED	Sep/'17	60	
	Transite Pipe	TP	Good				
Boiler Tank No.1	Boiler Tanks Inspections Holes (hand holes)	TI*	Removed/16	TESTED	Feb'16	25	
	Burner Cap - Rope Gasket at gas valve	GA	Removed2/16	TESTED	Feb'16	75	
	Burner Cap - Rope Gasket at converter oil valve	GA	Removed/16				75
	Burner Cap - Cementitious material		Removed/16	TESTED	Feb'16	0	
	Mortar, Gasket Seal and Firebrick (on both doors)		Removed/16	TESTED	Feb'16	0	
North Stairwell	Drain Pipe Elbow Insulation	PF	Removed/16	TESTED		0	
	Drywall Compound	DC	Good	TESTED	Jan/'18	4	
Communication Room	9x9 Floor Tile	F9	Removed /13				

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
Pool Engineers Office	Plaster - Ceiling	PL	Good				1-10
<b>Main Floor</b>	<b>All Plaster Walls &amp; Ceilings Contain Asbestos</b>						1-10
Men's Washroom/ Locker Room	Pipe Fitting Insulation	PF	Good				
	Plaster - Ceiling	PL	Good				1-10
Men's Showers	Plaster - Ceiling	PL	Removed/16				
North Stairwell	Plaster - Ceiling	PL	Good				1-10
	Plaster - Walls	PL	Good				1-10
Women's Washroom/Locker Room	Pipe Fitting Insulation ( Inside Of North Wall )	PF	Good				
	Plaster - Ceiling	PL	Good				1-10
Women's Showers	Plaster - Ceiling	PL	Removed				
South Stairwell	Plaster - Ceiling	PL	Good				1-10
	Plaster - Walls	PL	Good				1-10
	Drywall Compound	DC	Good	TESTED	Jan/'18	4	
South Pool Room	Pipe Fitting Insulation	PF	Good				
<b>Second Floor</b>							
<b>Track Exterior Walls/ Elevator Wall</b>	<b>Plaster Walls encapsulated behind retrofitted stucco wall</b>		Good				1-10
<b>Under South Bleachers</b>	<b>All Plaster Walls &amp; Ceilings Contain Asbestos</b>						1-10
West Mechanical Area	Spray On Insulation	SO	Removed/03				
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Good				20-40
	Pipe Mastic	MA	Good				10
	Mastic - Duct	MA	Good	TESTED	Feb/'12	10	
	Plaster - Walls	PL	Good				1-10
	Duct Mastic - Red	MA	Good				3
Canteen & Washrooms	Plaster - Ceiling	PL	Good				1-10
	Plaster - Walls	PL	Good				1-10
Centre Mechanical Area	Spray On Insulation	SO	Removed/03				20-40
	Spray On Insulation (White Fiberglass)	SO	Good	TESTED	Jan/'18	0	
	Pipe Fitting Insulation	PF	Good				
	Pipe Mastic	MA	Good				10
	Plaster - Walls	PL	Good				1-10
	Duct Mastic - Red	MA	Good				3
	Duct Mastic - Grey	MA	Good	TESTED	Jan/'18	0	

