Design & Build Contract

Canola Oil Transload Facility

PROJECT REF: CAVAN-MIS-2022-342/D&B/2022/022

DP World Fraser Surrey Inc.

Contract Documents

Volume 2: Employer's Requirements

Part 3: Performance and Technical Specifications – Building Works

September 2023

Design & Build Contract

Canola Oil Transload Facility

VOLUME 2 – Employer's Requirements

Part 3: Performance and Technical Specifications – Building Works

Prepared for

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Prepared by

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DP World FZE

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P3.1.1 Introduction

This document forms part of the Employer's Requirements for this Contract and is issued as part of a set of documents:

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Volume 2 – Employer's Requirements
Part 3: Performance and Technical Specifications – Buildings Works

- Volume 1: Commercial
- Volume 2: Employer's Requirements ○ Part 1: General Requirements
  - ○ Part 2: Performance, Design and Technical Specification for the Civil & Process Mechanical Works ○ **Part 3: Performance, Design and Technical Specification for the Building Works**
- Volume 3: Drawings
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This volume (Volume 2 Part 3) describes the Performance, Design and Technical Specification for the Building Works and shall be read in conjunction with all the other documents listed above.

This Specification has been produced to inform the Contractor of the minimum requirements of the Employer, the standard of work expected and the quality of the finished project. The Contractor shall also consider all of the requirements of the authorities having jurisdiction on the site and relevant local and authority standards and follow whichever is more stringent in the opinion of the Engineer.

The Contractor shall carry out all necessary investigations and advanced detailed studies and shall take full responsibility for his design. The Employer makes no guarantee of warranty, express or implied as to the accuracy, adequacy or completeness of any information that is contained or referenced in this Performance Specification.

This technical Specification shall represent the minimum requirements that apply but not limited to the following building:

MCC Building:

MCC building shall be modular, insulated, pre-engineered, and prefabricated building (self-framing or light steel frame) with all specified electrical equipment pre-installed. MCC Building will provide power throughout different areas and equipment of the site. Refer to the Electrical Single Line Diagram for MCC-01 and equipment layout drawing for equipment details inside the building. MCC to include but not limited to, HVAC, fire suppression system meeting best practices for an electrical / motor control room, and perimeter storm drain.

The MCC Building shall also include a Programmable Logic Controller (PLC) / Electrical room, and a Control Room.

Operator Shelters:

Shelters will be designed to provide weather protection and will include electrical hookup and a workstation.

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P3.2 Building Architectural and General Requirements

For details regarding Site Clearance refer to Employer's Requirements, Vol. 2 Part 2 for all technical specifications with respect to Structural Steelwork concerning Buildings.

P3.2.1 Earthworks

For details regarding Earthworks refer to Employer's Requirements Vol. 2 Part 2 for all technical specifications with respect to Earthworks concerning Buildings.

P3.2.2 Concrete Work

For details regarding Concrete Work refer to Employer's Requirements, Vol. 2 Part 2, for all technical specifications with respect to concrete Work concerning Buildings.

P3.2.3 Structural Steelwork

For details regarding Structural Steelwork refer to Employer's Requirements, Vol. 2 Part 2 for all technical specifications with respect to Structural Steelwork concerning Buildings.

P3.2.4 Protection of Steelwork against Corrosion

For details regarding protection of Steelwork against Corrosion refer to Employer's Requirements, Vol. 2 Part 2 for all technical specifications with respect to Protection of Steelwork against Corrosion concerning Buildings.

P3.2.5 Roof and Wall Cladding

P3.2.5.1 Steel Roof Cladding General

P3.2.5.1.1. Scope

This specification covers the furnishing and supply materials including equipment and labor necessary to complete the installation of corrugated metal panels as shown in the drawings.

The Roof Cladding shall be profiled metal sheeting.

P3.2.5.1.2. Performance requirements

General: Provide manufactured profiled metal sheeting assemblies complying with the performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure.

Structural Performance: Provide manufactured profiled metal sheeting assemblies capable of safely supporting design loads indicated under in-service conditions with vertical deflection no greater than the following, based on testing manufacturer's standard units according to ASTME 1592 or AS 1170 or approved standard.

Maximum permitted deflection is 1/180 of Span.

P3.2.5.1.3. Submittals

Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total Panel assemblies.

Shop Drawings: Show layouts of panels on roofs, details of edge conditions, joints, sheeting profiles, supports, anchorages, trim, flashings, closures, and special details.

Samples for Verification: Provide sample sheeting 300 mm. long by actual panel width, in the profile, style, color, and texture indicated. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.

Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Engineers and Employer, and other information specified.

Product Test Reports: Indicate compliance of manufactured wall panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

Any samples of panels shall be provided for inspection sufficiently in advance their manufacture and/or inclusion within the permanent works, to allow the Engineer time to make comments and determine their acceptability.

P3.2.5.1.4. Quality Assurance

Installer Qualifications: Engage an experienced installer who has completed profiled metal sheeting projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Roofing System Installer Qualifications: The roofing system shall be installed by competent personnel, who are experienced in the installation of roofing systems similar in design, material, and extent to that purposed for this project.

P3.2.5.1.5. Delivery, Storage and Handling

Deliver sheeting and other components so they will not be damaged or deformed. Package sheeting, for protection against damage, during transportation or handling.

Handling: Exercise care in unloading, storing, and erecting sheeting to prevent bending, warping, twisting, and surface damage.

Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather tight and ventilated covering. Store sheeting, to ensure dryness. Do not store sheeting in contact with other materials that might cause staining, denting, or other surface damage.

P3.2.5.1.6. Project Conditions

Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Co-ordinate fabrication schedule with the construction progress, to avoid delaying of the Work.

