

PART 1 General

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.
- .4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .5 Allow ten working days for Departmental Representative's review of each submission.
- .6 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .7 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .8 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .9 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.

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- .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .10 After Departmental Representative's review, distribute copies.
 - .11 Submit one transparency on plastic film, three hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
 - .12 Submit three hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
 - .13 Submit three hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
 - .14 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .15 Submit three hard copies and one electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .16 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections

and as requested by Departmental Representative.

- .17 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .18 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .19 Delete information not applicable to project.
- .20 Supplement standard information to provide details applicable to project.
- .21 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, transparency or copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .22 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 **SAMPLES**

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not

intended to change Contract Amount. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, fine resolution monthly with progress statement and as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 8 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .4 Frequency of photographic documentation: weekly.
 - .1 Upon completion of: excavation, foundation, framing and services before concealment, of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

1.7 FEES, PERMITS AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.
- .4 Submit acceptable certificate stating that suspended ceiling systems provide adequate support for electrical fixtures, as required by current bulletin of Electrical Inspection Department of Ontario Hydro.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 10 00 - Concrete forming and accessories
- .2 Section 03 22 00 - Concrete reinforcing
- .3 Section 03 35 00 - Concrete finishing
- .4 Section 07 21 13 - Board insulation

1.2 REFERENCES

- .1 Abbreviations and Acronyms:
 - .1 Portland Cement: hydraulic cement.
 - .1 Type GU - General use cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%. Type CI - with CaO content ranging from 15 to 30%.
 - .2 Type CH - with CaO greater than 20%.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C260/C260M-10a, Standard Specification for AirEntraining Admixtures for Concrete.
 - .2 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.
 - .3 ASTM C309-1, Standard Specification for Liquid MembraneForming Compounds for Curing Concrete
 - .3 CSA International
 - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005.
 - .3 CSA A283-06(R2011), Qualification Code for Concrete Testing Laboratories
 - .4 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2 except where specified otherwise.
 - .5 Contractor shall have on site at all times copies of CSA A23.1/A23.2.

- .6 Cementing materials shall conform to the respective requirements of CSA A3001, Cementitious Materials for Use in Concrete.

1.3 SUBMITTALS

- .1 For material supplied by this section, the Contractor shall provide information indicating types and quantities of recycled materials and provide information indicating types and quantities of materials that are from locally manufactured sources. Submit this information attached to relevant shop drawings.
- .2 Contractor shall participate and comply with the requirements of the Contractor's construction waste management plan to maximize diversion of recyclable and waste materials from landfill.
- .3 Submit mixture proportions in accordance with CSA A23.1/A23.2 and Clause 2.2 for review. Note that no concrete shall be placed prior to written review of the concrete mixes. Concrete mix design shall be submitted for review by the Departmental Representative 5 days prior to use.
- .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1/A23.2.
- .5 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1/A23.2.
- .6 At least 4 weeks prior to commencing work, Contractor shall inform Departmental Representative of proposed source of aggregates and SCMs, and provide access for sampling.
- .7 Provide certification that mixture proportions include preventative measures to mitigate potential expansions due to alkali aggregate reactivity in accordance with CSA A23.1/A23.2.
- .8 Provide proof that the ready mixed concrete producer has a current membership with Ready Mix Concrete Association of Ontario (RMCAO) as well as a current Certificate of Conformance for Concrete Production Facilities, issued by RMCAO.

- .9 Contractor shall submit a plan for curing to the Departmental Representative, for review and approval together with other tender documents. The curing plan shall be prepared in strict accordance with CSA A23.1/A23.2, as applicable, including:
 - .1 Method of protecting the concrete from evaporation of surface moisture from the fresh concrete.
 - .2 Type of curing material to be used.
 - .3 How the surface will be kept moist and the quality control requirements for keeping the surface moist.
 - .4 Time of initiation and duration of curing.
 - .5 Provisions to address potential problems such as high winds, and hot and cold weather.
 - .6 Limitations of access, if any, to the surfaces being cured.