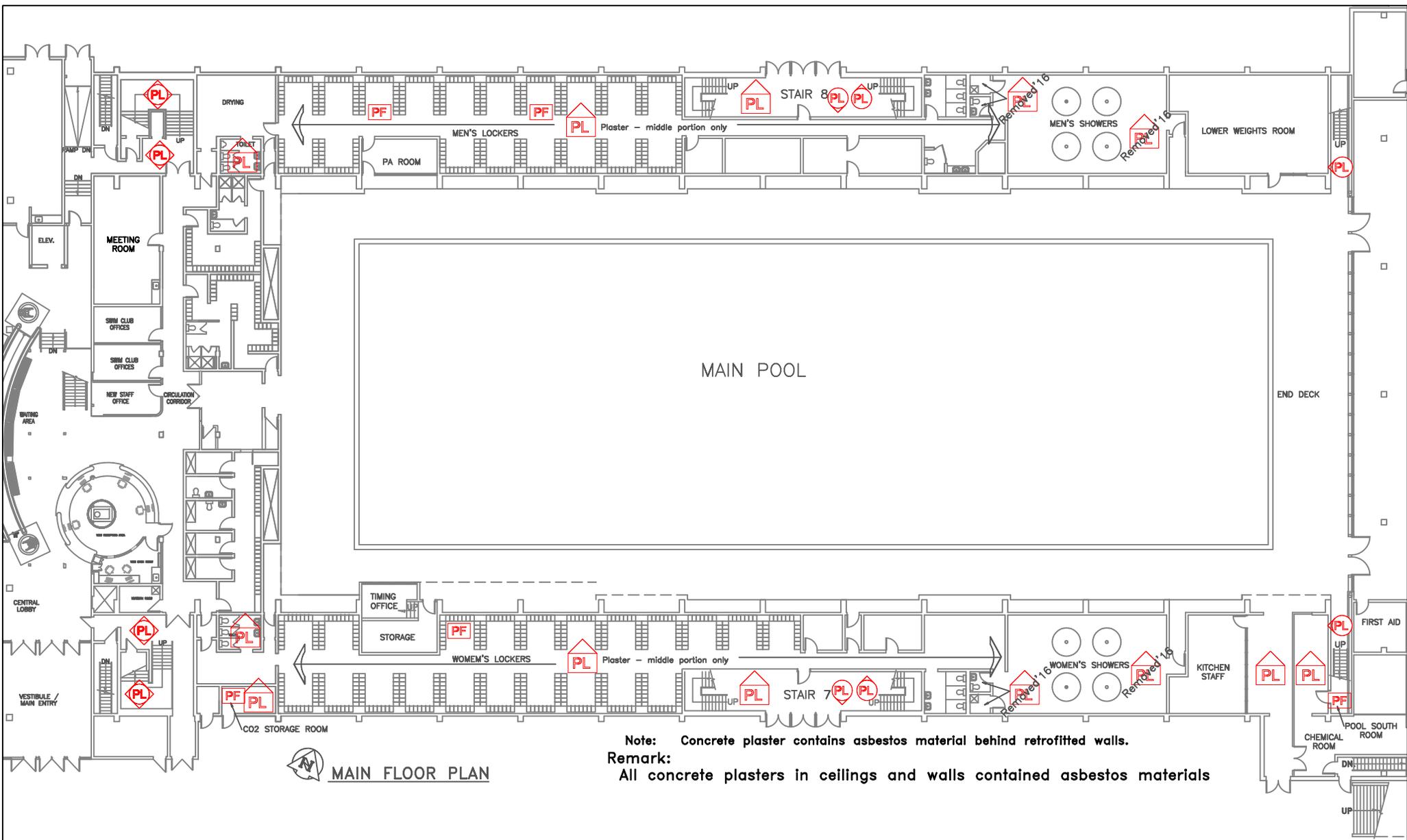
Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
East Mechanical Area	Spray On Insulation	SO	Removed/03	TESTED		50-60	
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Good				
	Pipe Mastic	MA	Good				10
	Plaster - Walls	PL	Good				1-10
	Duct Mastic - Red	MA	Good				3
South Bleachers Attic Area	Spray On Insulation	SO	Removed/03				
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Removed				
<b>Top Of Bleachers</b>							
Stairways and Back Walls	Plaster - Walls	PL	Good				1-10
Storage Room	Plaster - Walls	PL	Good				1-10
	Plaster - Ceiling	PL	Good				1-10
<b>Under North Bleachers</b>	<b>All Plaster Walls &amp; Ceilings Contain Asbestos</b>						
West Mechanical Area	Spray On Insulation	SO	Removed/03				
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Removed				
	Pipe Mastic	MA	Good				10
	Duct Mastic - Red	MA	Good				3
	Plaster - Walls	PL	Good				1-10
Washrooms & Canteen	Plaster - Ceiling	PL	Good				1-10
	Plaster - Walls	PL	Good				1-10
Central Mechanical Area	Spray On Insulation	SO	Removed/03				
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Good	TESTED		40-50	
	Pipe Mastic	MA	Good	TESTED	Jan/'12	10	
	Plaster - Walls	PL	Good				1-10
	Ducting Vibration Cloth (Black)			TESTED	Jan/'18	0	
	Duct Mastic - Red	MA	Good				3
East Mechanical Area	Plaster - Walls	PL	Good				1-10
	Spray On Insulation	SO	Removed/03				1-10
	Spray On Insulation (White Fiberglass)	SO	Good				0
	Pipe Fitting Insulation	PF	Good				40-50
	Pipe Mastic	MA	Good				10
	Duct Mastic - Red	MA	Good	TESTED	Jan/'18	3	

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
Offices	Plaster - Ceiling	PL	Good				1-10
	Plaster - Walls	PL	Good				1-10
	Sheet Flooring	FS	Good	TESTED	Feb/'13	15	
Under North Bleachers Attic	Spray On Insulation	SO	Removed/03				
	Pipe Fitting Insulation	PF	Removed				10
<b>Top Of Bleachers</b>							
Stairways and Back Walls	Plaster - Walls	PL	Good				
Storage Room	Plaster - Ceiling	PL	Good				
	Plaster - Walls	PL	Good				
<b>Catwalk Area</b>							
	Duct Insulation ( Black Mastic Only )	DI	Good	TESTED		15	
Southwest Air Handling Unit	Pipe Fitting Insulation	PF	Good	TESTED	Mar/'12	30-50	
Northwest Air Handling Unit	Pipe Fitting Insulation	PF	Removed/16				40-50
Northeast Air Handling Unit	Pipe Fitting Insulation	PF	Good				40-50
Centre Fan Unit	Pipe Fitting Insulation	PF	Good				40-50
	Duct Insulation	DI	Good	TESTED	Feb/'13	0	
30"Exhaust Pipe @ North East	Transite Pipe	TP	Good				
30"Exhaust Pipe @ South East	Transite Pipe	TP	Good				
Roof Drains	Transite Pipe	TP	Good				
Above Pool Area	Transite Ceiling Tile	C	Good	TESTED		30-50	
Ceiling Tile	Transite Ceiling Tile	HB	Good	TESTED	Nov/'17	12	
<b>Roof</b>							
30" Exhaust Pipe East End of Roof	Transite Pipe	TP	Good				
<b>Exterior</b>							
C O 2 Storage Room	Pipe Fitting Insulation	PF	Good				
	Stucco - Ceiling	ST	Good				
	Stucco - Walls	ST	Good				
Exterior: U/S of Cantilever	Stucco	ST	Good	TESTED	Apr'15	<1	

**NOTES:**

2. There may be asbestos containing materials present that were not located during asbestos inspections.
2. There may be asbestos containing materials present that were not located during asbestos inspections.
3. Floor tile and sheet flooring installed before 1990 may contain asbestos and must be treated as an asbestos containing material.
4. Vermiculite insulation may contain pockets of asbestos. All vermiculite insulation must be treated as an asbestos containing material.
5. For asbestos related inquiries, call Central Control at 204-986-2382