P3.2.5.1.7. Warranty

General Warranty: Special warranties specified in this Article shall not deprive the Employer of other rights the Employer may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on profiled metal sheeting within the specified warranty period and agreeing to repair finish or replace roof sheeting that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

Finish Warranty Period: 10 years from date of Substantial Completion.

Weather tight warranty period: 5 years from date of substantial completion.

P3.2.5.1.8. Products

Metals and Finishes

Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755 (ASTM A 755M) or approved standard and the following requirements:

Galvanized Steel Sheet: ASTM A 653, G550 (ASTM A 653M, Z275) or JIS 3312-Z25; structural quality, or approved standard or;

Minimum Thickness: 0.5 mm. unless otherwise indicated.

Finish: Apply the following organic coating in thickness indicated. Furnish appropriate air- drying spray finish in matching color for touch-up.

Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermo cured system composed of specially formulated inhibitive primer and fluoropolymercolour topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm).

Color: As selected by Engineer from manufacturer's full range of colors.

Roof Panel Assemblies

Boltless Sheeting: Manufacturer's standard factory-formed, standing-seam roof panel assembly designed for concealed mechanical attachment of panels to roof purlins or deck.

Clips: Provide stainless-steel sheeting clips designed to meet negative-load requirements.

Thermal Insulation

Provide and install thermal insulation complying with Section "Building Insulation" of this Specification.

Miscellaneous Materials

General: Provide materials and accessories required for a complete sheeting assembly and as recommended by sheeting manufacturer, unless otherwise indicated.

Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

Closure Strips: Closed-cell, self-extinguishing, expanded, and cellular, rubber or cross- linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

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Sealing Tape: Provide Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to seal joints in panel roofing and remain weathertight. Provide sealant recommended by panel manufacturer.

Expansion-Joint Sealant: For hooked-type expansion joints that must be free to move, provide nonsetting, non-hardening, non-migrating, heavy-bodied polyisobutylene sealant.

P3.2.5.1.9. Execution

P3.2.5.1.9.1. Examination

Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of profiled metal sheeting.

Panel Supports and Anchorage: Examine roof framing to verify that purlins, angles, channels, and other secondary structural panel support members and anchorage have been installed according to written instructions of panel manufacturer.

Do not proceed with sheeting installation until unsatisfactory conditions have been corrected.

P3.2.5.1.9.2. Preparation

Coordinate profiled metal sheeting with rain drainage work; flashing; trim; and construction of decks, parapets, walls, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

P3.2.5.1.9.3. Sheeting Installation

General: Comply with sheeting manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

Field cutting exterior panels by torch is not permitted.

Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by permanent separation as recommended by the cladding manufacturer.

Installation Tolerances: Shim and align sheeting units within installed tolerances of 6 mm. in 6 m. to line lines indicated.

P3.2.5.1.9.4. Cleaning and Protecting

Damaged Units: Replace sheeting and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touch-up or similar minor repair procedures.

Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

P3.2.5.2 Steel Wall Cladding General

P3.2.5.2.1. Scope

This section of the specification covers the supply and delivery of all materials and the provision of all equipment and labor necessary to complete the installation of corrugated metal wall panels as shown in the drawings and as specified herein.

P3.2.5.2.2. Performance Requirements

General: Provide manufactured wall panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

Structural Performance: Provide manufactured wall panel assemblies capable of withstanding design wind loads indicated under in-service conditions with deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 330 or approved standard.

Maximum Deflection: 1/180 of the span.

The wall cladding shall be subject to the Engineer's approval.

P3.2.5.2.3. Submittals

Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

Shop Drawings: Show layouts of panels, details of corner conditions, joints, panel profiles, supports, anchorages, trim, flashings, closures, and special details.

Samples for Verification: Provide sample panels 12 inches (300 mm.) long by actual panel width, in the profile, style, color, and texture indicated. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.

Qualification Data: Firms and persons specified in "Quality assurance". Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Engineers and Employer, and other information specified.

Product Test Reports: Indicate compliance of manufactured wall panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

Any samples of panels shall be provided for inspection sufficiently in advance their manufacture and/or inclusion within the permanent works, to allow the Engineer time to make comments and determine their acceptability.

P3.2.5.2.4. Quality Assurance

Installer Qualifications: Engage an experienced installer who has completed metal wall panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

P3.2.5.2.5. Delivery, Storage and Handling

Deliver panels and other components so they will not be damaged or deformed. Pack panels, for protection against damage, during transportation or handling.

Handling: Exercise care in unloading, storing, and erecting wall panels to prevent bending, warping, twisting, and surface damage.

Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

P3.2.5.2.6. Project conditions

Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Co-ordinate fabrication schedule with construction progress, to avoid delaying the Work.

P3.2.5.2.7. Warranty

General Warranty: Special warranties specified in this Clause shall not deprive the Employer of other rights the Employer may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal wall panels within the specified warranty period and agreeing to repair finish or replace wall panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

Finish Warranty Period: 10 years from date of Substantial Completion.

P3.2.5.2.8. Products

Metals and Finishes

Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755 (ASTM A 755M) or approved standard and the following requirements:

Galvanized Steel Sheet: ASTM A 653, G550 (ASTM A 653M, Z275) or JIS 3312-Z25; structural quality, or approved standard or;

Exposed Finish for Exterior Panels: Apply the following coating in thickness indicated.

Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm).

Color: As selected by Engineer from manufacturer's full range of colours.

Wall Panel Assemblies

Exterior Wall Panels: Fabricate panel face sheets to the profile or configuration indicated, and of the material, finish, and thickness indicated. Design joints between panels to form weather tight seals.

Steel Face Sheet: Minimum 0.5 mm. thick, metallic-coated steel sheet with organic coating finish, unless otherwise indicated.

Thermal Insulation

Provide and install thermal insulation complying with Section "Building Insulation" of this Specification.