1.4 AS-BUILT DRAWINGS

- .1 Maintain "As Built" conditions on record drawings for all concrete work as specified in Division 01. Clearly denoting the area, time, date and type placed

Part 2 Products

2.1 MATERIALS

- .1 Cement: Type GU to CSA Standard A3001.
- .2 Supplementary cementing materials: to CSA A3001.
- .3 Water: CSA A23.1/A23.2.
- .4 Fine aggregate: FA1 as per CSA A23.1/A23.2.
- .5 Coarse aggregate: 20 to 5 mm maximum nominal size as per CSA A23.1/A23.2.
- .6 Air entraining admixture: to ASTM C260.
- .7 Chemical admixtures: to ASTM C494/C494M.
- .8 Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, of plastic or fluid consistency, having minimum 28 day compressive strength of 50 MPa.
- .9 Chemical adhesive anchor system: Hilti HIT HY150 MAX, Epcon Acrylic 7 or approved equal.

- .10 Welding materials: to CSA W59. Welding electrodes: E49XX.
- .11 Steel sections and plates: angles, plates, etc., to be set in or anchored to concrete to CAN/CSA-G40.21, 300W.
- .12 Shop paint primer to CISC/CPMA 2-75.

2.2 CONCRETE MIXTURES

- .1 Unless noted on drawings, proportion normal density concrete in accordance with Alternative 1 (Performance), CSA Standard A23.1/A23.2, for the following elements and applications.

Piers, columns and foundation walls:

- .1 Class F-2 exposure.
- .2 Compressive strength at 28 days: 25 MPa.
- .3 Total air content: 4 -7%.
- .4 Slump at point of discharge into the work: 80 mm.

Footings, 125 mm thick interior slabs on grade and slabs on metal deck:

- .1 Class N exposure.
- .2 Compressive strength at 28 days: 25 MPa.
- .3 Total air content: less than 3 percent.
- .4 Slump at point of discharge into the work: 80 mm.

200 mm thick interior slab on grade:

- .1 Class C-4 exposure.
- .2 Compressive strength at 28 days: 32 MPa.
- .3 Total air content: less than 3 percent.
- .4 Slump at point of discharge into the work: 80 mm.

Exterior concrete (exterior slabs, unheated foundation walls, unheated slabs on grade, curbs, walkway, etc.):

- .1 Class C-2 exposure.
- .2 Compressive strength at 28 days: 32 MPa.
- .3 Total air content: 4 -7%.
- .4 Slump at point of discharge into the work: 80 mm.

Lean concrete:

- .1 Class N exposure.
- .2 Compressive strength at 28 days: 15 MPa.
- .3 Total air content: less than 3%.

.4 Slump at point of discharge into the work: 80 mm.

.2 The use of supplementary cementing materials is not permitted in slabs on grade and slabs on metal deck.

2.3 ADMIXTURES

.1 Use of admixtures subject to review by Departmental Representative.

.2 Use only compatible admixtures.

.3 Use of free calcium chloride and chloride bearing admixtures is not permitted.

.4 If required, add a water reducing admixture to concrete in accordance with manufacturer's specifications. Incorporate admixture as a liquid by automatic mechanical dispenser. Reduce mix water, thereby, but do not change cement content from that required in plain mix design. Take admixtures into account when designing mix, and ensure that they are compatible with each other and with concrete accessories.

.5 The Contractor shall note that for the concrete walls, the use of a superplasticizer may be required to increase the slump to 150 mm minimum for workability while maintaining design mix strength and water/cement ratio specified. Follow the manufacturer's recommendations.

Part 3 Execution

3.1 WORKMANSHIP

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

.2 Place concrete in accordance with CSA A23.1/A23.2. All concrete to be consolidated using high frequency vibrators. Vibration practices to be in accordance with ACI 309R.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement and consolidation.

.4 Preparations prior to placing of concrete shall include:

.1 Formwork completed and secured.

.2 Ice and free standing water removed.

.3 Reinforcement secured in place.

.5 All anchor rods and other embedded items accurately located and held in position.

- .6 Maintain accurate records of all concrete placed to indicate date, location of placement, quantity placed, concrete temperature and test specimens cast. Keep these records at site until project is complete.
- .7 Prior to placing, submit to the Departmental Representative for review the proposed method of curing, and protection of concrete during placing and curing in adverse weather conditions.

