

ROUGH CARPENTRY

1. GENERAL

1.1 Design Requirements

- .1 Design construction methods for expansion and contraction of materials. Adopt method of construction to ensure that materials are rigidly and securely attached and will not be loosened by work of other Sections. Fasten wood nailers, blocking, framing and strapping solidly to adjacent materials in true planes.

1.2 Quality Assurance

- .1 Lumber Identification: Lumber identification shall conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority (NLGA) or grade stamped by an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Source Limitation: Lumber for each type of structural component shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill. Grading: 120, National Grading Rule for Dimension Lumber, kiln dried to maximum 19% moisture, and in clean condition.
- .3 Plywood identification: by grade mark in accordance with applicable CSA standards.
- .4 Provide necessary temporary bracing until connectors are permanently installed.
- .5 Align and plumb faces of furring and blocking to tolerance of 1:600.

1.3 Submittals

- .1 Preservative Treatment Test Reports: Duplicate reports from chemical treatment manufacturer and certification by independent testing agency comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
- .2 Fire Retardant Treatment Test Reports: Duplicate test reports for fire-retardant treatment from chemical treatment manufacturer and certification by independent testing agency to requirements of CAN/ULC S102.
- .3 For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Site.
- .4 Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 Waste disposal

- .1 Dispose waste legally off-site, in accordance with governing regulation. Dispose of any end-cuts and left over chemicals in an approved land-fill site. Do not burn or allow other use of end-cuts.

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2. PRODUCTS

2.1 Materials

- .1 Framing Lumber: Unless specified otherwise, Spruce/Pine/Fir (SPF), NLGA 121b Standard, with structural members meeting minimum No. 2 Grade requirements of CAN/CSA-O141.
- .2 Cants, Curbs, Blocking, Nailers and other Members Less Than 89 mm (4 inch) Wide: Spruce, 122c. "Standard" light framing, except as otherwise specified.
- .3 Softwood Plywood, Douglas Fir, CSA O121-M of Following Grades: Good One Side (G1S) elsewhere.
- .4 Rough Hardware: CSA B111; Nails, screws, bolts, lag screws, anchors, special fastening devices and supports required for erection of carpentry components. Use galvanized components if exposed to exterior atmosphere.
- .5 General Purpose Adhesive: CSA O112 Series.
- .6 Proprietary Fasteners: Toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

2.2 Wood Preservative-Treated Materials

- .1 Preservative Treatment by Pressure Process: CSA O80 Series, using preservative chemicals acceptable to authorities having jurisdiction, ammoniacal or amine copper quat (ACQ), or copper azole (AC), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated with inorganic boron (SBX).
- .2 Precut wood, where practical, prior to preservative treatment.
- .3 Treat site cut pressure treated lumber cut ends treated with preservatives compatible with pressure treatment chemicals.
- .4 Kiln-dry material after treatment to a maximum moisture content of 19% for lumber and 15% for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- .5 Mark each treated item with the treatment quality mark of an inspection agency approved by the Canadian Lumber Standards Accreditation Board.
- .6 Application: Treat items indicated on Drawings, and the following:
 - .1 Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing and flashing.
 - .2 Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

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2.3 Fire-Retardant-Treated Materials

- .1 General: Identify fire-retardant-treated wood with appropriate classification marking of ULC or another testing and inspecting agency acceptable to authorities having jurisdiction.
- .2 Fire Retardant Treated Wood: Pressure treated, flame spread, fuel contributed and smoke developed ratings of 25 or less, tested in accordance with CAN/ULC S102.
- .3 Use treatment that does not promote corrosion of metal fasteners.

3. EXECUTION

3.1 Installation - General

- .1 Install members true to line, levels and elevations.
- .2 Construct continuous members from pieces of longest practical length.
- .3 Install spanning members with crown-edge up.
- .4 Install materials so that grade-marks and other defacing marks are not visible or are removed by sanding.
- .5 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .6 Countersink bolts where necessary to provide clearance for other work.
- .7 Fasten work to hollow units with toggle bolts and to solid masonry or concrete with lead expansion shields and lag screws. Do not use organic fibre or wood plugs.

3.2 Furring, Grounds, Nailers, Rough Bucks and Blocking

- .1 Install work as required to space-out and support wall and ceiling finishes, linings to rough openings and other work as required.

3.3 Cants, Curbs, Fascia Backing

- .1 Install wood cants, curbs and other wood supports as required and secure using galvanized fasteners.

3.4 Electrical, Data and Telephone Equipment Backboard

- .1 Provide fire retardant treated backboards for mounting equipment as indicated. Use 19 mm (3/4 inch) thick plywood on 38 mm x 89 mm (2 x 4) furring around perimeter and at maximum 300 mm (12 inch") intermediate spacing.

END OF SECTION

EXISTING ROOF MODIFICATION FOR NEW WORK

1. GENERAL

1.1 General Requirements

- .1 Maintain the existing building watertight at all times. Provide required temporary protection, and enclosures. Seal off or temporarily dam open roof edges to prevent any incidence of water into existing building or structure.

1.2 Quality Assurance

- .1 Tie-in new Work with adjacent existing roofing system in accordance with the Manufacturer's recommendations for the products used. All products to be compatible with the existing roof system components.
- .2 All Work shall meet the requirements of the Canadian Roofing Contractors' Association (CRCA) as amended by affiliated provincial roofing association, including all amendments up to project date.
- .3 Applicators: Member in good standing of the Canadian Roofing Contractors' Association affiliated provincial association and which has a minimum of five (5) years of proven satisfactory experience in the Work of this Section.
- .4 Ensure surfaces to receive Work of this Section are clean, level, smooth, solid and dry before commencing work each day.
- .5 Ensure temperatures during application are not less than the minimum recommended by the material manufacturer. Work shall not be carried out during inclement weather conditions.
- .6 Stop Work when temperature remains consistently below -18°C, especially when wind chill effect would tend to set bitumen before proper adhesion takes place.
- .7 Use only dry materials and apply only during weather that will not introduce moisture into roofing system.
- .8 Arrange for roofing material Manufacturer's Representative to visit the Site and discuss roofing application and any special requirements, prior to commencement of Work.

1.3 Submittals

- .1 Photographs: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by Work. Submit before Work begins.

1.4 Protection

- .1 Provide all necessary protection measures to prevent fumes, dust particles, odours and other foreign matter created or caused by roofing operation from entering the building, including the return air ducts.

EXISTING ROOF MODIFICATION FOR NEW WORK

- .2 Cover walls and adjacent Work where materials hoisted or used. Locate equipment to prevent smoke and fume against discolouring the building or adjacent buildings or becoming a nuisance to adjacent owners or the public.
- .3 Provide temporary protection at work areas or access to work areas with minimum 13 mm (1/2 inch) plywood underlaid with 25 mm (1 inch) polystyrene insulation board extending 900 mm (36 inch) beyond work area. Remove protection at completion of Work.
- .4 Use warning signs and barriers. Maintain in good order until completion of Work.
- .5 At end of each day's Work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
 - .1 Provide cut-offs against water intrusion into uncompleted Work and existing building. Remove cut-offs at commencement of subsequent Work.

1.5 Delivery, Storage and Handling

- .1 Deliver materials in original containers, sealed, with labels intact.
- .2 Do not store insulation in direct contact with the earth, road surface, or roof deck. Place suitable supports under the insulation upon delivery to protect it from absorbing dampness from the surrounding terrain or deck.
- .3 Provide and maintain dry, off-ground weatherproof storage. Take particular care to prevent materials from absorbing moisture. Remove unsatisfactory materials promptly and provide new dry materials.
- .4 Remove only in quantities required for same day use.
- .5 Remove and replace damaged, wet or broken materials.
- .6 Store materials away from open flame or ignition sources.

1.6 Warranty

- .1 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during Work, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.
 - .1 Notify warrantor of existing roofing system on completion of Work, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

2. PRODUCTS

2.1 Materials

- .1 Roofing Materials: New materials, same as and matching materials used in the existing roof system.

EXISTING ROOF MODIFICATION FOR NEW WORK

3. EXECUTION

3.1 Roofing

- .1 Preparation: Prepare existing roof for receipt of new Work. Ensure existing system is not damaged by preparation Work.
 - .1 Remove only areas of the existing roofing system which can be replaced, complete with membrane flashings, on the same day.
 - .2 Built-Up System: Remove existing top pour and aggregate cover back 900 mm (36 inch) from replacement area. Sweep all loose gravel back an additional 900 mm (36 inch).
- .2 Roofing and Flashing membrane: Install in accordance with Manufacturers' instructions.
- .3 Curbs: Install curbs required for new Work.