Miscellaneous Materials

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Accessories: Unless otherwise specified, provide components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross- linked, polyolefinfoam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non- toxic, non- staining tape.

Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant as recommended by panel manufacturer.

P3.2.5.2.9. Execution

Examination

Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of metal panel walls.

Panel Supports and Anchorage: Examine wall framing to verify that girts, angles, and other secondary structural panel support members and anchorage have been installed to meet requirements of panel manufacturer.

Do not proceed with wall panel installation until unsatisfactory conditions have been corrected.

Preparation

Co-ordinate metal wall panels with rain drainage work; flashing; trim; and construction of soffits, roofing, parapets, walls, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

Panel Installation

General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

Field cutting exterior panels by torch is not permitted.

Install panels with exposed exterior and interior fasteners, pre-finished to match panel finishes.

Locate and space exposed fasteners in true vertical and horizontal alignment. Use proper tools to obtain controlled, uniform compression for positive seal without rupture of neoprene washer.

Accessories: Install components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashing, louvers, sealants, gaskets, fillers, closure strips, and similar items.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.

Install weather seal to prevent air and moisture penetration. Flash and seal panels at ends and intersections with other materials with rubber, neoprene, or other closures to exclude weather.

Seal panel end laps with a beads of tape or sealant, full width of panel. Seal side joints where recommended by panel manufacturer.

Wall Panels: Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up according to sealant manufacturer's written instructions.

Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm. in 6 m.) on level, plumb, and location lines as indicated and within 1/8- inch (3-mm.) offset of adjoining faces and of alignment of matching profiles.

Cleaning and Protecting

Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touch-up or similar minor repair procedures.

Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

P3.2.6 Interior Partition Walls

P3.2.6.1 Materials

Partitions:

92mm steel studs, 26 gauge (0.551 mils), 24" O.C (600mm O.C.)

Both sides of the partition are to be lined with one layer of 15.9mm gypsum wall board

One hour rated partition wall to have 15.9mm gypsum wall board type ULIX each side

The partitions are insulated with 89mm fibreglass insulation (for a 1 hour rated partition);

P3.2.7 Building Insulation General

P3.2.7.1. Scope

This section of the specification covers the supply and delivery of all materials and the provision of all equipment and labor necessary to complete the installation of thermal insulation as shown in the drawings and as specified herein.

P3.2.7.2. Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

American Society for Testing and Materials (ASTM) Publications

C665-84: Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

D4397-84: Polyethylene Sheet for Construction, Industrial Applications

E84-84a: Surface Burning Characteristics of Building Materials Federal Specification (Fed. Spec.)

HH-I-1972: Insulation Board, Thermal Faced, Polyurethane or Polyisocyanurate

P3.2.7.3. Submittals

Product Data for each type of insulation product specified.

P3.2.7.4. Quality Assurance

Single-Source Responsibility for Insulation Product: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the works.

Fire-Test-Response Characteristics: Provide insulation and related materials with the fire- testresponse characteristics indicated in the drawings or specified elsewhere in this section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

Surface-Burning Characteristics: ASTM E84.

P3.2.7.5. Delivery, Storage and Handling

Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

P3.2.7.6. Product

Acceptable Manufacturers

Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the works shall be as approved by the Engineer.

Insulating Materials

General: Provide insulating materials that comply with requirements and with referenced standards.

Thermal Batt Insulation: Thermal insulation combining glass fibers with thermosetting resin binders and wrapped with foil-scrim-kraft or foil-scrim-polyethylene vapour retarder to comply with ASTM C665, and with other requirements indicated below:

Nominal density of 1.5 lb/cu.ft. (24 kg./cu m.) Nominal thickness of 50 mm.

Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

P3.2.8 Door and Window Hardware General

P3.2.8.1. Scope

This specification covers the furnishing and supply of materials including equipment and labor necessary to complete the installation of door and window hardware that are required for swing, sliding, and folding doors

P3.2.8.2. Submittals

Product data including manufacturer's technical product data for each item of door and window hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

Final hardware schedule coordinated with doors, window, frames, and related work to ensure proper size, thickness, hand, function, and finish of door and window hardware.

Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

a) Type, style, function, size, and finish of each hardware item.

b) Name and manufacturer of each item.

c) Fastenings and other pertinent information.

d) Location of each hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedule.

e) Explanation of all abbreviations, symbols, and codes contained in schedule.

f) Mounting locations for hardware.

g) Door and frame sizes and materials.

h) Window and frame sizes and materials.

Samples of each type of exposed hardware unit in finish indicated and tagged with full description for co-ordination with schedule. Submit samples prior to submission of final hardware schedule.

P3.2.8.3. Quality Assurance

Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

P3.2.8.4. Product Handling

Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.

Packaging of door and window hardware is the responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

Inventory door and window hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

Deliver individually packaged hardware items promptly to place of installation (shop or project site).

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P3.2.8.5. Maintenance

Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Employer's continued adjustment, maintenance, and removal and replacement of door hardware.

P3.2.8.6. Products

P3.2.8.6.1. Scheduled Hardware

A Hardware Schedule which includes design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware to be submitted by the Contractor for approval by the Engineer.

P3.2.8.6.2. Materials and Fabrication

Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.

Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible.

P3.2.8.6.3. Hinges, Butts and Pivots

Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

Screws: Provide Phillips flat-head screws complying with the following requirements For

metal doors and frames install machine screws into drilled and tapped holes.

For wood doors and frames install wood screws.

Finish screw heads to match surface of hinges or pivots.

Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 25 cm or less in height and one additional hinge for each 10 cm of additional height.

Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 25 cm or less in height with same rule for additional hinges.

P3.2.8.6.4. Lock Cylinders and Keying

Standard System: Except as otherwise indicated, provide new master key and grand master key system for Project.

Equip locks with manufacturer's standard 6-pin tumbler cylinders.