3.2 INSERTS

- .1 Embedded steel angles, plates and anchor rods shall be supplied by Structural Steel Contractor to the site and installed by the Foundation Contractor, unless noted otherwise on the drawings.
- .2 All anchor rods and embedded metal shall be carefully set to conform to the dimensions shown on the drawings and shall be rigidly held in place during placing of the concrete.
- .3 No sleeves, ducts, pipes or other openings shall pass through beams or columns except where expressly detailed on the drawings or approved by the Departmental Representative.
- .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of all modifications from Departmental Representative before placing of concrete. See architectural, mechanical and electrical drawings for additional inserts to be installed in this section.
- .5 Check locations and sizes of sleeves, openings, etc., shown on structural drawings with Departmental Representative prior to placing concrete. Sleeves, openings, etc., greater than 100 mm square not indicated on structural drawings must be approved by the Departmental Representative.

3.3 HOUSEKEEPING PADS, CURBS

- .1 Accurately place all required concrete bases, curbs and housekeeping pads as shown for architectural, mechanical and electrical equipment, including reinforcing steel indicated on drawings.
- .2 Build in anchor rods as required.
- .3 Finish slabs to match adjacent surfaces.
- .4 Refer to mechanical, electrical and architectural drawings for size, locations and number of pads.

3.4 GROUTING

- .1 Grout underside of steel columns and beam bearing plates with a minimum 40 mm thickness of non-shrink grout mixed in accordance with to the manufacturer's instructions to ensure a smooth level surface at the elevation indicated and having full contact with the underside of the bearing plate. Proposed grout shall be capable of being mixed at a fluid consistency; dry pack placement of the grout is not permitted.
- .2 Provide 24 hours notice prior to grouting base plates.

3.5 INSTALLATION OF REINFORCING STEEL/ANCHOR RODS USING ADHESIVE ANCHOR SYSTEM

- .1 Install reinforcing steel/anchor rods using adhesive anchor system in concrete at locations noted or shown noted or shown on the drawings and/or as required to complete the work. Installation shall be in strict accordance with the manufacturer's written instructions.

3.6 FINISHING

- .1 Finish exposed concrete to CSA A23.1/A23.2.
- .2 Unless specified elsewhere, interior slabs on grade shall receive sufficient passes with a trowel to obtain a dense hard smooth surface free of trowel marks.
- .3 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise detailed.
- .4 All concrete exposed to view requires a smooth form finish.
- .5 Formed concrete surfaces shall be surface finished as soon as practical and not later than 6 hours following formwork removal. Remove all ties, fins and projections. Patch tie holes, indentations and other surface irregularities with sand cement patching mortar $f'c = 30$ MPa. Fill and repair honeycomb and holes. Vertical formed surfaces (ie walls) shall not be more than 3 mm in or out of control line.
- .6 Use wind breaks/sun screens as required to prevent premature drying of concrete slabs prior to finishing. Screens to be used when are temperatures, relative humidity, concrete temperature and wind velocities are such that to create surface moisture evaporation rates in excess of 0.75 kg/(sq. m-h). Protection of concrete shall be in accordance with CSA A23.1/A23.2

3.7 CURING

- .1 Curing of all elements cast under this section shall begin immediately following placing and finishing following the requirements of CSA A23.1. All 200mm thick slab shall be wet cured for a minimum of 7 days in accordance with CSA A23.1/A23.2.

- .2 Contractor shall obtain the approval of the Owner, for proposed means of monitoring concrete curing conditions. Contractor shall be responsible for confirming completion of curing.

3.8 COLD WEATHER REQUIREMENTS

- .1 As a minimum, the requirements of CSA A23.1/A23.2 shall be followed for cold weather protection.
- .2 All materials and equipment needed for the protection and curing of the concrete in cold weather, as defined by CSA A23.1/A23.2, shall be available on site before the concrete placement begins.
- .3 Cold weather protection and curing shall be applied in order to maintain the concrete temperature at or above 10°C for the time of the curing periods specified in CSA A23.1/A23.2. Measures shall be taken to prevent subsequent frost penetration to the footing level.
- .4 Provide heated enclosures and/or insulated tarps as required to maintain minimum 10 degrees concrete surface temperature for a period of 5 days following concrete placement. Provide controlled cool down period to prevent surface cracking at end of protection period. Ensure that no concrete is placed on or against frozen subgrade, formwork, or reinforcing steel.