3.2 Sleeve Flashing

- .1 Prefabricated purpose made to suit pipes and penetrations.
- .2 Embed deck flange in a layer of mastic sealer. Flash into the roofing membrane in general accordance with CRCA flashing detail.
- .3 Apply sealant at joint between base of sleeve flashing and roof membrane flashing.

3.3 Installation - Metal Flashings and Trims

- .1 Install sheet metal work in accordance with CRCA specifications, using concealed fastenings except where approved before installation.
- .2 Fabricate metal flashings and other sheet metal work to details shown. Form pieces in 2400 mm (8 feet) maximum lengths. Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 13 mm (1/2 inch). Miter and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- .6 Counterflash membrane flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.
- .7 Lock end joints and seal with sealant.

3.4 Cleaning

- .1 Remove existing debris from all roof areas.

EXISTING ROOF MODIFICATION FOR NEW WORK

- .2 Clear out roof drains, scuppers, eaves troughs and down spouts of debris and ensure they are free draining at project completion.
- .3 Remove surplus materials and debris resulting from Work daily as the Work proceeds and on completion.
- .4 Remove stains, sealants and adhesives from soiled surfaces.

END OF SECTION

FIRESTOPPING AND SMOKE SEALS

1. GENERAL

1.1 Quality Assurance

- .1 Installers: Competent installers having minimum five (5) years experience in application of materials and systems being used, approved and trained by material or system manufacturer.
- .2 Materials and Systems: Asbestos free closures to fire and smoke at openings around penetrations, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions.
 - .1 Draft tight barriers to retard passage of flame and smoke, and firefighter's hose stream and passage of liquids around outside of mechanical and electrical assemblies where they penetrate fire separations.
 - .2 Maintain fire resistance rating of adjacent floor, wall or other fire separation assembly acceptable to authorities having jurisdiction.
 - .3 Conform to both the temperature and flame ratings of CAN/ULC-S115 and, where applicable, to ASTM E814, and other requirements of authorities having jurisdiction.
- .3 Regulatory Requirements: Be responsible for securing approval from authorities having jurisdiction where project conditions require modification to tested and listed systems.

1.2 Submittals

- .1 Shop Drawings: Indicate ULC or cUL assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, installation methods and materials of firestopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, size of opening, adjacent materials and number of penetrations. Submit copies of current ULC or cUL listings for each system and certified copies of test reports verifying that firestopping and smoke seals meet or exceed specified requirements.
- .2 Engineering Judgment: Indicate Manufacturer's engineering judgment identification number and drawing details when no ULC or cUL system is available for an application. Include project name and name of installing company who will install Work.
- .3 Identification Label: Full size sample, indicate sample wording, and text and background colours.

2. PRODUCTS

2.1 Materials

- .1 General: Certified and listed by ULC or WH in accordance with CAN/ULC-S115 and bearing ULC, cUL or WH label, heat resistant, flexible, durable and compatible with adjacent materials and finishes, self supporting at penetration capable to adhere and maintain its integrity while providing effective barrier against passage of flame, smoke and gases, and provide flame and temperature rating in accordance with requirements of governing building code for openings in respective fire resistance rated floor, wall or other assemblies.

FIRESTOPPING AND SMOKE SEALS

- .1 Materials and products shall not cause stress, chemical or physical reaction, or other damage to penetrating items or adjacent materials.
- .2 Firestop Systems: Certified by ULC, WH and listed in ULC Guide No. 40 U19.
- .3 Firestop System Components: Certified by ULC, WH and listed in ULC Guide No. 40 U19.13 under the Label Service of ULC.
- .4 Cementitious Matrixes: Minimum 2758 kPa (400 psi) compressive strength when cured, to retard cable tray warping within the firestop seal.
- .5 Elastomeric Assemblies: Flexible, elastomeric seal suitable to withstand the required movement and capable of returning to original configuration without damage to seal and without adhesive or cohesive failure.
- .6 Primers: Manufacturer's standard for specific material, substrate, and end use.
- .7 Water (if applicable): Potable, clean and free from injurious amounts of deleterious substances.
- .8 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.
- .9 Pipe and Duct Insulation and Wrappings: Compatible with firestopping systems.
- .10 Intumescent Pads: Permanently pliable type.
- .11 Intumescent Composite Sheet: Composite sheet, strip or precut shapes.
- .12 Sealants and Putty For Vertical and Overhead Joints: Non-sagging.
- .13 Sealants and Fluid Seals at Floors: Self-levelling.
- .14 Identification Labels: Minimum 75 mm x 100 mm (3 inch x 4 inch) permanent self-adhering or mechanically retained corrosion resistant metal labels, with black text on yellow background.
 - .1 Indicate ULC or cUL firestopping system number, rating, products used, and contact information of installers.

3. EXECUTION

3.1 Installation

- .1 Ensure materials and products are compatible with abutting materials, coatings and finishes. Remove applied coatings and finishes as required to permit proper installation and adhesion.

FIRESTOPPING AND SMOKE SEALS

- .2 Ensure that pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seal are installed prior to Work of this Section and that insulation and wrapping within fire seals is a ULC or cUL listed component of the system to be installed, unless ULC or cUL certified assembly permits such other insulation and wrapping to remain within the assembly. Otherwise, precede installation of mechanical insulations or remove insulation from area of insulated pipe or duct where such pipes or ducts penetrate a fire separation.
- .3 Coordinate Work of this Section with the Work of Mechanical and Electrical Divisions. Ensure the continuity and integrity of thermal and vapour barriers where such are removed, altered, or replaced, acceptable to these Divisions and the Contract Administrator.
- .4 Apply Work in accordance with Manufacturer's instructions and tested designs acceptable to authorities having jurisdiction to provide required temperature and flame rated seal, and to prevent passage of smoke and liquids.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing. Completely fill and seal voids with firestopping and smoke seal materials. Do not cover up materials until full curing has taken place. Notify Contract Administrator when completed installations are ready for review and prior to concealing or enclosing Work.
- .6 Use elastomeric assemblies at the following locations. Do not use rigid seals:
 - .1 Openings where reinstallation occurs.
 - .2 Openings around penetrations for electrical bus ducts, pipes, ductwork and other electrical and mechanical items requiring sound and vibration control or allowance for expansion, contraction and other movement.
 - .3 Joints and spaces designed and required to allow movement such as building movement joints, deflection spaces, control joints, expansion joints, and similar locations.
- .7 Identification Labels: Locate labels in discreet and visible locations adjacent to openings and joints that have received Work of this Section. Apply labels after finish painting is completed.
 - .1 Penetrations: Apply labels on both sides of fire separations.
 - .2 Joints: Apply one label for each 6000 mm (20 feet) run of joints or fraction thereof.

3.2 Cleaning

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application. Remove temporary dams after initial set of firestopping and smoke seal materials.

END OF SECTION

JOINT SEALANTS

1. GENERAL

1.1 Submittals

- .1 Samples for Colour Selection: Provide 150 mm (6 inch) long cured, colour samples of Manufacturer's standard range of colours in each type of sealant for selection by Contract Administrator. Submit samples of primer, bond breaker tape and joint backing material, if requested.
- .2 Product Data: Submit product information from sealant manufacturers prior to commencement of Work of this Section verifying:
 - .1 Selected sealant materials are from those specified.
 - .2 Composition and physical characteristics.
 - .3 Surface preparation requirements.
 - .4 Priming and application procedures.
 - .5 Suitability of sealants for purposes intended and joint design.
 - .6 Test report on adhesion, compatibility and staining effect on samples of materials used on Project.
 - .7 Suitability of sealants for temperature and humidity conditions at time of application.

1.2 Quality Assurance

- .1 Installer: Trained and approved by the Manufacturer and having a minimum three (3) years experience in the installation of the Work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type. If requested, provide letter of certification from manufacturer stating that installer is certified applicator of its products, and is familiar with proper procedures and installation requirements required by the Manufacturer.
- .2 Maintenance Seminars: Instruct City's maintenance personnel on proper maintenance procedures.