**PI-13**



MAIN FLOOR PLAN

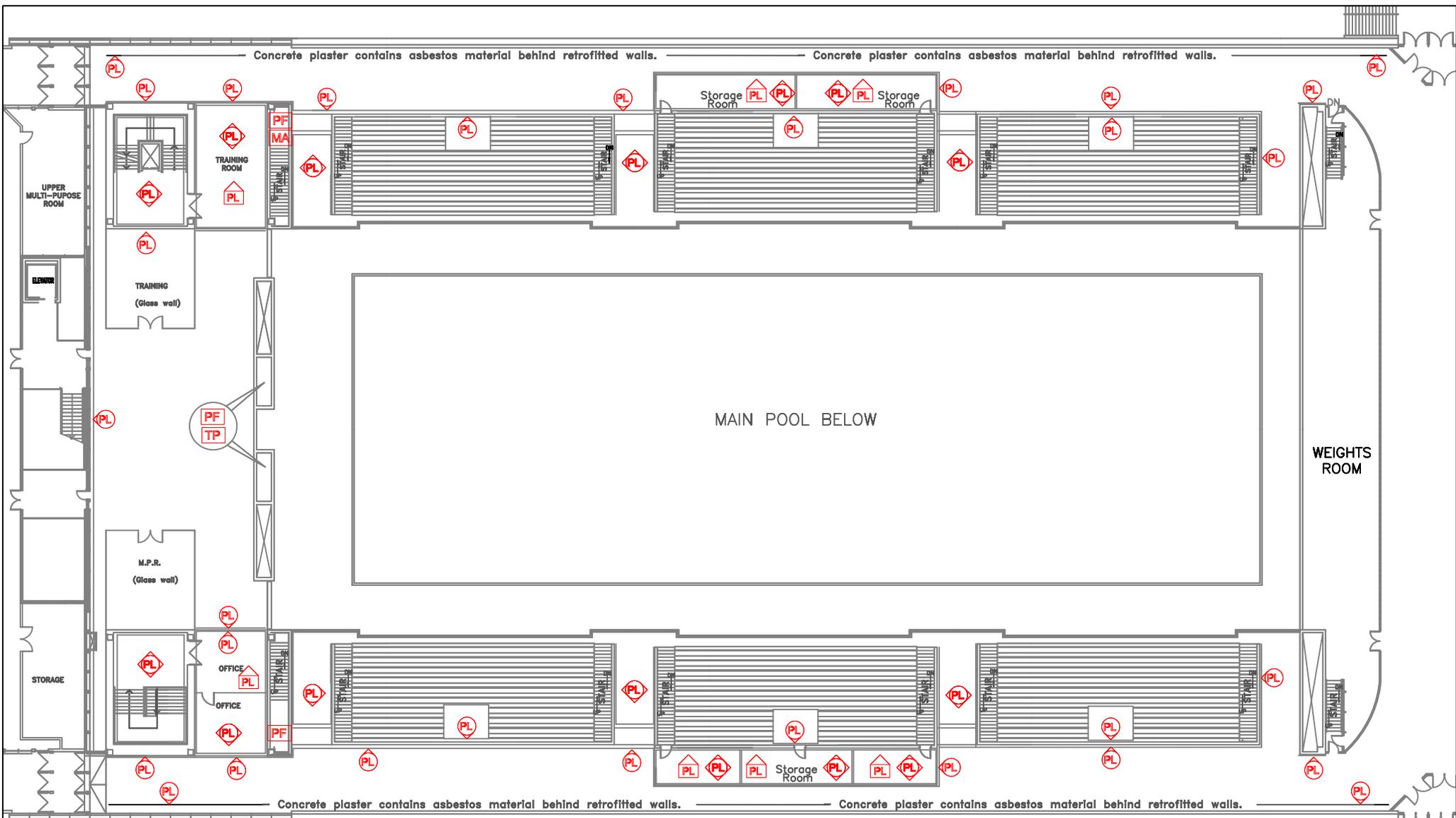
**Note:** Concrete plaster contains asbestos material behind retrofitted walls.  
**Remark:** All concrete plasters in ceilings and walls contained asbestos materials

LEGEND	GENERAL LABELS	ON CEILING	ABOVE CEILING	UNDER FLOORING	WALL DETAIL	ENCAPSULATED ASBESTOS
?? =	??	??	??	??	??	■
AF:ASBESTOS FABRIC	F9:9X9 FLOOR TILE	SC:STIPPLE CEILING				
BR:BOILER REFRACTORY	F12:12X12 FLOOR TILE	SO:SPRAY ON				
CA:CAULKING	GA : GASKET	ST:STUCCO				
C12: 12X12 CEILING TILE	HB:HARDBOARD	TI:TANK INSULATION				
C24: 24X24 CEILING TILE	MA:MASTIC	TP:TRANSITE PIPE				
C48: 24X48 CEILING TILE	PF:PIPE FITTING INSULATION	VE:VERMICULITE				
DC:DRYWALL COMPOUND	PI:PIPE INSULATION					
DI:DUCT INSULATION	PL:PLASTER					
FS:SHEET FLOORING	RD:ROOF DRAIN					

**NOTES:**  
 1. THERE MAY BE ASBESTOS CONTAINING MATERIALS PRESENT THAT WERE NOT LOCATED DURING BUILDING INSPECTIONS  
 2. REFER TO THE ASBESTOS INVENTORY SURVEY SHEET FOR MORE INFORMATION  
 3. DO NOT DISTURB ASBESTOS. FOR HANDLING PROCEDURES CALL CENTRAL CONTROL AT 986-2382