3.9 HOT WEATHER CURING

- .1 Hot weather curing and protection shall conform to the requirements of CSA A23.1/A23.2.
- .2 When the air temperature is at or above 25°C, the basic curing period (3 days) shall be accomplished by water spray, or saturated absorptive fabric rather than by curing compounds, in order to achieve cooling by evaporation. Apply curing compound immediately following the basic curing period.

3.10 DEFECTIVE CONCRETE

- .1 All honeycombed concrete and embedded debris shall be removed to sound concrete and the areas patched in a manner acceptable to the Engineer-Architect.

3.11 PATCHING

- .1 Patch imperfections within 24 hours of stripping of forms. Patch imperfections less than 30 mm deep as follows:
 - .1 Chip down edges perpendicular to surface to Departmental Representative's approval.
 - .2 Wet area and brush on 1:1 cement-sand grout.
 - .3 Patch with 1:2 cement-sand mortar with 10% hydrated lime.

- .2 Patch existing concrete surfaces where damaged by cutting or drilling.
- .3 Patch all form tie holes.

3.12 INSPECTION AND TESTING

- .1 Inspection, sampling, testing and reporting of concrete and concrete materials will be carried out by a testing laboratory approved by the Departmental Representative as specified in Division 1. All test methods shall be in accordance with CSA A23.1/A23.2.
- .2 Testing laboratory will cast three test specimens from each 75 m³ of concrete placed, for every placement or when required by the Departmental Representative. Cylindrical specimens shall be tested in compression at 7 and 28 days (2 specimens) unless directed otherwise by the Engineer-Architect.
- .3 Testing laboratory will make at least one slump test and one air content test for each set of test specimens cast.
- .4 Alkali-aggregate reaction tests are to be performed or certification reports supplied verifying the quality of the aggregates to be used.
- .5 Copies of all test reports to be submitted to the Departmental Representative, General Contractor, Ready Mixed Concrete Producer, and the Engineer-Architect.
- .6 Cost of all tests to be borne by the Owner as specified in Division 1.
- .7 CSA A23.1 shall form the basis for acceptance, strengthening or replacement of concrete not meeting specified quality.

.8 The Contractor shall cooperate with and assist the testing company by providing access to all parts of the work as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 30 00 - Cast-in-place Concrete
- .2 Section 05 21 00 - Steel Joist Framing
- .3 Section 05 31 00 - Steel Deck
- .4 Section 05 50 00 - Metal Fabrications
- .5 Section 09 91 23 - Interior Painting
- .6 Section 09 91 23 - Exterior Painting

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A325-13, Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa minimum Tensile Strength (Metric).
 - .2 ASTM A490M-12, Standard Specification for High-Structural Steel Bolts, Classes 10.9 and 10.93 Steel, for Structural Steel Joints (Metric).
- .2 Canadian Institute of Steel Construction (CISC)/Canadian paint Manufacturers Association (CPMA).
 - .1 Handbook of the Canadian Institute of Steel Construction
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel
- .3 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-09, Design of Steel Structures.
 - .4 CAN/CSA-S136-12, North American Specifications for the Design of Cold Formed Steel Structural members.
 - .5 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .6 CSA W48-06(R2011), Filler Metals and Allied materials for metal Arc Welding.
 - .7 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .8 CSA W55.3-08, Certificate of Companies for Resistance Celding of Steel and Aluminum.
- .4 The Society for Protective Coatings (SSPC) and national Association of Corrosion Engineers (NACE) International.
 - .1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.
- .5 Do structural steel work to CSA S16 and CAN/CSA-S136 except where specified otherwise.
- .6 Do welding to CSA W59 except where specified otherwise.

1.3 AS-BUILT DRAWINGS

- .1 Maintain "As-Built" conditions on record drawings in accordance with Division 1.