Comply with Employer's instructions for master-keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

Key Material: Provide keys of nickel silver only.

Key Quantity: Furnish 3 change keys for each lock, 3 master keys for each master system, and 3 grandmaster keys for each grandmaster system.

Deliver keys to Employer.

All external doors and windows shall be provided with locks. A key master zoning system shall be provided.

P3.2.8.6.5. Key Control System

Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, permanent markers, and standard metal cabinet, all as recommended by system manufacturer.

Provide complete cross index system set up by key control manufacturer, and place keys on markers and hooks in the cabinet as determined by the final key schedule.

Provide hinged-panel type cabinet for wall mounting.

P3.2.8.6.6. Closers and Door Control Devices

Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.

Flush Floor Plates: Provide finished metal flush floor plates for floor closers except where thresholds are indicated, and cover plate is specified to be an integral part of threshold. Finish floor plate to match hardware sets, unless otherwise indicated.

Recessed Floor Plates: Provide recessed floor plates where no thresholds are indicated, and floor closers are located in an area of resilient flooring, concrete floor. Recess plates to receive an insert of the floor finish material of the normal thickness as indicated. Provide extended spindle on closer as may be necessary to accommodate thickness of floor finish.

Hardware Finishes

Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

Provide finishes that match those established by BHMA or, if none established, match the Engineer's sample.

Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated.

P3.2.8.7. Execution

P3.2.8.7.1. Installation

Mount hardware units at heights indicated following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Engineer.

Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, co-ordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the specific chapter. Do not install surface-mounted items until finishes have been completed on the substrates involved.

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Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Section “Joint Sealants”.

Weather stripping and Seals: Comply with manufacturer’s instructions and recommendations to the extent installation requirements are not otherwise indicated.

P3.2.8.7.2. Adjusting, Cleaning and Demonstrating

Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

Clean adjacent surfaces soiled by hardware installation.

Instruct Employer’s personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

P3.2.9 Doors and Frames General

P3.2.9.1. Interior Doors:

Doors are always solid core, sound or fireproof in a timber frame, lacquered or painted, alternatively in an aluminum frame; Thickness: 40 mm.

P3.2.9.2. Metal Doors

P3.2.9.2.1. Scope

This specification covers the furnishing and supply of materials including equipment and labour necessary to complete the installation of commercial-quality steel doors and frames for doors and related openings, including hollow-metal panels and louvers in these doors and frames.

P3.2.9.2.2. Definitions

Metal Thickness: Sheet metal thickness given in inch-pound (metric) dimensions are nominal thickness and subject to tolerances as defined in the ASTM standards listed for the following materials:

Steel Sheet: ASTM A568 (ASTM A568M).

Galvanized Steel Sheet: ASTM A525 (ASTM A525M).

P3.2.9.2.3. Submittals

General: Submit each item in this Article according to the Conditions of the Contract Specification Sections.

Product Data including manufacturer's specifications for fabrication and installation.

Provide data substantiating that products comply with requirements.

Shop Drawings showing fabrication and installation of custom steel doors and frames work. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of frame anchorage, door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessories items. Provide a schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

Sample representing the required construction of doors and frames for project. Doors showing vertical-edge, top, and bottom construction; insulation, face stiffeners, hinge, and other applied hardware reinforcement. Include louver section and glazing stops where applicable. Frames showing profile, welded corner joint, welded hinge reinforcement, floor, and wall anchors, stops, and silencers. Include panel and louver sections and glazing stops where applicable.

P3.2.9.2.4. Quality Assurance

Manufacturer Qualifications: Engage a firm experienced in manufacturing custom steel doors and frames similar to those indicated for this project that maintains a record of successful in- service performance, as well as sufficient production capacity to produce required units without delaying the work.

P3.2.9.2.5. Delivery, Storage and Handling

Deliver doors and frames palleted, wrapped, or crated to provide protection during transit and job storage.

Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Engineer; otherwise, remove and replace damaged items as directed.

Store doors and frames at building site under cover. Place units on minimum 4-inch (100- mm) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to promote air circulation.

P3.2.9.2.6. Products

Manufacturers:

Shall be approved by Engineer.

Materials:

Galvanized steel Sheets: Zinc-coated carbon-steel sheets of commercial quality, complying with ASTM A526 (ASTM A526M) and ASTM A525 with A 60 or G 60 (ASTM A525M with Z 180 or ZF 180) coating designation, mill phosphatides.

Material: Minimum 16 gauge galvanized steel sheet.

- Door Thickness: 1-3/4 inches, thermally insulated.
- Finish: Factory primed and field painted.

Door Hardware:

- Quality Level: Heavy duty commercial.
- Locksets and Latchsets: Mortise type.

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- Lock Cylinders: Integral.

Keying: Employer's requirements.

Doors

Galvanized Steel Doors:

a) Fabricate doors from 2 outer, galvanized, stretcher-leveled steel sheets not less than 1.6 mm thick. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts. Provide weep-hole openings in bottom of doors to permit escape of entrapped moisture. Close bottom edge with minimum 1.6 mm thick galvanized steel closing channel and top edge with minimum 1.6-mm thick galvanized steel filler channel so webs of channels are flush with bottom and top edges. Seal joints in top edges of doors against water penetration.

b) Reinforce inside of doors with vertical steel sheet sections not less than 1.6 mm thick. Space vertical reinforcing (150 mm) o/c and extend full door height. Spot-weld to both face sheets at not more than (150 mm) o/c.

c) Reinforce tops and bottoms of doors with 1.6 mm thick horizontal steel channels spot welded maximum (150 mm) o/c to outer sheets. Close top and bottom edges to provide flush, waterproof weather seal, as integral part of door construction or by adding inverted steel channels at least 1.6 mm thick.

d) Door Core Materials - Polyisocyanurate Rigid, modified polyisocyanurate, closed cell board. Density; 32 kg/m3 (2.0 pcf) minimum, thermal values; RSI 1.9 (R 11.0) minimum, in accordance with ASTM C591 (un-faced) or C 1289 (faced). .2 Temperature Rise Rated (TRR) Core composition to provide the fire-protection rating and limit the temperature rise on the unexposed side of door to 250°C at 30 or 60 minutes, as determined by governing building STEEL DOORS AND FRAMES 08 11 13 CSDMA - 2006 [08100] 6 code requirements. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, covering the Standard Method of Tests of Door Assemblies and shall be listed by a nationally recognized testing agency having a factory inspection service.