1.3 Delivery, Storage and Handling

- .1 Deliver materials in original, unopened containers with Manufacturers labels identifying Manufacturer's name, brand name of product, grade and type, application directions and shelf life or expiry date of product.
- .2 Handle and store materials in accordance with Manufacturer's printed directions. Store flammable materials in safe, approved containers to eliminate fire hazards.
- .3 Do not use sealing materials that has been stored beyond the maximum recommended shelf life.

JOINT SEALANTS

1.4 Project Conditions

- .1 Environmental Requirements: Do not apply any sealant under adverse weather conditions, when joints to be sealed are damp, wet or frozen or when at ambient temperatures below 5°C (40°F). Maintain minimum temperature of application during application and for eight (8) hours after application. Consult Manufacturer for specific instructions before proceeding and obtain Contract Administrator's approval.

2. PRODUCTS

2.1 Materials

- .1 General: Non-bleeding, non-migrating, capable of supporting their own weight.
 - .1 Vertical and Overhead Joints: Non-sag.
- .2 Sealant Type A: ASTM C920, Type S, Grade NS, Class 25, Use NT-M-A, one component, chemical curing, urethane base, Sikaflex 1a by Sika, or Dymonic by Tremco.
- .3 Sealant Type B: ASTM C834, latex based, Tremflex 834 by Tremco.
- .4 Joint Backing: Preformed, compressible, resilient, non-waxing, non-extruding, non-staining closed cell polyethylene or urethane foam, shape to suit intended use, oversize 25% and compatible with sealant, primer and substrate.
- .5 Bond Breaker Tape: As recommended by sealant manufacturer.
- .6 Joint Primer: Non-staining, suitable for substrate surfaces, compatible with joint sealants and as recommended by sealant manufacturer.
- .7 Cleaning Material: Non-corrosive, non-staining, as recommended by sealant manufacturer and acceptable to material or finish manufacturers for surfaces adjacent to sealed areas.
- .8 Sealants, Cleaning Materials and Primers: Compatible with each other.

3. EXECUTION

3.1 Examination

- .1 Ensure joints are suitable to accept and receive sealants. Commencement of Work implies acceptance of surfaces and conditions.
- .2 Before any sealing Work is commenced, test materials for indications of staining or poor adhesion.

3.2 Preparation

- .1 Remove existing sealant from joints to be re-sealed. Ensure that all joint interfaces are clean and prepared to accept new Work.

JOINT SEALANTS

- .2 Clean joints and spaces which are to be sealed and ensure they are dry and free of dust, loose mortar, oil, grease, oxidation, coatings, form release agents, sealers and other foreign material.
- .3 Clean ferrous metals of rust, mill scale and foreign materials by wire brushing, grinding or sanding.
- .4 Install joint backing material to achieve correct and uniform joint profile.
- .5 Where joint design or depth of joint prevents use of joint backing material, apply bond breaker tape to prevent three-sided adhesion.
- .6 Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections. Install bond breaker tape at back of joint where joint backing is not required or cannot be installed.
- .7 Where surfaces adjacent to joints are likely to become coated with sealant during application, mask them prior to priming and sealing.
- .8 Do not exceed shelf life and pot life of materials, and installation times, as stated by manufacturers.
- .9 Be familiar with work life of sealant to be used. Do not mix multiple component materials until required for use.
- .10 Use materials as received from manufacturer, without additions, deletions and adulterations of materials.
- .11 Seal joints in surfaces to be painted before surfaces are painted. Where surfaces to be sealed are prime painted in shop before sealing check to make sure prime paint is compatible with primer and sealant. If they are incompatible, inform Contract Administrator and change primer and sealant to compatible types approved by Contract Administrator.
- .12 Where irregular surface or sensitive joint border exists, apply masking tape at edge of joint to ensure joint neatness and protection.
- .13 Prime joints as required by sealant manufacturer. Prime sides of joints for type of surface being sealed prior to application of joint backing, bond breaker or sealant.

3.3 Application

- .1 Apply sealant using hand operated guns or pressure equipment fitted with suitable nozzle size and equipment approved by sealant manufacturer. Apply in accordance with manufacturer's directions and recommendations.
- .2 Force sealant into joint and against sides of joints to obtain uniform adhesion. Use sufficient pressure to completely fill all voids in joint regardless of variation in joint widths and to proper joint depth as prepared. Ensure full firm contact with interfaces of joint. Superficial pointing with skin bead shall not be acceptable.
- .3 Finish face of compound to form smooth, uniform beads. At recesses in angular surfaces, finish compound with flat face, flush with face of materials at each side. At recesses in flush surfaces, finish compound with concave face flush with face of materials at each side.

JOINT SEALANTS

- .4 Tool surfaces as soon as possible after sealant application or before any skin formation has occurred. Ensure tooling does not damage seal or tear compound. Avoid pulling of sealant from sides.
- .5 Joint surfaces shall be straight, neatly finished, free from ridges, wrinkles, sags, dirt, stains, air pockets and embedded foreign matter or other defacement and be uniform in colour, free from marbling and/or colour streaking due to improper mixing or use of out of shelf life products.

3.4 Sealant Schedule

- .1 Use one of sealants specified for each type in following locations. Ensure sealant chosen for each location is recommended by manufacturer for use for conditions encountered.
- .2 Refer to Drawings for sealing work not specifically listed in this Section.
- .3 Seal following joints with Sealant Type A: Interior non-rated gypsum board control joints.
- .4 Seal following joints with Sealant Type B: Interior door frames, both sides.

3.5 Cleaning

- .1 Immediately clean adjacent surfaces which have been soiled and leave Work in neat, clean condition. Remove excess materials, compounds smears or other soiling resulting from application of sealants. Use recommended cleaners and solvents.

END OF SECTION

STEEL DOORS AND FRAMES

1. GENERAL

1.1 Quality Assurance

- .1 Fabrication and Installation: Comply with requirements of Canadian Steel Door Manufacturers Association.
- .2 Source Limitations: Obtain doors and frames through one source from a single manufacturer.

1.2 Requirements of Regulatory Agencies

- .1 Fire Protection Rated Assemblies: Labelled and listed by a nationally recognized testing agency having factory inspection service in conformance with ULC CAN4 S104M and ULC CAN4 S105M for fire protection ratings indicated.

1.3 Submittals

- .1 Shop Drawings: Indicate each type of door and frame, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, anchorage to each type of wall opening, arrangement of hardware and fire protection rating.

1.4 Delivery, Storage, and Handling

- .1 Brace and protect doors and frames to prevent distortion during shipment. Store in a secure dry location.
- .2 Store doors vertically, resting on planks, with blocking between to allow air to circulate.

2. PRODUCTS

2.1 Materials

- .1 Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum ZF180 zinc-iron-alloy (galvannealed) coating designation.
- .2 Minimum Core Thickness: Metallic coated sheet steel with out coating.
 - .1 Door Frames: 1.519 mm (0.060 inch).
 - .2 Doors, Face Sheets: 1.519 mm (0.060 inch).
 - .3 Lock and Strike Reinforcements: 2.66 mm (0.1 inch).
 - .4 Hinge Reinforcements: 3.416 mm (0.134 inch) thick by 38 mm (1-1/2 inch) wide by 150 mm (6 inch) longer than hinge and pivot, secured by not less than 6 spot welds.
 - .5 Surface Applied Hardware Reinforcements : 2.66 mm (0.1 inch).
 - .6 Closer or Holder Reinforcements: 2.66 mm (0.1 inch).

STEEL DOORS AND FRAMES

- .7 Floor Anchors: 1.6 mm (0.060 inch).
- .8 Frame Anchors:
 - .1 In-Place Masonry/Concrete: 0.912 mm (0.036 inch).
 - .2 Steel Stud: 0.912 mm (0.036 inch).
- .3 Touch-up primer: CAN/CGSB-1.181, Zinc rich primer.
- .4 Door Silencers: Single stud rubber/neoprene type
- .5 Welding: CSA W59-M.
- .6 Filler: Metallic paste, manufacturer's standard.