1.4 SUBMITTALS

- .1 Upon Request, submit three (3) certified copies of mill test reports covering chemical and physical properties of steel used in this work. Such mill test reports shall be certified by qualified metallurgists confirming that tests conform to requirements of CAN/CSA-G40.20 and CAN/CSA-G40.21.

1.5 SHOP DRAWINGS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Each drawing submitted shall bear the signature and stamp of qualified professional engineer registered in Ontario.
- .3 Clearly indicate shop and erection details including cuts, copes, connections, holes, threaded fasteners, and welds. Indicate welds by welding symbols as defined in CSA W59.
- .4 Anchor rod plan and erection drawings shall be originals prepared by fabricator. Reproduction of contract drawings not permitted.
- .5 All shop drawings and material lists are to contain a blank area measuring 70 mm high by 100 mm long located near the bottom right hand corner of the drawing or page. This area is to be reserved for the Departmental Representative's review stamp.

1.6 CONNECTION DESIGN

- .1 The Fabricator shall be responsible for the design, proportioning and detailing of the steel connections.
- .2 The Fabricator shall submit all typical and special connection design details and calculations in advance of preparing any shop drawings.
- .3 The Departmental Representative reserves the right to review the detailed drawings of the connections to ensure general compliance with the forces shown on the tender documents.
- .4 This review does not relieve in any way the responsibility of the Fabricator for the connections. However, if the Departmental Representative discovers deficiencies in the connections requiring extensive design checks and/or modifications to the detailed shop drawings submitted by the Fabricator, costs incurred by the Departmental Representative above the normal review process will be back charged against the Contractor.

1.7 COMPANY CERTIFICATION

- .1 To meet the requirements of the 2010 National Building Code of Canada, all welding on this project is to be done only by companies certified to Division 1 or 2 of CSA Standard W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .2 Under the Standard W47.1 the company is required to employ a registered Professional Engineer with an audited background in welding design procedure and practice, as well as welding supervisors and welders, all of whom have had their qualifications audited.
- .3 Only companies certified to CSA W47.1 (Division 1 or 2) at the time of bidding this job will be considered as eligible to bid.

Part 2 Products

2.1 MATERIALS

- .1 Channels, plates, angles and rods: to CAN/CSAG40.21, 300W.
- .2 Rolled W sections: to CAN/CSA-G40.21, 350W.
- .3 Hollow structural sections: to CAN/CSA-G40.21, 350W, Class C or ASTM A500 Grade C.
- .4 Bolts, nuts and washers: to ASTM A325. Provide galvanized bolts in areas of special paint.
- .5 Welding materials: to CSA W59.
- .6 Shop paint primer for standard structural steel: to CISC/CPMA 2-75 unless noted otherwise, color to be grey.
- .7 Steel Primer for exterior (unheated) steel: shall be three component zinc rich epoxy primer 70% solids by weight with zinc portions at least 80% by weight of dried coating. Standard of quality: Ameron Amercoat 68HS or equivalent. Steel primer shall be supplied by the same manufacturer as the topcoat specified below.
- .8 Steel Topcoat for exterior (unheated) steel: to be high-build epoxy coating having not less than 63% solids by weight. Standard of quality: Ameron Amerlock 370 or equivalent. Epoxy topcoat shall be recommended by paint manufacturer for exterior applications. Colour selection by Departmental Representative.
- .9 Shop galvanizing: hot dip galvanizing with a minimum coating of 0.6 kg per square metre to CAN/CSA-G164.
- .10 Anchor rods: CAN/CSA-G40.21, 350W. Supply anchor rods to size shown on drawings complete with ASTM-A563 nuts and ASTM F436 circular washers or plate washers as noted on drawings. Provide galvanized anchor rods where noted on drawings.
- .11 Rods: to CAN/CSA G40.21, 300W.
- .12 Welding electrodes: E49XX.

- .13 Anchor rods and embedded steel: structural steel contractor to supply and ship to site all anchor rods and embedded steel to be placed in concrete by concrete contractor.