ASBESTOS LOCATIONS			
BUILDING:	PI-13 Pan Am Pool 25 Poseidon Bay Winnipeg, Manitoba		
REVISED BY:	DATE:	SCALE:	SHEET #:
REM	February 22, 2013	N.T.S.	1/6

**CITY OF WINNIPEG**  
 PLANNING, PROPERTY & DEVELOPMENT DEPARTMENT  
 MUNICIPAL ACCOMMODATIONS DIVISION  
 4th FLOOR - 185 KING STREET  
 WINNIPEG, MANITOBA R3B 1J1  
 PHONE: (204) 986-7266  
 FAX: (204) 986-7311



**SECOND FLOOR PLAN - Mezzanine level**

**Remark:**  
 - All concrete plasters in ceilings and walls contained asbestos materials except for the retrofitted walls in north & south exterior concrete wall of which asbestos materials located behind that walls.

LEGEND	GENERAL LABELS	ON CEILING	ABOVE CEILING	UNDER FLOORING	WALL DETAIL	ENCAPSULATED ASBESTOS
?? =	??	??	??	??	??	■
AF:ASBESTOS FABRIC	F9:9X9 FLOOR TILE	SC:STIPPLE CEILING				
BR:BOILER REFRACTORY	F12:12X12 FLOOR TILE	SO:SPRAY ON				
CA:CAULKING	GA : GASKET	ST:STUCCO				
C12: 12X12 CEILING TILE	HB:HARDBOARD	TI:TANK INSULATION				
C24: 24X24 CEILING TILE	MA:MASTIC	TP:TRANSITE PIPE				
C48: 24X48 CEILING TILE	PF:PIPE FITTING INSULATION	VE:VERMICULITE				
DC:DRYWALL COMPOUND	PI:PIPE INSULATION					
DI:DUCT INSULATION	PL:PLASTER					
FS:SHEET FLOORING	RD:ROOF DRAIN					

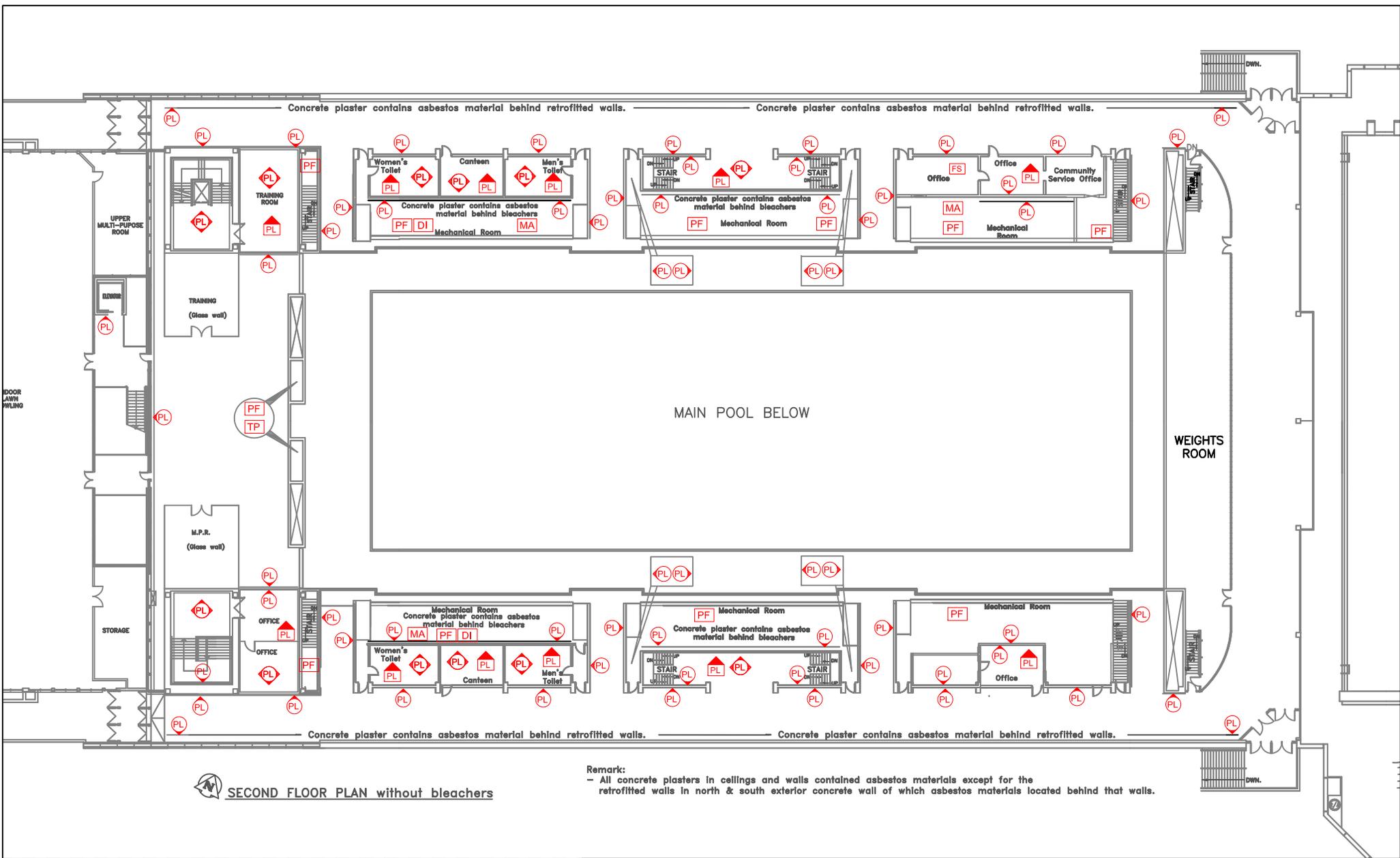
**NOTES:**  
 1. THERE MAY BE ASBESTOS CONTAINING MATERIALS PRESENT THAT WERE NOT LOCATED DURING BUILDING INSPECTIONS  
 2. REFER TO THE ASBESTOS INVENTORY SURVEY SHEET FOR MORE INFORMATION  
 3. DO NOT DISTURB ASBESTOS. FOR HANDLING PROCEDURES CALL CENTRAL CONTROL AT 986-2382