2.2 Fabrication - General

- .1 Blank, reinforce, drill and tap units for mortised, templated hardware, and electronic hardware using templates provided by the hardware suppliers. Reinforce units for surface mounted hardware.
- .2 Do welding to CSA W59.
- .3 Factory apply touch up primer to doors and frames manufactured from metallic coated steel where coating has been removed during fabrication.
- .4 Provide appropriate anchorage to floor and wall construction.
- .5 Make provisions in doors and frames to suit requirements of Section providing security devices.
- .6 Fabricate fire protection rated assemblies to ULC requirements and bearing ULC, cUL or Warnock-Hersey International Ltd., label, as acceptable to authorities having jurisdiction.
- .7 Locate fire protection rating labels on the inside of the frame hinge jamb and door hinge edge midway between the top hinge and the head of the door.

2.3 Fabrication – Frames

- .1 Fabricate frames to profiles and maximum face sizes as required to suit design, welded construction.
- .2 Cut mitres and joints accurately and weld continuously on inside of frame profile.
- .3 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.
- .4 Provide jamb anchors for fixing at floor.
- .5 Provide three door silencers on strike jamb for each single door.

STEEL DOORS AND FRAMES

2.4 Fabrication – Doors

- .1 Doors: Flush, swing type doors with longitudinal edges seamless, continuously welded, welds ground smooth, filled and sanded flush.

3. EXECUTION

3.1 Installation - General

- .1 Install fire protection rated assemblies in accordance with NFPA 80.
- .2 Touch up with primer galvanized finish damaged during installation.

3.2 Installation - Frames

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Provide suitable anchors to suit construction. Use one base anchor and two wall anchors per jamb side for frames up to 1500 mm (60 inch) and one additional wall anchor per jamb side for each additional height of 750 mm (30 inch) or fraction thereof.
 - .1 In-Place Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- .3 Secure anchorages and connections to adjacent construction.
- .4 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Remove temporary spreaders after frames are built-in.
- .5 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

3.3 Installation - Doors

- .1 Provide even clearance, measured from the pull face of doors:
 - .1 Between Top and Vertical Edges of Door and Frames: 3 mm plus/minus 1.6 mm (1/8 inch plus or minus 1/16 inch).
 - .2 Between Door Bottom of Finished Floor, Fire Protection Rated Assemblies: To NFPA 80 requirements.
- .2 Adjust operable parts for correct function.

3.4 Cleaning

- .1 Clean and make good all surfaces soiled or otherwise damaged in connection with Work. Upon completion of Work and remove debris, equipment and excess material from Site.

END OF SECTION

FINISH HARDWARE

1. GENERAL

1.1 Quality Assurance

- .1 Furnish services of an Architectural Hardware Consultant (AHC) for preparation of hardware Shop Drawings, keying, coordination with other Sections, consultation with the City and the Contract Administrator and for on-site inspections.
- .2 Inspect all hardware after installation by the Manufacturer's Representative who shall certify in writing to the City, that all hardware has been supplied and installed in accordance with the Specifications and reviewed Shop Drawings, and are functioning properly.
- .3 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .4 Provide to applicable Sections templates and information required for proper preparation and application of hardware in ample time to facilitate progress of Work.
- .5 Before furnishing any hardware, carefully check Hardware Schedule, Drawings and Specifications. Verify door hands, door and frame material and operating conditions, and assure that hardware will fit work to which it is to be attached. Advise Contract Administrator in writing of required revisions.
- .6 Templates: Check Hardware Schedule, Drawings and Specifications, and furnish promptly to applicable Sections any templates, template information and Manufacturer's literature, required for proper preparation for hardware, in ample time to facilitate progress of Work.
- .7 Provide services of competent mechanics for the installation of hardware. Make adjustments necessary to leave hardware in perfect working order. Provide written summary of Work completed and status of all items, including any adjustments, revisions or modifications.
- .8 Maintenance Seminar: Instruct City regarding proper care, cleaning and general maintenance procedures.
- .9 Source Limitations: Obtain each type of product from a single manufacturer.

1.2 REGULATORY REQUIREMENTS

- .1 Ensure hardware for fire protection rated openings complies with requirements of authorities having jurisdiction, with door and frame manufacturer's tested assemblies, and that hardware items bear labels acceptable to authorities having jurisdiction.

1.3 Extended Warranty

- .1 Warrant Work against defects in materials and quality of performance for a period of five (5) years for door closers and two (2) years for other hardware.

FINISH HARDWARE

2. PRODUCTS

2.1 Materials

- .1 Type and Design: Matching existing.
- .2 Metal Finishes: Free from defects, clean and unstained, and of uniform colour.
- .3 Fasteners: Screws, bolts, expansion shields and other fastening devices as required for satisfactory installation and operating of hardware.
 - .1 Same finish as hardware to which it is to be fastened.
- .4 Supply hardware complete with all necessary screws, bolts and other fastening of suitable size and type to anchor the hardware in position neatly and properly in accordance with the best practices and to the Contract Administrator's approval.
- .5 Hinges
 - .1 Stamp hinge catalogue numbers on face of leaf of each hinge at factory to enable easy recognition of hinge material and manufacture after doors are hung.
 - .2 Where doors are required to swing to 180 degrees, furnish hinges of sufficient throw to clear trim.
- .6 Locksets
 - .1 Cylinders and Keys: To City's existing system.
 - .2 Strikes: ANSI standard size with curved lip strikes for latch bolts and no lip strikes for dead locks. Provide complete with wrought boxes finished to match strike.
- .7 Closers
 - .1 Hydraulically controlled and full rack and pinion operation.
 - .2 Adjustable closing speed, latch speed and back check control.
 - .3 Adjustable swing power.
 - .4 Install all necessary attaching brackets, mounting channels, cover plates, etc. where necessary for correct application of door closers.
 - .5 Parallel arms at out swinging exterior doors and at interior doors where specified.
- .8 Push Plates and Kickplates
 - .1 Kickplate Length: 40 mm (1-1/2 inch) less than door width and 300 mm high.
 - .2 Thickness: 1.3 mm (0.050 inch), free of rough or sharp edges. Corners and edges to be slightly radiused.
- .9 Door Stops

FINISH HARDWARE

- .1 Install floor stops in manner so as not to create a tripping hazard and allows maximum opening of doors.
- .2 Furnish door stops of height to engage doors.

2.2 Keying System

- .1 Key locksets to suit existing system.
- .2 Stamp keys "DO NOT DUPLICATE".
- .3 Provide two (2) change keys for each lock.
- .4 Confirm with City for shipping directions.

3. EXECUTION

3.1 Preparation

- .1 Thoroughly check design and provide required hardware for openings to required detail.
- .2 Trim undesignated openings with hardware of equal quality and design to that specified for similar opening.
- .3 Furnish door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

3.2 INSTALLATION

- .1 Install finish hardware to template in accordance with Manufacturer's written instructions. Do not modify finish hardware without Manufacturer's written approval.
- .2 Install finish hardware secure, plumb, level, and true to line.
- .3 Cut and fit to substrates avoiding damage and weakening. Reinforce attachment substrate as necessary for proper installation and operation.
- .4 Size cutouts so that hardware item completely covers cutout.
- .5 Mortise work to correct location and size without gouging, splintering, and causing irregularities in exposed finish work.
- .6 Where cutting and fitting is required on substrates to be painted or similarly finished, install, fit, and adjust hardware prior to finishing.
- .7 Remove hardware and place in original packaging.
- .8 Re-install hardware after finishing operation is complete.
- .9 Install hardware items affixed to concrete and masonry with machine screws and threaded metal expansion shields.

FINISH HARDWARE

- .10 Set, fit and adjust hardware according to Manufacturer's templates and instructions. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.
- .11 Pre-drill kickplates and doors before attachment of plates. Apply with water resistant adhesive and countersunk stainless steel screws.
- .12 Weatherstrip exterior doors. Install effectively to tightly seal entire perimeter of door. Secure in place with non-ferrous screws, in accurate alignment.
- .13 Maintain integrity of weather seal at head of doors fitted with closers. Adapt weatherstripping as required to achieve specified performance and provide any necessary accessories.
- .14 After installation of hardware under this Section, check opening units for correct fit and uniformity of space around perimeter of units, or between units. Provide smoothly operating opening units free from binding.

3.3 Field Quality Control

- .1 Have hardware supplier's representative visit Site and submit written report of each visit to Site, giving storage conditions and installation details, date and name of hardware supplier's representative.
- .2 Before completion of Work but after hardware installation, have hardware supplier's representative inspect Work and submit certificate to City stating that final inspection has been made and that hardware of proper type has been properly installed and adjusted, is in good working order and condition, and is in conformance with Contract requirements.