2.2 FABRICATION

- .1 Fabricate structural steel as indicated to CSA S16 and in accordance with reviewed shop drawings.
- .2 Provide punched holes from 11 mm to 27 mm in diameter for attachment of other work. Refer to drawings for details and locations.
- .3 Reinforce openings to maintain required design strength.
- .4 Beam to beam and beam to column connections shall be simple connections proportioned for a minimum of 50% of the total uniformly distributed load for laterally supported beams of the given span as per CISC 350W Handbook of Steel Construction, Tenth Edition, unless noted otherwise on the drawings. Single angle beam connections will not be permitted for main structural beams and girders.
- .5 In addition to the shear as specified in Item 2.2.4, the beam connections shall be designed for the moments and axial forces indicated on the drawings. These forces shall be considered to act simultaneously.
- .6 Roof beams 6 m long and over which are installed parallel and adjacent to roof joists shall be cambered as shown on the drawings. All beams and girders shall be placed with natural bows upwards.
- .7 Unless noted otherwise, loads shown on the drawings are specified loads and moments, shears and axial forces are factored.
- .8 Steel beams, columns, channels, purlins and girts shall be cut from full length stock or ordered cut to length. All substitutions shall be subject to the approval of the Departmental Representative.
- .9 No holes shall be punched or cut in beams, columns or beam to column connections with the exception of those indicated on the drawings. Where such holes are indicated the member shall be reinforced to resist the maximum allowable section moment and shear.
- .10 All exposed members to be welded or otherwise connected, shall be scribed and cut to the adjoining members in a neat workmanlike manner. Contractor should note that all exposed structural steel shall be fabricated to AISC Specification "Architecturally Exposed Structural Steel".
- .11 All bolted connections are to be detailed as bearing type unless otherwise noted on the drawings.
- .12 Use bolted connections where possible to facilitate disassembly.
- .13 Supply embedded plates, angles and anchor rods for installation by the Concrete Contractor.

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- .14 All HSS members shall be continuously sealed at all open ends and have drain holes at low points.
- .15 Site survey of anchor rod locations: before proceeding with fabrication of base plates, survey the foundations to determine exact location of anchor rods and fabricate base plates to suit rod locations.
- 2.3 SHOP PRIMING STANDARD STRUCTURAL STEEL
- .1 All interior structural steel: clean, prepare surfaces and shop prime structural steel to CSA S16 in preparation for CISC/CPMA Standard 2-75 primer.
- .2 Visual inspection of shop welding shall be carried out prior to shop painting.
- .3 Use primer unadulterated, as prepared by manufacturer. Do not paint when temperature is lower than 7°C.
- .4 Clean surfaces to be field welded; do not paint.
- 2.4 SHOP PRIMING EXTERIOR (UNHEATED) STRUCTURAL STEEL
- .1 All exterior steel (i.e. unheated) shall be blast cleaned to conform to "The Steel Structures Paintings Council" specification SSPC-SP6-91.
- .2 The zinc epoxy primer shall be mixed, applied to the metal surface immediately after cleaning and cured at the proper temperature in accordance with the manufacturer's recommendations.
- .3 All surfaces shall be completely free of dust and dirt prior to the application of the zinc epoxy.
- .4 The zinc epoxy primer shall be applied to the metal surface with airless spray equipment as recommended by the zinc epoxy manufacturer. All leading edges to be hand stripped prior to spray application.
- .5 The zinc epoxy shall be applied in the shop to obtain a dry film thickness of 3.0 mils (one coat) with a tolerance of -0.25 to +0.5 mils to all surfaces.
- 2.5 TOP COAT FOR EXTERIOR (UNHEATED) STRUCTURAL STEEL
- .1 Touch-up of damaged areas of the zinc epoxy primer coating shall be carried out in accordance with the above requirements except that brush application may be used in lieu of airless spray equipment.
- .2 Touch-up shall be done with a primer that is recommended by the paint manufacturer and approved by the paint manufacturer for compatibility with the zinc epoxy shop primer.
- .3 The epoxy top coating shall be mixed, applied to the zinc rich primed surfaces and cured at the proper temperature in accordance with the manufacturer's recommendations.