ASBESTOS LOCATIONS			
BUILDING:	PI-13 Pan Am Pool 25 Poseidon Bay Winnipeg, Manitoba		
REVISED BY:	DATE:	SCALE:	SHEET #:
RSFC	January 18, 2012	N.T.S.	2/6

**CITY OF WINNIPEG**  
 PLANNING, PROPERTY & DEVELOPMENT  
 DEPARTMENT  
 MUNICIPAL ACCOMMODATIONS DIVISION  
 4th FLOOR - 185 KING STREET  
 WINNIPEG, MANITOBA R3B 1J1  
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 FAX: (204) 986-7311



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**SECOND FLOOR PLAN without bleachers**

**Remark:**  
 - All concrete plasters in ceilings and walls contained asbestos materials except for the retrofitted walls in north & south exterior concrete wall of which asbestos materials located behind that walls.

LEGEND	GENERAL LABELS	ON CEILING	ABOVE CEILING	UNDER FLOORING	WALL DETAIL	ENCAPSULATED ASBESTOS
?? =	??	??	??	??	??	■
AF:ASBESTOS FABRIC	F9:9X9 FLOOR TILE	SC:STIPPLE CEILING				
BR:BOILER REFRACTORY	F12:12X12 FLOOR TILE	SO:SPRAY ON				
CA:CAULKING	GA : GASKET	ST:STUCCO				
C12: 12X12 CEILING TILE	HB:HARDBOARD	TI:TANK INSULATION				
C24: 24X24 CEILING TILE	MA:MASTIC	TP:TRANSITE PIPE				
C48: 24X48 CEILING TILE	PF:PIPE FITTING INSULATION	VE:VERMICULITE				
DC:DRYWALL COMPOUND	PI:PIPE INSULATION					
DI:DUCT INSULATION	PL:PLASTER					
FS:SHEET FLOORING	RD:ROOF DRAIN					

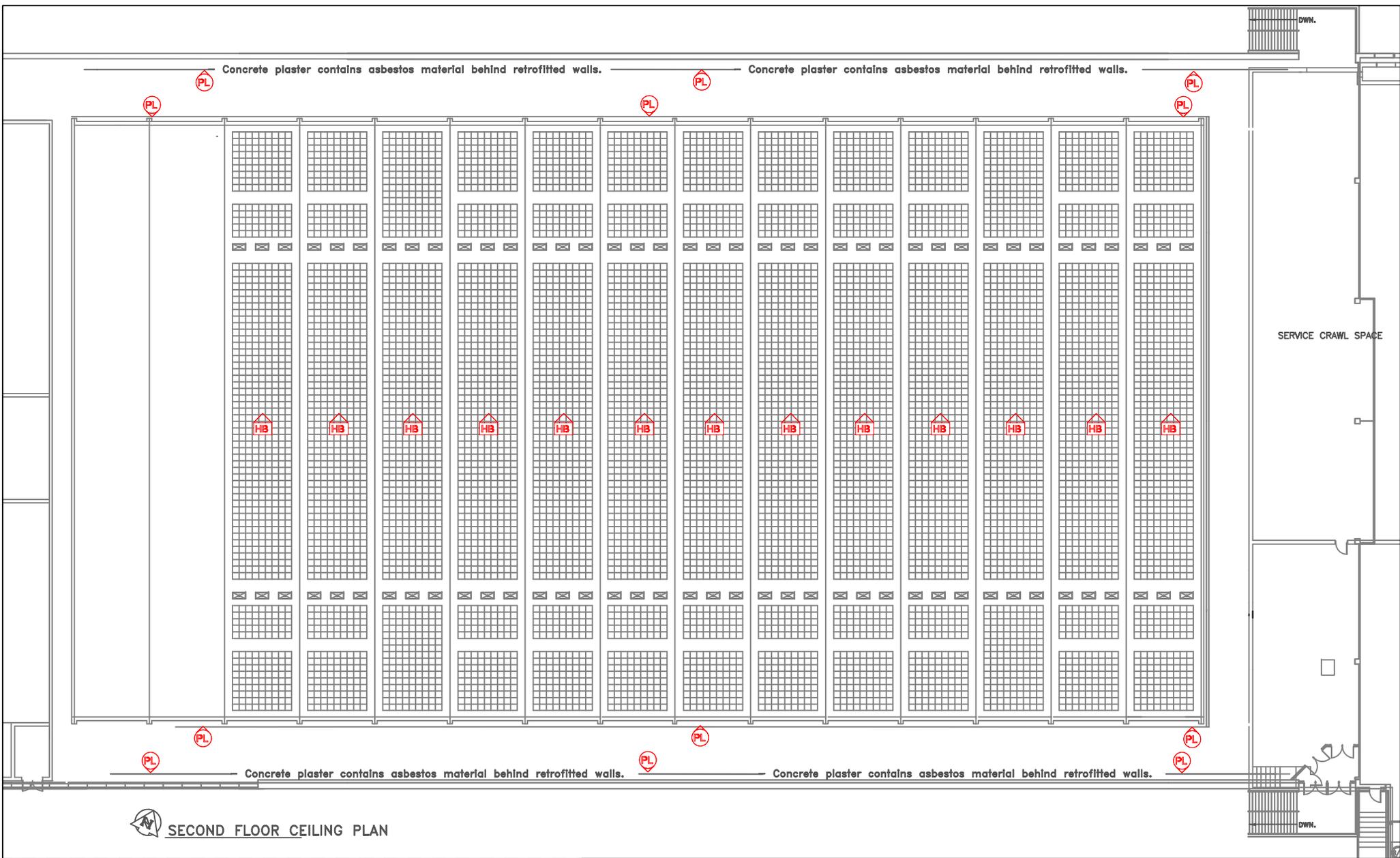
**NOTES:**  
 1. THERE MAY BE ASBESTOS CONTAINING MATERIALS PRESENT THAT WERE NOT LOCATED DURING BUILDING INSPECTIONS  
 2. REFER TO THE ASBESTOS INVENTORY SURVEY SHEET FOR MORE INFORMATION  
 3. DO NOT DISTURB ASBESTOS. FOR HANDLING PROCEDURES CALL CENTRAL CONTROL AT 986-2382