3.4 ADJUSTMENTS AND CLEANING

- .1 Adjust and clean hardware according to Manufacturer's written instructions.
- .2 Turn over construction keys and extractor key to City and provide any required adjustment or modifications prior to substantial performance of the Contract.
- .3 Hand over to City change keys.

3.5 HARDWARE SCHEDULE

- .1 Doors 01, 02 and 03
 - .1 Three (3) Hinges 127 mm x 114 mm Mortised Concealed Ball Bearing x 626
 - .2 One (1) Storeroom Lockset
 - .3 One (1) Closer
 - .4 One (1) Floor Stop
 - .5 Two (2) Kickplates 300 mm x 630 mm
 - .6 One (1) Electric Strike 24VDC Fail Secure Von Duprin 6200 Series x C32D (Door 001 Only).

FINISH HARDWARE

END OF SECTION

GYPSUM BOARD

1. GENERAL

1.1 Quality Assurance

- .1 Install Work level to tolerance of 3 mm in 3000 mm (1/8 inch in 10 feet).
- .2 Select studs with maximum deflection of L/240 at lateral force of 480 Pa (10 psf) for maximum heights indicated.
- .3 Fire Performance Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.2 Environmental Requirements

- .1 Do not install Work in any area unless satisfied that work in place has dried out, and that no further installation of damp materials is contemplated.

1.3 Delivery, Storage, and Handling

- .1 Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- .2 Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

2. PRODUCTS

2.1 Materials - Panels

- .1 Gypsum Board, Paper Faced: ASTM C1396/C1396M, paper faced, regular and fire rated Type X core, 1200 mm (48 inch) wide x maximum practical length, ends square cut, square edged base layer and taper edged face layer.
- .2 Gypsum Board, Siliconized: ASTM C1658/C1658M, glass mat faced, regular and fire rated Type X core, 1200 mm (48 inch) wide x maximum practical length, ends square cut, taper edge, DensArmor Plus Interior Guard by G-P Gypsum Corporation or other acceptable equivalents.

2.2 Materials - Framing

- .1 Steel Studs: ASTM C645, minimum 0.46 mm (0.018 inch) base metal thickness, hot-dipped galvanized to ASTM A653/A653M G60 (Z180) zinc coating, roll formed, widths as indicated, with knock-out holes for mechanical and electrical services. Use 20 gauge studs for cement board and fiber reinforced panels.
- .2 Floor and Ceiling Tracks: ASTM C645, minimum 0.46 mm (0.018 inch) base metal thickness, hot-dipped galvanized to ASTM A653/A653M G60 (Z180) zinc coating, roll formed, width to suit studs.

GYPSUM BOARD

- .3 Furring Runners and Channels: ASTM C645, minimum 0.46 mm (0.018 inch) base metal thickness, hot-dipped galvanized to ASTM A653/A653M G60 (Z180) zinc coating, roll formed.
- .4 Hangers, Tie Wires, Inserts, Anchors: Manufacturer's standard.
- .5 Channel Bridging: Hot dipped galvanized, 1.37 mm (0.0538 inch) bare steel thickness, 38 mm (1-1/2 inch) deep with minimum 12.7 mm (1/2 inch) wide flange.
- .6 Backing Plate: Galvanized steel sheet for blocking and bracing in length and width indicated, minimum base metal 0.8 mm (0.0312 inch) thick.

2.3 Accessories

- .1 Casing Beads, Corner Beads: 0.48 mm (25 gauge) hot dipped galvanized steel, perforated flanges, designed to be concealed with joint compound; one piece length per location.
- .2 Sealant: Acoustical sealant by Tremco Ltd.
- .3 Joint and Laminating Compounds: As recommended by gypsum board manufacturer, high bond, low shrinkage and asbestos-free.
- .4 Joint Tape: 50 mm (2 inch) wide reinforced tape.
- .5 Vapour Retarder: 6 mil thick clear polyethylene.
- .6 Insulation: Mineral fibre, AFB by Roxul Inc., SAFB by Fibrex, or other approved equivalents, width to match stud spacing.
- .7 Gypsum Board Screws: ASTM C1002, self-drilling, self-tapping gypsum board screws, 25.4 mm (1 inch) long #6 for single layer application, 41.3 mm (1-5/8 inch) long #7 for double layer application.

3. EXECUTION

3.1 Installation - Partition and Wall Framing

- .1 Align partition top and bottom tracks and secure by screws at 600 mm (24 inch) o.c. maximum.
- .2 Place studs vertically at 400 mm (16 inch) o.c. unless otherwise noted, and not more than 50 mm (2 inch) from abutting walls, and at each side of openings and corners. Position studs in top and bottom tracks.
- .3 Screw attach end studs to top and bottom tracks. Screw attach intermediate studs to bottom tracks. Secure intermediate studs to top tracks by crimping or by other means of fastening acceptable to Contract Administrator.
- .4 Continuously cross brace steel studs at 1500 mm (60 inch) on centre to provide rigid installation to Manufacturer's instructions.

GYPSUM BOARD

- .5 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
- .6 Provide two (2) studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm (2 inch) apart using clips or other approved means of fastening placed alongside frame anchor clips.
- .7 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with Manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .8 Frame openings and around built-in equipment, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .9 Provide stud, furring channel, and backing plates secured between studs for attachment of fixtures, electrical boxes, and other items. Comply with stud and gypsum board manufacturers' written recommendations.
- .10 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .11 Apply two (2) continuous beads of sealant at junctions of metal framing and structure, including bottom and top tracks, where partitions abut fixed building components. Fill junction completely and continuously from floor to ceiling, or to structure for full height partitions.
- .12 Frame for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .13 Where vapour retarder carries over metal framing members ensure that installation of insulation and vapour barrier and perimeter seals are complete before applying gypsum board finish. Tape vapour barrier joints.

3.2 Installation - Suspended Ceiling Framing

- .1 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.
- .2 Space framing members at 400 mm (16 inch) centres.
- .3 Provide additional ceiling suspension hangers within 150 mm (6 inch) of each corner and at maximum 600 mm (24inch) around perimeter of light fixtures and diffusers.
- .4 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

3.3 Installation - Gypsum Panels

- .1 Do not apply gypsum panels until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply gypsum panels to framing using screw fasteners, at 300 mm o.c. and at closer spacings as required for fire resistance rated assemblies.

GYPSUM BOARD

- .3 Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- .4 Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1.6 mm (1/16 inch) of open space between panels. Do not force into place.
- .5 Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- .6 Attach gypsum panels to framing provided at openings and cutouts.
- .7 Form control and expansion joints with space between edges of adjoining gypsum panels.
- .8 Cover both faces of steel stud partition framing with gypsum panels in concealed spaces.
 - .1 Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 0.7 sq.m. (8 sq.ft.) in area.
 - .2 Fit gypsum panels around ducts, pipes, and conduits.
 - .3 Where partitions intersect open joists and other structural members projecting below underside of slabs and decks, cut gypsum panels to fit profile formed by joists and other structural members; allow 6 mm to 10 mm (1/4 inch to 3/8 inch) wide joints to install sealant.
- .9 Gypsum board single layer application:
 - .1 On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - .2 On partitions and walls, apply gypsum panels parallel to framing, unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints.
 - .3 Stagger abutting end joints not less than one framing member in alternate courses of board.
- .10 Single layer fastening method: Fasten gypsum panels to supports with steel drill screws.

3.4 Installation - Insulation

- .1 Provide continuous coverage between studs and run continuously from floor to ceiling, or to structure for full height partitions, over door frames and openings and around corners.
- .2 Pack insulation around cut openings in gypsum board, behind outlet boxes around plumbing, heating or structural items passing through the system and at abutting walls.
- .3 Secure insulation to one interior face of gypsum board with adhesive or mechanical fasteners or by other approved means.

GYPSUM BOARD

- .4 For partitions receiving insulation, provide minimum two (2) continuous beads of acoustical sealant at junctions between top and bottom tracks and the structure.

3.5 Installation - Fire Rated Assemblies

- .1 Construct fire rated assemblies where indicated, to requirements of authorities having jurisdiction.