Frames

Fabricate frames of full-welded unit construction, with corners mitered, reinforced, and continuously welded full depth and width of frame. Knockdown frames are not acceptable. For galvanized steel doors, form frames from galvanized steel sheets not less than 1.6 mm thick.

Hardware Reinforcement: Minimum thickness of steel reinforcing plates for the following hardware:

Hinges and Pivots: 4.6 mm thick by (38 mm) wide by (200 mm) longer than hinge, secured by not less than 8 spot welds.

Strikes, Flush Bolts, and Closers: 3.2 mm.

Surface-Mounted Hold-Open Arms and All Other Hardware: 3.2 mm.

Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt-welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.

Head Reinforcing: Where installed in masonry, leave vertical mullions in frames open at top for grouting.

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Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 1.6 mm thick galvanized steel.

Rubber Door Silencers: Except on weather-stripped doors, drill stop in strike jamb to receive 3 silencers on single-door frames and drill head jamb stop to receive 4 silencers on double-door frames. Install plastic plugs to keep holes clear during construction.

Plaster Guards: Provide (0.45-mm) thick steel plaster guards or dust-cover boxes, welded to frame, at back of hardware cut-outs where mortar or other materials might obstruct hardware operation and to close off interior of openings. Fabrication

Fabricate doors and frames rigid, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Where practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at the project site. Weld exposed joints continuously; grind, fill dress, and make smooth, flush, and invisible.

Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

Hardware Preparation: Prepare doors and frames to receive hardware, including cut- outs, reinforcing, mortising, drilling, and tapping according to final hardware schedule and templates provided by hardware supplier.

Finishes

Shop Painting: Clean, treat, and paint exposed surfaces of steel doors and frames, including galvanized surfaces. Clean steel surfaces of mill, scale, rust, oil, grease, dirt, and other foreign materials before applying paint. Apply pre-treatment to cleaned metal surfaces; use cold phosphate solution (SSPC-PT 2), hot phosphate solution (SSPC-PT 4), or basic zinc chromate-vinyl butyral wash primer (SSPC-Paint 27). Apply shop coat of prime paint within time limits recommended by pre-treatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.02 mm)

Galvanized Steel Doors and Frames: Apply primers and finishes to doors and frames after fabrication.

Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply baked-on or air-dried primer immediately after cleaning and pre- treatment.

Color and Gloss: As selected by Engineer from manufacturer's full range of choices for color and gloss.

P3.2.9.2.7. Execution, Installation & Adjusting and Cleaning

Frames:

a) Install custom steel frames for doors, transoms, sidelights, borrowed lights, and other openings, of size and profile as indicated.

b) Install frames and accessories according to manufacturer's installation instructions and as specified.

c) Setting Masonry Anchorage Devices: Provide masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.

d) Set anchorage devices opposite each anchor location, according to details on Shop Drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.

Placing Frames:

a) Set frames accurately in position, plumb, align, and brace securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

b) At existing concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices. Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces. Remove spreader bars only after frames or bucks have been properly set and secured. Doors:

Fit steel door in their respective frames, with the following clearances: a)

Jambs and Head: (2 mm).

b) Meeting Edges, Pairs of Doors: (3 mm).

c) Bottom (9 mm), where no threshold or carpet.

d) Bottom: (3 mm), at threshold or carpet.

Adjusting and Cleaning

Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.

Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

Field-Painted Finish: Apply two topcoats as specified in Section “Painting”

Wood Doors

Doors to meet requirements of ANSI/WDMA **Heavy Duty** performance values**.**

Faces of wood veneered doors intended for transparent finish**,** with veneer match.

Grain or pattern direction **vertical**

Core structural composite lumberproperly oiled and left in good working condition.

P3.2.10 Glazing

This section of the specification covers the supply and delivery of all materials and the provision of all equipment and labor necessary to complete installation of glazing for the following products, including those specified in other sections where glazing requirements are specified by reference to this section.

- Window units
- Entrances and other doors
- Mirrors

All glazing shall be double, insulating glazing

P3.2.10.1 System Performance Requirements

General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealant or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

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Glass Design: Confirm glass thickness by analyzing project loads and in-service conditions. Provide glass lights for the various size openings in the thickness and strengths (annealed or heat-treated) to meet or exceed the following criteria:

Minimum glass thickness, nominally of lights in exterior walls is 8 mm (0.315 inch).

Heat-absorbing glass thickness is the same throughout project.

The glazing system shall be subject to the Engineer's approval.

Minimum glass thickness of lights, whether composed of annealed or heat-treated glass, are selected so the worst-case probability of failure does not exceed the following:

8 lights per 1000 for lights set vertically or not over 15 degrees off vertical and under wind action. Determine minimum thickness of monolithic annealed glass according to ASTM E1300. For other than monolithic annealed glass, determine thickness per glass manufacturer's standard method of analysis including applying adjustment factors to ASTM E1300 based on type of glass. Deflection of glass is limited to 1/180 of clear span or 3/4" (19 mm), whichever is smaller, unless otherwise indicated.

Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on materials' actual surface temperatures, due to both solar heat gain and night-time sky heat loss.

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

P3.2.10.2 Submittals

Product data for each glass product and glazing material indicated.