ASBESTOS LOCATIONS			
BUILDING:		PI-13 Pan Am Pool 25 Poseidon Bay Winnipeg, Manitoba	
REVISED BY:	DATE:	SCALE:	SHEET #:
REM	February 23, 2018	N.T.S.	3/6



**Winnipeg**  
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 4th FLOOR - 185 KING STREET  
 WINNIPEG, MANITOBA R3B 1J1  
 PHONE: (204) 986-7266  
 FAX: (204) 986-7311



**SECOND FLOOR CEILING PLAN**

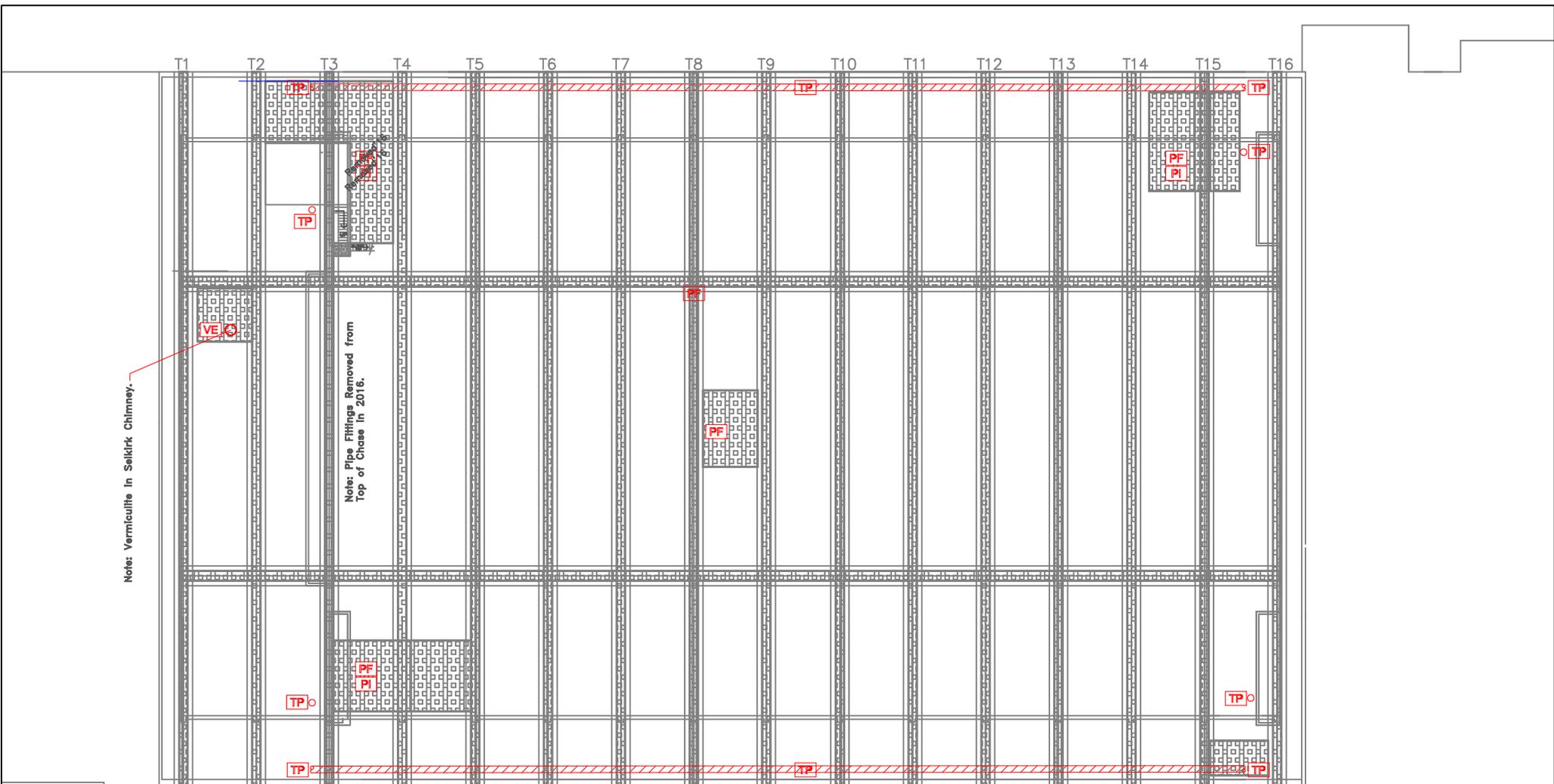
LEGEND	GENERAL LABELS	ON CEILING	ABOVE CEILING	UNDER FLOORING	WALL DETAIL	ENCAPSULATED ASBESTOS
?? =	??	??	??	??	??	
AF:ASBESTOS FABRIC		F9:9X9 FLOOR TILE	F12:12X12 FLOOR TILE	SC:STIPPLE CEILING	SO:SPRAY ON	
BR:BOILER REFRACTORY		GA : GASKET	HB:HARDBOARD	ST:STUCCO	TI:TANK INSULATION	
CA:CAULKING		MA:MASTIC	PF:PIPE FITTING INSULATION	TP:TRANSITE PIPE	VE:VERMICULITE	
C12: 12X12 CEILING TILE		PL:PLASTER	PI:PIPE INSULATION	RD:ROOF DRAIN		
C24: 24X24 CEILING TILE						
C48: 24X48 CEILING TILE						
DC:DRYWALL COMPOUND						
DI:DUCT INSULATION						
FS:SHEET FLOORING						