3.6 Installation - Accessories

- .1 Erect casing beads, corner beads straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured by screw fasteners. Fit corners accurately, free from rough edges.
- .2 Provide corner beads at external corners of gypsum board partitions and where indicated.
- .3 Provide casing beads at gypsum board terminations, at gypsum board wall/ceiling junctions, where gypsum board butts against surfaces having no trim concealing junction and where indicated.
- .4 Construct control joints of two (2) back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint. Provide continuous polyethylene dust barrier behind and across control joints.

3.7 Installation - Access Doors

- .1 Install access doors to electrical and mechanical fixtures specified in respective Sections.
- .2 Rigidly secure frames to furring or framing systems.

3.8 Installation - Taping and Filling

- .1 Apply joint compounds and reinforcing tapes in accordance with Manufacturer's specifications.
- .2 Fill joints, casing beads, corner beads, screwholes and depressions on gypsum board surfaces exposed to view to provide smooth seamless surfaces and square neat corners.
- .3 Apply joint compounds, after preceding coat has dried, free of tool marks and ridges and excess joint compound. Feather edge compounds onto surfaces of gypsum boards. After final coat has dried for at least twenty four (24) hours sand to leave smooth for decoration. Do not sand paper face of gypsum board.
 - .1 First Coat: Apply tape embedment coat in width to suit tape.
 - .2 Second Coat: Apply to 175 mm (7 inch) wide, centred on joints and corners.
 - .3 Third Coat: Apply to 300 mm (12 inch) wide, centred on joints and corners.
- .4 Joints, Three Coat Method: Fill gaps between boards with joint compound. Embed reinforcing tape in a first coat of joint compound. Apply two (2) additional separate coats of joint compound. Let dry and sand smooth.

GYPSUM BOARD

- .5 Internal Corners, Two Coat Method: Fill gaps between boards with joint compound. Embed creased reinforcing tape into a first coat of joint compound applied 50 mm (2 inch) wide at each side of corner. Apply second coat of compound to one side of joint. Let dry and apply compound to other side. Let dry and sand smooth.
- .6 Fastener Heads and Accessories, Three Coat Method: Fill holes, depressions and nose of accessories with a three coat application of joint compound. Let dry and sand smooth.
- .7 Gypsum Board Above Finished Ceiling: Finish accessories, joints, and interior angles with tape and first coat of joint compound. Tool marks and ridges are acceptable, no other finishing required.
- .8 Siliconized Gypsum Board:
 - .1 Entire Surface: One coat of purpose made compound. Let dry and sand smooth.

END OF SECTION

EPOXY FLOORINGS

1. GENERAL

1.1 Quality Assurance

- .1 Installer Qualifications: Trained and approved by the manufacturer and having a minimum three (3) years experience in the installation of the Work described in this Section and can show evidence of satisfactory completion of projects of similar size, scope and type. If requested, provide letter of certification from manufacturer stating that installer is certified applicator of its products, and is familiar with proper procedures and installation requirements required by the manufacturer.
- .2 Maintenance Seminars: Engage a factory authorized service representative to train City's maintenance personnel on proper maintenance procedures.
- .3 Pre-Installation Meeting: Two (2) weeks prior to commencing Work of this Section, arrange for Manufacturer's Technical Representative to visit the Site and review preparatory and installation procedures to be followed, conditions under which the Work will be done, and inspect the surfaces to receive the Work of this Section. Advise the Contract Administrator of the date and time of the meeting.
- .4 Manufacturer's Site Inspection: Have the Manufacturer's Technical Representative inspect the Work at suitable intervals during application and at conclusion of the Work of this Section, to ensure the Work is correctly installed. When requested, submit Manufacturer's inspection reports and verification that the Work of this Section is correctly installed.
- .5 Fire Performance Characteristics: Provide Work with fire performance characteristics required by authority having jurisdiction, and determined by actual testing by testing agency acceptable to authorities having jurisdiction.
- .6 Testing of Concrete Floors: Test floors that have been cured for minimum twenty eight (28) days, and after preparation for Product installation is complete and patching or levelling compound is fully cured. Conduct testing simultaneously on floors free of sealer, curing compounds, oil, grease and other agents detrimental to the test and Product performance. Locate test sites to cover representative installation areas. Do not proceed with Work when the test results do not conform to the specified allowable.
 - .1 Cohesive Strength: Minimum 1.5 MPa (210 psi) by tensile load as tested to CSA A23.2-6B. Do one (1) test for every 93 sq.m. (1000 sq.ft.) or fraction thereof.
 - .2 Moisture Vapour Transmission: ASTM D4263 plastic sheet method, no visible condensation or vapour allowed. Do one (1) test for every 46 sq.m. (500 sq.ft.) or fraction thereof.
 - .3 Surface Moisture Content: Maximum 4%, tested by moisture meter. Do one (1) test for every 46 sq.m. (500 sq.ft.) or fraction thereof.
 - .4 Surface Temperature: Minimum 3°C above the measured dew point.

1.2 Delivery, Storage and Handling

- .1 Deliver materials to Site and store in their original packaging, bearing Manufacturer's name.

EPOXY FLOORINGS

- .2 Protect and store materials in dry, well ventilated and weatherproof space. During winter, store materials in heated space with min. 10°C (50°F) temperature, remove only as needed for immediate use. Keep materials away from open flame or welding sparks.
- .3 Store carefully on end, with selvaige edges up materials delivered in rolls.

1.3 Protection

- .1 Protect surfaces which are not to be waterproofed from soiling by spillage, overspray, or other causes in connection with work of this Section.

1.4 Environmental Requirements

- .1 Maintain air temperature and structural base temperature above 5°C for twenty four (24) hours before, during and twenty four (24) hours after installation.
- .2 Provide forced air circulation during installation and curing periods for enclosed applications.

1.5 Warranty

- .1 Warrant Work of this Section against defects or deficiencies for a period of five (5) years commencing from date of Total Performance. Promptly correct, at no expense to City, any defects or deficiencies which become apparent within warranty period.

2. PRODUCTS

2.1 Materials

- .1 Waterproofing and Epoxy Flooring (MRW): Liquid applied high solids elastomeric epoxy, epoxy urethane or polyurethane waterproofing, and high solids wearing course, MRW System by Sika; Resoclad Type II System by Duochem Inc; Stonproof ME7/Stonkote GS4 by Stonhard Limited.
- .2 Epoxy Floor Coating (EF): Low VOC, low odour; coating and sealer; slip-resistant finish; standard colour, Duochem 9400 by Duochem Inc., Stonkote GS4 by Stonhard Limited or FastFlor CR by Sika.
- .3 Subfloor Filler: Compatible to floor coating and as recommended by coating manufacturer.
- .4 Joint Reinforcement: Spun bound nylon or polyester reinforcement tape as required and recommended by manufacturer.
- .5 Primer: As recommended by waterproofing manufacturer.
- .6 Joint Sealant: Compatible with waterproofing materials and approved by membrane manufacturer, self-levelling for horizontal surfaces and non-sag for vertical surfaces.

EPOXY FLOORINGS

3. EXECUTION

3.1 Examination

- .1 Inspect surfaces to receive membrane waterproofing to assure they are dry and free from conditions that will adversely affect execution, permanence, or quality of Work.
- .2 Ensure that surfaces to receive work have been provided as specified in the Work of other Sections; that they will not adversely affect execution, permanence or quality of Work; and that they can be put into acceptable condition by means of preparation specified in this Section.

3.2 Preparation

- .1 Before and during application, remove dust and dirt from substrate surfaces.
- .2 Remove laitance, curing compounding, loose and unsound concrete by mechanical means. Prepare surface by steel shot blasting, grit blasting, chisel or hammer chipping. Ensure substrate surfaces receiving Work of this Section are hard, sound, and roughened to irregular surface with weak concrete removed and surface holes and voids exposed.
- .3 Repair holes or other deficiencies in accordance with Manufacturer's recommendations.
- .4 Reinforce construction joints and cracks to Manufacturer's instructions by stretch coating minimum 100 mm (4 inch) wide or by 75 mm (3 inch) wide joint reinforcement centred on cracks.
- .5 Seal joints and/or spaces between substrate and pipes, columns, all wall/floor junctions and other items passing through substrate.