Samples for verification purposes of 30 cm (12-inch)-square samples of each type of glass indicated except for clear monolithic glass products, and 30 cm (12-inch)-long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.

Product certificates signed by glazing materials manufacturers, certifying that their products comply with specified requirements.

Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealant was tested for compatibility with other glazing materials including sealant, glazing tape, gaskets, setting blocks, and edge blocks.

Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.

Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual.

P3.2.10.3 Quality Assurance

Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below. Refer to these publications for glazing terms not otherwise defined in this section or in referenced standards.

SIGMA Publications: TM-3000 "Vertical Glazing Guidelines" Safety Glass: Products complying with ANSI Z 97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

Fire-Resistive Glazing Products for Door and window Assemblies: Products identical to those tested per ASTM E152, labeled, and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component light of units with appropriate certification label of inspecting and testing agency indicated below:

Insulating Glass Certification Council (IGCC).

Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for project with a record of successful in- service performance.

Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

Primary glass of each (ASTM C 1036) type and class indicated.

Heat-treated glass of each (ASTM C 1048) condition indicated. Insulating glass of each construction indicated.

Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

Field-Constructed Mock-ups: Prior to glazing, erect mock-ups for each glass product indicated below to verify selections made under sample submittals and to demonstrate aesthetic effects and quality of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of work:

Glass Products: Erect mock-ups with the following kinds of glass to match glazing systems required for project, including typical light size, framing systems, and glazing methods:

Heat-strengthened coated glass.

Fully tempered glass.

Place mock-ups on site in location and of size indicated or, if not indicated, as directed by Engineer.

Notify Engineer one week in advance of the dates and times when mock-ups will be erected. Obtain Engineer's acceptance of mock-ups before start of final unit of work.

Demonstrate the proposed range of aesthetic effects and workmanship.

Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of Work.

When directed, demolish and remove mock-ups from project site.

Accepted mock-ups in undisturbed condition at time of substantial completion may become part of completed unit of work.

Pre-construction Compatibility and Adhesion Testing: Submit to sealant manufacturers, samples of each glass, gasket, glazing accessory, and glass-framing member that will contact or affect glazing sealant for compatibility and adhesion testing as indicated below:

Use test methods standard with sealant manufacturer to determine if priming and other specific preparation techniques are required for rapid, optimum glazing sealant adhesion to glass and glazing channel substrates.

Perform tests under normal environmental conditions during installation.

Submit not less than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, insulating units) for adhesion testing, as well as one sample of each glazing accessory (gaskets, setting blocks and spacers) for compatibility testing.

Schedule sufficient time to test and analyze results to prevent delay in the work.

Investigate materials failing compatibility or adhesion tests and get sealant manufacturer's written recommendations for corrective measures, including using special primers.

P3.2.10.4 Delivery, Storage and Handling

Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

Project Conditions

Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

P3.2.10.5 Products

Acceptable Manufacturers

Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in Product Data Sheets at end of this Section.

Elastomeric Glazing Sealant

Compatibility: Select glazing sealant and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealant and tapes that are suitable for applications indicated and conditions existing at time of installation.

Colors: Provide color of exposed joint sealant to comply with the following: Provide selections made by Engineer from manufacturer's full range of standard colors for products of type indicated.

Glazing Sealant for Fire-Resistant Glazing Products: Identical to product used in test assembly to obtain fire-resistive rating.

Miscellaneous Glazing Materials

General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.

Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.

Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.

Spacers: Elastomeric blocks or continuous extrusions with a Shore Adurometer hardness required by glass manufacturer to maintain glass lights in place for installation indicated.

Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

Plastic Foam Joint Fillers: Pre-formed, compressible, resilient, non-staining, non- extruding, nonoutgassing, strips of closed-cell plastic foam of density, size and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistive rating.

Fabrication of Glass and Other Glazing Products

Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

Clean cut or flat grind vertical edges of butt-glazed monolithic lights in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

P3.2.10.6 Execution

Examination:

Examine glass framing, with glazier present, for compliance with the following:

Manufacturing and installation tolerances, including those for size, square ness, offsets at corners.

Presence and functioning of weep system.

Minimum required face or edge clearances.

Effective sealing between joints of glass-framing members.

Do not proceed with glazing until unsatisfactory conditions have been corrected. Preparation

Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

General

Comply with combined recommendations of manufacturers of glass, sealant, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

Glazing channel dimensions as indicated on drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thickness, with reasonable tolerances. Adjust as required by Project conditions during installation.

Protect glass from edge damage during handling and installation as follows:

Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lights with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.

Remove damaged glass from project site and legally dispose of offsite. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

Apply primers to joint surfaces where required for adhesion of sealant, as determined by pre-construction sealant-substrate testing.

Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

Do not exceed edge pressure stipulated by glass manufacturers for installing glass lights.

Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

Set glass lights in each series with uniform pattern, draw, bow, and similar characteristics. Tape Glazing

Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sight-line of stops.

Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening

Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

Do not remove release paper from tape until just before each light is installed.

Center glass lights in openings in setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

Gasket Glazing (Dry)

Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

Install gaskets so they protrude past face of glazing stops. Sealant Glazing (wet)

Install continuous spacers between glass lights and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealant cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

Force sealant into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

Tool exposed surfaces of sealant to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

Lock-strip Gasket Glazing

Comply with ASTM C716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

Installation of Mirrors

A number of options are available to securely and attractively mount an unframed mirror on a wall. The choice of the most acceptable technique will depend upon the type of wall construction, location and other factors. Some of the methods are:

Channel & Clips: A continuous channel across the bottom of the mirror must be anchored securely to the wall because it will carry the weight of the mirror. Metal or plastic clips, securely fastened into the wall can then be used to complete the installation. If metal clips are used, a felt or plastic pad should be placed between the mirror and each clip to prevent spilling the edges of the mirror. Two 1/8" × 4" setting blocks should be in the channel at the quarter points and two 1/4" weeps drilled between.