**NOTES:**  
 1. THERE MAY BE ASBESTOS CONTAINING MATERIALS PRESENT THAT WERE NOT LOCATED DURING BUILDING INSPECTIONS  
 2. REFER TO THE ASBESTOS INVENTORY SURVEY SHEET FOR MORE INFORMATION  
 3. DO NOT DISTURB ASBESTOS. FOR HANDLING PROCEDURES CALL CENTRAL CONTROL AT 986-2382

ASBESTOS LOCATIONS			
BUILDING:	PI-13 Pan Am Pool 25 Poseidon Bay Winnipeg, Manitoba		
REVISED BY:	DATE:	SCALE:	SHEET #:
RSFC	January 18, 2012	N.T.S.	4/6

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 PLANNING, PROPERTY & DEVELOPMENT  
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 MUNICIPAL ACCOMMODATIONS DIVISION  
 4th FLOOR - 185 KING STREET  
 WINNIPEG, MANITOBA R3B 1J1  
 PHONE: (204) 986-7266  
 FAX: (204) 986-7311



Note: Vermiculite in Selkirk Chimney.

Note: Pipe Fittings Removed from Top of Chase in 2016.



**ROOF CATWALK PLAN**

Remark:  
- Asbestos containing pipe fittings are through out catwalk area in various locations.

**LEGEND**

GENERAL LABELS    ON CEILING    ABOVE CEILING    UNDER FLOORING    WALL DETAIL    ENCAPSULATED ASBESTOS



AF:ASBESTOS FABRIC	F9:9X9 FLOOR TILE	SC:STIPPLE CEILING
BR:BOILER REFRACTORY	F12:12X12 FLOOR TILE	SO:SPRAY ON
CA:CAULKING	GA : GASKET	ST:STUCCO
C12: 12X12 CEILING TILE	HB:HARDBOARD	TI:TANK INSULATION
C24: 24X24 CEILING TILE	MA:MASTIC	TP:TRANSITE PIPE
C48: 24X48 CEILING TILE	PF:PIPE FITTING INSULATION	VE:VERMICULITE
DC:DRYWALL COMPOUND	PI:PIPE INSULATION	
DI:DUCT INSULATION	PL:PLASTER	
FS:SHEET FLOORING	RD:ROOF DRAIN	

**NOTES:**

1. THERE MAY BE ASBESTOS CONTAINING MATERIALS PRESENT THAT WERE NOT LOCATED DURING BUILDING INSPECTIONS
2. REFER TO THE ASBESTOS INVENTORY SURVEY SHEET FOR MORE INFORMATION
3. DO NOT DISTURB ASBESTOS. FOR HANDLING PROCEDURES CALL CENTRAL CONTROL AT 986-2382

**ASBESTOS LOCATIONS**

BUILDING:	PI-13 Pan Am Pool 25 Poseidon Bay Winnipeg, Manitoba
REVISED BY:	REM
DATE:	February 23, 2018
SCALE:	N.T.S.
SHEET #:	5/6



**CITY OF WINNIPEG**  
PLANNING, PROPERTY & DEVELOPMENT DEPARTMENT  
MUNICIPAL ACCOMMODATIONS DIVISION  
4th FLOOR - 185 KING STREET  
WINNIPEG, MANITOBA R3B 1J1  
PHONE: (204) 986-7266  
FAX: (204) 986-7311

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## **APPENDIX 3**

Pool Reverberation Time Analysis,  
May 1, 2018

---

To:	Jeff Penner Stantec Winnipeg, MB, Canada	From:	Tracie Ferguson Stantec San Francisco, CA, USA
Project:	Pan-Am Pool Ceiling and Lighting Upgrades #115418008	Date:	May 1, 2018

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**Reference: Pool Area Reverberation Time Analysis**

This memo presents the analysis and recommendations relating to interior architectural acoustics of the pool area for the Pan-Am Pool upgrade project in Winnipeg, Manitoba. All information below is based on the March 23, 2018 Preliminary Design Report, discussions during a conference call on Monday, April 16, 2018, and drawing updates received on May 1, 2018.