- .4 All surfaces shall be free of dust, dirt, moisture, oil or grease prior to the application of the epoxy coating. Oil and grease shall be removed with a thinner as recommended by the manufacturer of the paint system.
- .5 Contractor shall note that the zinc epoxy primer is to be applied in the shop and a time period may elapse before applying the final coat of epoxy. The Contractor shall clean all surfaces that are to be top-coated insuring that they are free of all contaminants. The cleaning method must be approved by the coating manufacturer.
- .6 Contractor shall note that the epoxy coating is to be applied in the shop after steel fabrication and priming.
- .7 The epoxy coating shall be applied to the steel surface with airless spray equipment as recommended by the manufacturer of the paint. All leading edges to be hand stripped prior to spray application.
- .8 All surfaces shall receive one top coat (5-7 mils dry film thickness) of High Build Epoxy at the fabrication shop. Touch-up of damaged areas in the field shall be carried out in accordance with the above requirements except that brush application may be used in lieu of airless spray equipment.

2.6 HOT DIP GALVANIZED STRUCTURAL STEEL

- .1 Refer to drawings for members that shall be hot dip galvanized.
- .2 All steel to be galvanized to be cleaned of loose mill scale, rust, dirt, and all foreign matter to SSPC-SP10, near-white blast cleaning. Field repair damaged areas use an inorganic zinc-rich paint with matching color.

2.7 SUBSTITUTIONS

- .1 Estimate the work on the basis of the member sizes shown on the drawings. Substitution of larger sizes shall not be considered as an extra to the contract. Substitutions to be approved by the Departmental Representative.

Part 3 Execution

3.1 ERECTION

- .1 Erect structural steel as indicated to CSA S16 and in accordance with shop drawings to minimum tolerances. Erect temporary bracing to ensure plumbness and stability. Bracing to remain in place until the decking and permanent bracing are in place and securely connected and the concrete floor slabs have been placed.
- .2 Loads during construction - all structural steel shall be protected against loads exceeding the design capacity during construction.
- .3 Where indicated, continuously seal members by continuous welds and grind smooth.

- .4 Obtain written permission of Departmental Representative prior to field cutting or altering of structural members.
- .5 Top of steel beams and joists to be set at proper elevation so that the metal deck when erected produces a smooth sloping surface for installation of roofing.

3.2 TOUCH-UP PAINTING

- .1 Field touch up shop primer and shop top coats to bolts, welds and burned or scratched surfaces at completion of erection.

3.3 INSPECTION AND TESTING

- .1 Inspection and testing of materials and workmanship will be carried out by a testing laboratory approved by the Departmental Representative.
- .2 Owner will pay costs of inspection and testing as specified in Division 1.
- .3 Visual welding inspection will be carried out on all welding as outlined in CSA W59 by an inspector certified to CSA W178.2.
- .4 Inspection of connections will be carried out during steel erection. The Contractor shall cooperate with and assist the Testing Company by providing access to all parts of the work as required.
- .5 Inspection of connections will be carried out in accordance with CSA S16.
- .6 Radiographic testing shall be done in the fabrication shop or field in Accordance with CSA W59. Extent of radiographic testing: 100% of cranked beam splices uniformly distributed throughout the beam depth. If this testing results in an unacceptable standard, the structural steel contractor will be responsible for reinforcing or repairing all connections and providing a complete radiographic test of the member with the results being made available to the Departmental Representative. Proposed repair methods to be made available to the Departmental Representative for review prior to starting repairs.
- .7 A qualified protective coating inspection firm will verify preparations of structural steel surfaces prior to application of shop primers, review equipment being employed and shall measure dry film thickness of primers and dry film thickness of top coat. Copies of reports shall be submitted to the Departmental Representative.
- .8 If this testing results in an unacceptable standard, the Contractor shall be responsible for the re-cleaning, re-priming of the surfaces until standards are met.
- .9 A technical representative of the primer manufacturer will also review methods of work to ensure manufacturer's recommendations are being strictly adhered to and shall submit a report to the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 05 12 23 - Structural steel for buildings
- .2 Section 05 31 00 - Steel deck

1.2 REFERENCES

- .1 Canadian institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
 - .1 CISC/CPMA 2-75-1975, Quick-Drying Primer for Use on Structural Steel.
- .2 CSA International
 - .1 CAN/CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S16-09, Design of Steel Structures.
 - .3 CAN/CSA S136-12, North American Specification for the Design of Cold Formed Steel Structural Members.
 - .4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .5 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).
 - .6 CSA W55.3-08, Certificate of Companies for Resistance Welding Steel and Aluminum.
- .3 Do work to CSA S16 and CAN/CSA-S136 except where specified otherwise.
- .4 Do welding to CSA W59 except where specified otherwise.
- .5 Use qualified fabricators in accordance with CSA W47.1.