Metal Frames: Metal framed mirrors seldom offer mounting problems because the frame protects the edge of the glass.

General Precautions: Mirrors should not be mounted directly against unpainted plaster, wood, plywood, concrete or concrete block walls. These surfaces must be painted to prevent potential damage to the mirror. Mirrors should be mounted plumb and in plane to avoid distorted or reflected images. Space for air circulation and elimination of condensation should always be provided between the back of the mirror and the wall.

Method shall be subject to the Engineer's approval Protection and Cleaning

Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove non-permanent labels, and clean surfaces.

Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

Wash glass in each area of project not more than 4 days prior to date scheduled for inspections that establish date of substantial completion. Wash glass as recommended by glass manufacturer.

Product Data Sheet Primary Float Glass

The glass shall be highest grade or ASTM C1036, Type I (transparent glass, flat), Class 1 (clear) with a minimum thickness of 8 mm as according to the calculation criteria described in clause "System Performance Requirements" of this section, whichever is greater.

The contractor shall determine the required thickness of glass to meet the System Performance Requirements specified in Clause 0 of this Specification. Notwithstanding the aforementioned performance requirements, the absolute minimum thickness of glass permitted for inclusion into the permanent works shall be 8 mm.

Clear Fully Tempered Glass:

Uncoated, Clear, Heat-Treated Float Glass: ASTM C1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below:

Kind FT (fully tempered) where indicated.

Glass Thickness: As according to the calculation criteria described in clause “System Performance Requirement” of this section, but not less than 6 mm, and as shown on the drawings.

Tempered glass door shall be of 6 mm minimum thickness and as shown on the drawings.

General: Provide fully tempered glass that is indicated below.

Fully tempered glass shall be free from bubbles, smoke vanes, air holes, scratches and all other defects.

Fully tempered glass shall not be cut or worked after toughening. Glass with damaged or chipped edges or scratched surface shall be rejected.

All fully tempered glass shall be passed heat-soak test.

The contractor shall determine the required thickness of glass to meet the System Performance Requirements specified in Clause 0 of this Specification. Notwithstanding the aforementioned performance requirements, the absolute minimum thickness of glass permitted for inclusion into the permanent works shall be 8 mm.

The contractor shall determine the required thickness of glass to meet the System Performance Requirements specified in Clause 0 of this Specification. Notwithstanding the aforementioned performance requirements, the absolute minimum thickness of glass permitted for inclusion into the permanent works shall be 8 mm.

P3.2.11 Acoustical Ceilings

P3.2.11.1 Scope

Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

P3.2.11.2 Performance:

Fire, structural, and seismic performance meeting requirements of building code and local authorities. Acoustical performance based on project requirements

P3.2.11.3 Materials

Fabric-Faced Acoustical Ceilings:
Panel Size: 24 by 48 inches. Panel
Edge: Square

P3.2.11.4 Installation

- Install materials and suspension systems in accordance with manufacturer's instructions and recommendations, and ASTM C 636. Coordinate installation with location of mechanical and electrical work to ensure proper locations and anchorage.
- Level ceiling to within 1/8 inch in 10 feet in both directions. Scribe and cut panels to fit accurately. Measure and layout to avoid less than half panel units.
- Removal and reinstallation at existing ceilings: Remove and store materials for reuse when allowed. Handle with white gloves and avoid damaging corners and edges. Clean tiles and grid system, which have been removed. Provide additional materials

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to complete the work and to replace damaged existing materials. New materials shall match existing materials as approved.

- Adjust, clean, and touch-up all system components.

P3.2.12 Painting and Protective Coatings

P3.2.12.1. General

For details regarding Painting and Protective Coatings refer to Employer's Requirements, Part 2, Technical Specification, for all technical specifications with respect to painting and Protective Coatings concerning Buildings.

Unless otherwise stated, the preparation and application of protective coatings and paintings shall generally be in accordance with the provisions of the relevant Canadian Standards and shall be to the approval of the Engineer. All works shall be carried out by skilled labor experienced in the use of the materials specified.

The Contractor shall submit for approval the name of the paint manufacturer. After approval from the Engineer is obtained, the Contractor shall submit a certificate from the relevant manufacturer giving the guarantee that the paint offered shall be manufactured, tested and analyzed, and that the date and the results of such tests and analyses shall be offered with each consignment and that the paint conforms in all respects with the relevant Standards and Specifications. The manufacturer shall not be changed unless prior approval is obtained from the Engineer.

The Contractor shall make fullest use of the advisory services of the approved manufacturer. Should any such advice conflict with these Specifications, the Contractor shall obtain written instructions from the Engineer before proceeding with the work. Full facilities shall be provided for the approved paint manufacturer to inspect and check the preparation and painting during all stages of the Contract and to report to the Engineer.

P3.2.12.2 Paints

All paints to be used in the works shall be subject to the approval of the Engineer.

All coats of paint shall be compatible with each other and shall be from the same manufacturer unless otherwise approved by the Engineer.

The colors of the paint shall be as specified by Engineer and will generally be specified with reference to BS 5493.

The Contractor shall make application for a color schedule within eight (8) weeks after Commencement of Works.

The application shall be accompanied by the name of the manufacturer and the type of paint to be used and color cards of each type of paint. Samples shall be submitted on request of the Engineer.

A sample of the paint, when applied to a burnished steel surface, shall 24 hours later approximate be tested to the specified colour to the satisfaction of the Engineer's Representative.

Where two coats of paint of the same color are specified one coat shall be tinted so as to differentiate between the two coats.

Before ordering any materials for painting the Contractor shall have samples thereof tested, as specified by the Engineer, by a testing authority, nominated by the Engineer.