3.3 Application - General

- .1 Mix and apply Work in strict accordance Manufacturer's printed directions in specified thickness, with integral cove bases, uninterrupted except at sawn joints or other types of joints required, free of laps, pin holes, voids, crawls, skips or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.
- .2 Work coating into corners and other restricted areas, up and over bases, and into recesses in floors to ensure full coverage.
- .3 Make clean true junctions with no visible overlap between adjoining applications of coatings.
- .4 Primer: Apply primer over prepared substrate, at Manufacturer's recommended spreading rate with timing of application co-ordinated with subsequent application of Work to ensure optimum adhesion between flooring materials and substrate.
- .5 Cove Base: Provide 150 mm (6 inch) high cove base struck straight to provide line for wall finish.

EPOXY FLOORINGS

3.4 Application –Waterproofing and Epoxy Flooring (MRW)

- .1 Install waterproofing in accordance with the recommendations of the manufacturer and in a manner to make the treated surfaces waterproof.
- .2 Apply membrane material in 2 coat application on substrate and over cracks to achieve minimum uniform continuous coating of 0.5 mm (20 mils) dry film thickness.
- .3 Apply wearing course material in 1 coat application on waterproofing membrane to achieve uniform continuous coating of 0.25 mm (10 mils) dry film thickness.
- .4 Total minimum thickness of system: 0.75 mm (30 mils).
- .5 Extend waterproofing material, minimum 150 mm (6 inch) onto vertical surfaces to form waterproofed base, ensure continuity of the membrane.
- .6 At floor drains, install waterproofing around perimeter of drains to obtain waterproofing material which is flush with top of drain and slopes as indicated on Drawings.

3.5 application – epoxy floor coating (EF)

- .1 Finish coats: Apply minimum of two (2) finish coats at spreading rate recommended by manufacturer to achieve minimum total thickness of 0.5 mm (0.020 inch) DFT. Allow minimum recommended drying time between coats.
 - .1 Base Coat: Apply base coat and immediately broadcast aggregates and back roll to obtain slip-resistant texture finish. Let dry.
 - .2 Top Coat: Apply top coat to dry base coat for consistent appearance.

3.6 ADJUSTMENT AND CLEANING

- .1 Touch up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.
- .2 Remove promptly as Work progresses spilled or splattered coating materials from surfaces of Work performed under the Sections. Clean floors on completion of work. Do not mar surfaces while removing splatters.
- .3 Protect complete Work from traffic for minimum one (1) week to allow proper curing of floor finish. Protect Work from any trades using area after completion of installation.

END OF SECTION

FINISH PAINTING

1. GENERAL

1.1 Quality Assurance

- .1 Employ a Subcontractor with a minimum of two (2) years experience as an independent contractor specializing in painting.
- .2 Comply with requirements of the OPCA Manual (Canadian Painting Contractors Architectural Painting Specification Manual, latest edition, available from the Ontario Painting Contractors Association) and CAN/CGSB-85.100, except where greater requirements are specified.

1.2 Submittals

- .1 Provide paint samples for approval as required by the Contract Administrator.
- .2 Before ordering, submit a schedule endorsed by the paint manufacturers of all paint types, showing brands and quality identification of material to be used, for approval.

1.3 Delivery, Storage and Handling

- .1 Provide a room or rooms for storage of paint materials and equipment. Keep room clean, under lock and key, and surrounding surfaces protected against damage. Provide a carbon dioxide fire extinguisher in each storage room.
- .2 Keep oily rags, waste and other similar combustible materials in closed metal containers and remove at end of each day. Take precautions to avoid spontaneous combustion.
- .3 Provide adequate cover for all finished work close to surfaces to be painted. Covers shall be placed before painting commences and remain until completed.
- .4 Post "wet paint" signs while Work is in process or drying.
- .5 Post "no smoking" signs where volatile materials are being used.

2. PRODUCTS

2.1 Materials

- .1 Acceptable products: Listed in Chapter 5 of OPCA Manual, highest grade, first line quality of the manufacturer.
- .2 Paint and coating materials for each system shall be products of a single manufacturer.
- .3 Thinners, Cleaners, etc.: Type and brand recommended by the paint manufacturer, bearing identifying labels.
- .4 Gloss Terms: Having the following values when tested in accordance with ASTM D523 "Test for Specular Gloss", 60 degree gloss meter method:
 - .1 Flat: 5 to 20.

FINISH PAINTING

- .2 Eggshell: 20 to 40.
- .3 Semi-gloss: 40 to 60.
- .4 Gloss: 60+.

3. EXECUTION

3.1 Preparation - General

- .1 Thoroughly vacuum clean all surfaces to be painted.
- .2 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or dropping from fouling surfaces not being painted.
- .3 Place cotton waste, cloths and material which may constitute a fire hazard in metal containers and remove daily from site.
- .4 Remove all electrical plates, surface hardware, fittings and fastenings, prior to painting operations. Store and replace in undamaged condition on completion of Work in each area.
- .5 Mask off and protect finished surfaces and materials in a manner acceptable to the Contract Administrator.

3.2 Preparation - Wood

- .1 Sand finish surfaces smooth with No. 00 sandpaper. Clean soiled surfaces with an alcohol wash. Wipe off dust and other loose dirt, or vacuum clean before application of coatings.
- .2 Seal knots, pitch, and sapwood with two coats of shellac. After prime coat is dry and sanded, fill nail and screw holes, and cracks with wood filler, or with putty for interior Work and caulking compound for exterior Work. Colour fillers to match wood or stain if surfaces are given clear final coatings. Smooth, sand, and prime fillers when set.
- .3 Sand and fill exposed plywood and particle board edges. Use filler compatible with finishing materials.

3.3 Preparation - Metal Surfaces

- .1 Unprimed steel: Remove weld flux, scale and rust with scrapers, wire brushes, wire power wheels, sandblasting, chipping, or grinding as may be required. Finish surfaces smooth, and remove weld flux alkali contamination with phosphoric acid solution. Wash with solvent.
- .2 Primed steel: Before touch-up of prime paint, smooth out surface irregularities; clean weld joints, bolts, nuts, and damaged areas with phosphoric acid solution; and wash with solvent.
- .3 Galvanized steel: Prepare galvanized surfaces using abrasive blast cleaning with sand. Wash thoroughly with mineral spirits, and wipe dry with completely clean cloths. Phosphatize surfaces, or apply one coat of etch type primer unless otherwise specified.

FINISH PAINTING

3.4 Application

- .1 Do Work by skilled tradesperson, to Manufacturer's directions. Apply paint only when dust-free conditions prevail. Results shall be even, uniform in sheen, colour and texture; free from brush or roller marks, or other defects.
- .2 Apply paint by brush or roller. Spray painting may be permitted at the approval of the Contract Administrator before work commences.
- .3 The Contract Administrator may at any time prohibit the use of spray painting for such reasons as carelessness, poor masking or protective measures, drifting paint fog, disturbance to other trades or failure to obtain a dense, even, opaque finish.
- .4 Do not paint over fire rating labels on doors and frames and over identification labels on mechanical and electrical equipment.
- .5 Permit paint to dry and touch up suction spots before applying succeeding coats.
- .6 Tint various coats of multiple coat work to distinguish between coats.
- .7 The painting coats as specified are intended to cover surfaces perfectly. If the Contractor is of the opinion that the specified materials will not provide uniform coverage, report in writing to the Contract Administrator, before commencing the Work. If surfaces finished as specified are not covered perfectly apply additional coats at no additional cost.
- .8 Use same brand of paint for primer, intermediate, and finish coats.
- .9 Reduce materials only when indicated by paint manufacturer. Reduce only with approved thinner.
- .10 Remove finishing hardware, fittings and trim prior to painting and replace after painting is finished. Alternatively, use masking tape and remove tape before paint is dry.
- .11 Strain paint through fine mesh if hardened paint or foreign materials are present in the container.

3.5 Mechanical, Electrical Equipment and Related Surfaces

- .1 Unless otherwise specified or noted, finish all unfinished conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:
 - .1 Where exposed to view areas.
 - .2 In interior high humidity areas.
 - .3 In mechanical and electrical rooms.
- .2 In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .3 Touch up scratches and marks on factory finished equipment with products compatible with factory finish.