**General Notes on Room Acoustics**

Room acoustics refers to the shaping and finishes of a room as they affect sound. The standard metric for determining how “live” or “dead” a room acts is called the reverberation time (RT). By definition, it is the time required for the average sound pressure level in a room to decrease 60 decibels after a steady state source stops generating sound. The longer the RT, the longer sound persists before dying out, and the more difficult speech intelligibility becomes.

A room’s interior finishes largely control the reverberation time. Hard materials, such as gypsum board, glass, or concrete reflect sound, which increases the RT. Adding absorption reduces reverberation time. Absorption is typically provided by soft materials, into which sound can enter and be captured rather than reflected. Absorption, as well as proper room shaping or diffusion, also helps to control undesirable reflections and echoes.

**Existing Conditions**

According to the facility website, the Pan Am Pool is the City of Winnipeg’s premier aquatic facility and meets international standards to host world-class aquatic events. The Pan Am Pool is a heavily utilized space which receives requests for diving, swimming, synchronized swimming, and water polo events of a local, provincial, national, and international nature.

The existing ceiling system in the main tank and spectator viewing area is fifty years old and contains asbestos tiles on a cable-suspended metal grid. The old ceiling tiles do not provide a great deal of acoustic benefit as the space is stated to be lively and loud and it is difficult to understand voice announcements through the existing audio system.

While investigating the ceiling removal, the City determined that scaffolding would be required throughout the main tank area. Having the scaffolding in place would provide an opportunity for other upgrades in the area, such as acoustical improvements, lighting upgrades, and PA system replacement.

**Design Target**

Many of the surfaces in a pool are required to be hard-surfaced materials which are resistant to water and chemical damage. Unfortunately, the hard-surfaced materials required for maintenance do not provide much sound absorption. The hard-surfaced materials, the large volume of the space, and even the water surface itself all contribute to a very high reverberation time. The mid-frequency reverberation time in an untreated indoor pool space can typically be around 6 seconds. This high reverberation time can lead to compromised speech intelligibility, making it difficult to communicate during events or practices.

Considering the available surfaces in a pool, a mid-frequency reverberation time of 1.5 to 2.0 seconds is typically targeted to help provide a comfortable environment for occupants.

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### Proposed Finishes Analysis and Recommendations

Part of the upgrade project will involve removing the existing ceiling and replacing the ceiling with an effective sound absorbing material. Additional absorptive material is planned for the wall surfaces behind the seating area on both the plan north and south sides of the space. Specific finishes included in the analysis of the pool include the following:

- Floor: Bleacher seating (assumed to be wood), sealed concrete, and the pool water surface.
- Ceiling: Exposed metal deck with 37,505 sqft [3,484 m<sup>2</sup>] of acoustic ceiling panels.
- Walls: Assumed to be a combination of wood bleachers, exterior glass, painted concrete, and acoustic wall panels. The current design calls for 1,639 sqft [152.3 m<sup>2</sup>] of acoustic wall panels on the plan north and south walls (3,278 sqft [304.5 m<sup>2</sup>] total panel area) and about 1,800 sqft [167.2 m<sup>2</sup>] on the short window wall across from the dive deck.
- The basis of design product for the new ceiling and wall panels in the pool is the Sound Concepts Euromat panels, <http://www.soundconceptscan.com/product.php?ptype=ceilings&pname=euromat>.

A reverberation time analysis was conducted for the pool area using various combinations of 1" thick and 2" thick Euromat panels. The panels were assumed to be direct-attached to the walls (A-Mount) and suspended in clouds from the structure (E-400 Mount). According to manufacturer's literature, the Euromat panels have the following absorption coefficients and overall Noise Reduction Coefficient (NRC) ratings:

Euromat Panel Mounting	Thickness	Absorption Coefficients						
		125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	NRC
Wall Panel A-Mount	1"	0.05	0.33	0.90	1.05	1.09	1.03	0.85
Wall Panel A-Mount	2"	0.33	0.71	1.23	1.29	1.22	1.24	1.1
Ceiling Panel E-400 Mount	1"	0.56	0.93	0.96	1.01	1.12	1.2	1.0
Ceiling Panel E-400 Mount	2"	0.50	0.92	0.99	1.09	1.15	1.19	1.05

Using the finishes and the absorption coefficients listed above, the calculated mid-frequency reverberation times in the pool area are as follows:

Euromat Wall Panel Thickness	Euromat Ceiling Panel Thickness	Estimated Pool Deck Mid-Frequency Reverberation Time
2" Thick Wall Panels	2" Thick Ceiling Panels	1.7 – 2.0 seconds
1" Thick Wall Panels	1" Thick Ceiling Panels	1.7 – 2.0 seconds
1" Thick Wall Panels	2" Thick Ceiling Panels	1.7 – 2.0 seconds
<b>2" Thick Wall Panels</b>	<b>1" Thick Ceiling Panels</b>	<b>1.7 – 2.0 seconds</b>

Even though the estimated mid-frequency reverberation times for all cases is similar in seconds, it is recommended to incorporate 2" thick Euromat Panels on the walls and 1" thick Euromat Panels on the ceilings. This configuration of panels offers the best reverberation time performance across all frequency bands, including frequencies below 500 Hz. It

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should be noted that even with the addition of the proposed acoustic panels, low frequency noise, such as from amplified music, may still sound a bit “boomy” and loud in the space.

This concludes the analysis and recommendations relating to the interior architectural acoustics of the pool area for the Pan-Am Pool upgrade project in Winnipeg, Manitoba. Please do not hesitate to contact us with any further questions or concerns or if additional information is required.

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