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In order that the Contractor can satisfy the Engineer that the painting system is satisfactory, test pieces shall be painted by the Contractor. Separate test pieces shall be made for each type of paint. The Engineer may subject these test pieces to such test as he thinks fit in order to establish that the painting system is capable of withstanding any handling or site conditions that are likely to occur.

The paint shall retain its properties during storage at the Site and any paint which fails in this respect shall not be allowed to be used on the Works.

If the Engineer's Representative so requires samples shall be taken from the containers at any time after delivery at the Site for inspection and the Contractor shall have such samples tested, as specified by the Engineer, by a testing authority nominated by the Engineer.

All paints shall be thoroughly mixed until homogeneous and if necessary, be strained free from skins, lumps or sediment.

Thinners and driers may only be added to enable the paint to comply with the specified application or drying requirements and they shall not be used without the approval of the Engineer's Representative.

P3.2.12.3 Preparation of Surfaces for Painting - General

No paint shall be applied to wet, acid, alkaline, damp, rough or greasy surfaces. The Contractor shall examine all surfaces before applying any coats and he will be held responsible for any poor work caused by improper surfaces.

Application of paint will be held as acceptance by the Contractor of such surfaces and working conditions for the results specified and for which he is responsible.

Before the next coat of paint is applied the previously applied coat of paint shall be thoroughly dry, and its surface shall be rubbed down and dusted off in such a way, as is necessary to obtain a smooth matt surface to which the next coat will firmly adhere.

P3.2.12.4 Application of Paint

In so far as otherwise specified all paint shall be applied by hand with suitable brushes or rollers and shall be well rubbed in.

Spray painting may be allowed by the Engineer, except where soiling of adjacent surfaces is likely to occur, in the case of paints containing lead and in any other case where spraying is not considered by the Engineer to be a suitable method for any reason. No paint shall be applied by spraying without the prior approval of the Engineer.

All paints shall be applied in accordance with the manufacturer's instructions for use in the local climate.

All necessary measures shall be taken to avoid excessive or uneven thickness of paint film and the finished surface shall be free from orange peel appearance, runs, sags" curtaining and other defects.

The finishing coat shall not be put on without approval of the Engineer's Representative.

The finishing coat shall be smooth and free from brush marks or any other defects, including those showing through from preceding coats.

All equipment used in carrying out the painting shall be clean of all foreign matter and shall be cleaned out before being used for a different color, type or class of material.

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At the end of each working period two pack primers, epoxide, polyurethane and other paints with a limited "pot life" shall be discarded and such paints shall not be mixed with fresh paint.

Paints which have livered, gelatinized, or otherwise deteriorated shall not be used.

P3.3 Building Electrical Requirements

Furnish all labor, materials and equipment required to install complete and operational electrical system as indicated on the drawings and as specified herein, all to the entire satisfaction of the Engineer.

The Design Builder must meet all VFPA and all applicable code requirements and as a minimum shall:

- Provide an electrical panel at 208/120V with main breaker in each building;
- Panel to be equipped with branch circuit breakers as required to feed loads within the building;
- Provide LED interior luminaires to meet the minimum recommended IESNA illumination levels;
- Provide low voltage control relays and master switch to control lighting on/off. Locate master switch in coordination with the Owner and provide local switches immediately adjacent to each door. Locations subject to the approval of the Engineer;
- Provide a wall mounted fiber patch panels as required. Locations subject to the approval of the Engineer;
- Provide power outlets within the operational spaces, with 2 outlets at each work station and minimum of 4 outlets in each room. Locations subject to the approval of the Engineer;
- Provide a communications outlet at each work station;
- Provide a local fire alarm panel complete with field devices as required by code and to monitor the status of the fire protection systems.

P3.4 Building Plumbing, Mechanical & HVAC Requirements

Furnish all labor, materials and equipment required to install complete and operational HVAC systems as indicated on the drawings and as specified herein, all to the entire satisfaction of the Engineer.

The Design Builder, as a minimum, shall:

- Provide electric air-to-air heat pump systems in the MCC Building;
- Connect the MCC Building to the existing Terminal network, for monitoring and reporting.
- Provide air curtains shall be installed above all exterior doors;
- Provide heating and cooling shall be provided with the following provisions:
  - Provide the interior temperatures of the buildings are to be adjustable; ○ Provide the building is to be ventilated using a combination of natural ventilation and mechanical systems; and
  - the building shall be designed to maintain relative humidity for an office space in accordance with Table 1: Summary of HVAC Design Criteria;

Table 1: Summary of HVAC Design Criteria

Facility	AC/Hr. (b)	Temperature (°C)		Room pressure (Relative to adjacent space)	Comments
		Heating	Cooling		
Offices	---- (a)	22	24(d)	Slightly positive (Not relative to adjacent space)	Air flow rate will be determined by sensitive load
Washrooms	25 L/s per Unit/ 5 L/sm^2	15	___	Slightly negative	100 % exhaust
Kitchen	1.5 L/sm^2	22	24(d)	Slightly negative	Dedicated kitchen hood exhaust
Storage	5.0 L/sm^2	15	___	Slightly negative	100 % exhaust
Server Room	1	18-27(e)	18-27(e)	Slightly positive	Air flow rate will be determined by cooling load and differential pressure

Notes:

(a) 100 percent outside air
(b) The values listed are minimum
(c) Air flow will also prevent a maximum temperature rise above ambient greater than 10°C, based on all of the heatproducing machinery in the room
(d) Relative humidity 50% ±5%
(e) Low-end moisture 5.5°C DP; High end moisture 60%RH and 15°C DP

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- All exposed and un-insulated pipes, ferrous supports, gantries, brackets and steelwork in the Contract works shall be painted.

Signature:  **Email:** bclegg@fwsgroup.com

Signature: 

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