FINISH PAINTING

- .4 Do not paint over nameplates.
- .5 Paint the inside of all ductwork where visible behind louvers, grilles and diffusers for a minimum of 450 mm or beyond sight line, whichever is greater, with primer and one coat of flat black paint.
- .6 Paint the inside of light valances gloss white.
- .7 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .8 Paint or band all fire protection piping and sprinkler lines in accordance with mechanical specification requirements. Keep sprinkler heads free of paint.
- .9 Paint or band all natural gas piping in accordance with mechanical specification requirements.
- .10 Back prime and paint face and edges of plywood service panels for telephone and electrical equipment before installation to match adjacent wall surface. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Paint exterior steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.6 Existing Surfaces

- .1 Paint or repaint all existing surfaces of items or rooms where noted, including "new" Work which has been incorporated into the existing Work and existing Work which has been damaged, altered or otherwise disturbed during renovation operations.
- .2 Repaint surfaces or rooms adjacent to rooms where alterations or renovations have been carried out and which have been damaged or otherwise disturbed by the alterations or renovations. Where such damages occur, repaint completely.
- .3 Remove from existing surfaces to be painted all rust, scale, oil grease, mildew, chemicals and other foreign matters.
- .4 If coatings on existing surfaces have failed so as to affect the proper performance or appearance of paint to be applied, or if such coatings can be easily removed, remove them and prepare the substrates properly. Dull hard or glossy surfaces by sanding, sandblasting or by other abrasive methods prior to painting.
- .5 Repaint surfaces entirely between changes of planes which have been incorporated into the existing Work and existing Work which has been damaged, altered or otherwise disturbed during renovation operations. Give existing surfaces two coats of paint or enamel over the existing finish to match the previous finish.

3.7 Interior Finishes

- .1 System references listed are based on Chapter 4B (Interior) of OPCA Manual and are Premium Grade, unless noted otherwise:

FINISH PAINTING

.2 Gypsum Board

.1 Gypsum Board Ceiling, Latex, Egg Shell: INT. 4-B.

.2 Gypsum Board Walls, Latex, Semi-Gloss: INT. 4-B.

.3 Galvanized and Zinc Coated Steel

.1 Latex Finish, Semi-Gloss: INT-13-D.

3.8 Cleaning

.1 Remove paint marks and splatterings, as Work proceeds and on completion.

END OF SECTION

HYDRONIC PIPING

1. GENERAL

1.1 Quality Assurance

- .1 Welding materials, fabrication standards and labour qualifications must conform to ANSI/ASME B31.1, ANSI B16.25, ASME Section IX, and the Provincial Board of Labour Regulations latest current editions.
- .2 Use welders fully qualified and licensed by Provincial Authorities.
- .3 Non-specified pipe joining and pipe fitting methods such as T-drill and press fit are not permitted in any piping system covered under Division 23.

2. PRODUCTS

2.1 Pipe

	Service	Material
.1	Hot water and glycol heating to 120°C (250°F)	Steel, Sch.40, ASTM A53, Grade B heating to 120°C (250°F)
.2	Equipment drains and overflows	Sch.40, galvanised steel, ASTM A120 Type L hard copper ASTM B88M

2.2 Fittings and Joints

	Service	Material	Joint
.1	Hot water and glycol heating 120°C (250°F)	Banded malleable iron, 1033 kPa (150 psi), up to 50 mm	Screwed
		Steel, same schedule as pipe, for sizes 50 mm and larger	Welded
		Cast steel mechanical	Grooved, Victaulic Brand or Grinnel Gruv-Lok only
.2	Equipment drains and overflows	Galvanised banded malleable iron	Screwed
		Wrought copper, bronze	50-50 solder
		Cast brass	Screwed
.3	Use factory fabricated butt welded fittings for welded steel pipes.		
.4	Use long radius elbows for steel and cast iron water piping, including grooved mechanical fittings.		

HYDRONIC PIPING

2.3 Unions, Flanges and Couplings

- .1 Size 50 mm and under: 1033 kPa (150 psi) malleable iron, bronze to iron ground joint unions for threaded ferrous piping, air tested for gas service, all bronze for copper piping.
- .2 Sizes 65 mm and over: 1033 kPa (150 psi) forged steel welding neck flanges for ferrous piping, 1033 kPa (150 psi) bronze slip-on flanges for copper piping. Gaskets shall be 1.5 mm (1/16 in) thick performed synthetic rubber bonded asbestos.
- .3 Flange bolting: For systems up to 120°C (250°F), use carbon steel stud bolts, semi-flushed and heavy hex nuts, ASTM A307-GrB. For systems up to 215°C (420°F), use alloy steel bolts ASTM A193-GrB7, and semi-finished heavy hex nuts ASTM A194-Gr2H.
- .4 Where permitted by the Contract Administrator, use grooved mechanical couplings to engage and lock grooved or shouldered pipe ends and to allow for some angular deflection, contraction and expansion. Couplings consist of malleable iron housing-clamps, C-shaped composition sealing gasket EPDM Grade E and steel bolts. Use galvanised couplings for galvanised pipe. All grooved mechanical couplings and fittings shall have a minimum working pressure of 1033 kPa (150 psi). Victaulic brand or Grinnel Gruv-Lok only.

3. EXECUTION

3.1 Preparation

- .1 Ream pipes and tubes. Clean off scale and dirt, inside and outside, before assembly. Remove welding slag or other foreign material from piping.
- .2 Protect all steel pipes when stored on site from external conditions and ensure protective coating remains intact. If in the opinion of the Contract Administrator, deterioration of the protective coating has instigated corrosion, all rust must be removed down to bare metal and prime coated with red oxide paint.

3.2 Connection

- .1 Screw joint steel piping up to and including 40 mm. Weld piping 65 mm and larger, including branch connections. Screw or weld 50 mm piping for liquid systems, weld 50 mm piping for air and gas systems.
- .2 Make screwed joints with full cut standard taper pipe threads with approved non-toxic joint compound applied to male threads only.
- .3 Make joints for plain end pipe with gasket and clamp type mechanical fastener.
- .4 Clamp cast iron water pipe at fittings with 20 mm rods and properly anchor and support.
- .5 Use grooved mechanical couplings and mechanical fasteners, only where permitted by the Contract Administrator.
- .6 Use galvanised couplings with galvanised pipe.
- .7 Make connections to equipment, specialty components, and branch mains with unions or flanges.

HYDRONIC PIPING

- .8 Provide dielectric type connections wherever joining dissimilar metals in open systems. Brass adapters and valves are acceptable.
- .9 Use insulating plastic spacers for copper pipe installation in metal studs.

3.3 Route and Grades

- .1 Route piping in orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space. Run exposed piping parallel to walls. Group piping wherever practical at common elevations. Install concealed pipes close to the building structure to keep furring to a minimum.
- .2 Slope water piping 0.2% and provide hose bibb drains at low points.
- .3 Equip low points with 20 mm drain valves and hose nipples.
- .4 Provide air collection chambers with manual air vent at all high points of system. Collection chambers to be 25 mm dia. or line size whichever is greater and 150 mm high minimum. Square tees may only be used to assist with complete venting and draining.
- .5 Make reductions in water pipes with eccentric reducing fittings installed to provide drainage and venting. Top flat for water pipes
- .6 Grade horizontal drainage and vent piping 2% minimum, unless noted otherwise.
- .7 Pipe the discharge from all relief valves, safety valves, vents, drains, equipment blowdowns, water columns and overflows to the nearest building drain. Pipe to glycol recovery tanks for a glycol based system.

3.4 Installation

- .1 Install piping to allow for expansion and contraction without unduly stressing pipe or equipment connected.
- .2 Provide clearance for proper installation of insulation and for access to valves, air vents, drains and unions.
- .3 Install piping material specified as inside the building to 2400 mm outside of building.

3.5 Welded Pipe Branch Connections

- .1 Make branch connections according to the following schedule.

Legend:

T: Forges tee or reducing tee

S: Socolet

W: Weldolet

HYDRONIC PIPING

HEADER PIPE SIZE (mm)	BRANCH PIPE SIZE (mm)													
	15	20	25	30	40	50	65	75	100	150	200	250	300	
15	T													
20	T	T												
25	T	T	T											
30	T	T	T	T										
40	T	T	T	T	T									
50	S	S	S	T	T	T								
65	S	S	S	S	T	T	T							
75	S	S	S	S	S	T	T	T						
100	S	S	S	S	S	T	T	T	T					
150	S	S	S	S	S	W	T	T	T	T				
200	S	S	S	S	S	W	W	W	T	T	T			
250	S	S	S	S	S	W	W	W	W	T	T	T		
300	S	S	S	S	S	W	W	W	W	W	T	T	T	

END OF SECTION