1.3 SUBMITTALS

- .1 The joist supplier shall submit standard quality procedures utilized for the manufacturer of the works.
- .2 Upon Request, submit three certified copies of mill test reports covering chemical and physical properties of steel used in this work. Such mill test reports shall be certified by qualified metallurgists confirming that test conform to requirements of CAN/CSA-G40.20 and CAN/CSA-G40.21.

1.4 DESIGN OF STEEL JOISTS

- .1 Design steel joists to carry loads indicated on drawings in accordance with CSA S16.
- .2 Roof joists to be designed for a maximum live load deflection of $1/300^{\text{th}}$ of the span unless noted otherwise on the drawings and a total load deflection of $1/240^{\text{th}}$ of the span.
- .3 Unless noted otherwise, loads shown on the drawings are specified loads.

1.5 SHOP DRAWINGS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Each drawing submitted shall bear the signature and stamp of a qualified professional engineer registered in Ontario.
- .3 Clearly indicate joist spacing, bearing and anchorage details, framing openings, accessories, schedule of materials, depth, camber, splicing details, deflection and loading.
- .4 Erection drawings shall be originals prepared by fabricator. Reproduction of contract drawings is not permitted.
- .5 All shop drawings and materials lists are to contain a blank area measuring 70 mm high by 100 mm long located near the bottom right hand corner of the drawing or page. This area is to be reserved for the Departmental Representative's review stamp.

Part 2 Products

2.1 MATERIALS

- .1 Structural steel: to CAN/CSA-G40.21.
- .2 Welding materials: to CSA W59.
- .3 Shop paint primer: to CISC/CPMA 2-75, color to be grey.

2.2 FABRICATION

- .1 Fabricate steel joists and accessories to CSA S16 and CAN/CSA-S136.
- .2 Weld to CSA W59.
- .3 Bridging shall be supplied in accordance with the requirements of CSA S16. Bridging shall be terminated on either side of the opening and placed to the sides of the openings. The Contractor shall be responsible for coordinating lines of bridging with the Departmental Representative as required to avoid conflicts with other building elements.
- .4 The open web steel joists are required to furnish lateral support to the top flanges of all supporting steel beams and walls.
- .5 Connections to the supporting steel shall be capable of withstanding a horizontal force of not less than ten percent of the end reactions of the joists but in no case shall be less than 2-20 mm bolts or less than a pair of 5 mm welds 40 mm long.
- .6 Steel joists to be designed for point loads at all bracing locations used to support bottom flanges of supporting beam. The axial load in the bracing angles is to be not less than ten percent of the joist reaction.

- .7 Extended joist ends shall be supplied to a length and position as indicated on the drawings and shall be designed to support the loads indicated, with a maximum live load deflection of $1/360^{\text{th}}$ of the extension.
- .8 Construct shoes of open web steel joists to provide full and level bearing of the shoe.
- .9 Center joist shoes on centerline of supporting steel beams and walls unless noted otherwise.
- .10 Camber joists as per CSA S16 unless shown otherwise on the drawings.
- .11 All OWSJ framing into columns shall be tie joists with bottom chord extending and connected to column.

2.3 SHOP PRIMING

- .1 Clean, prepare surface and shop prime steel to CSA S16 in preparation for CISC/CPMA Standard 2-75 primer.
- .2 Inspection of shop welding shall be carried out prior to shop painting.

Part 3 Execution

3.1 ERECTION

- .1 Erect steel joists and bridging as indicated in accordance with shop drawings and specified reference standard CSA S16 to minimum tolerances.
- .2 All OWSJ's when in final position shall have top and bottom chords in oriented as per the manufacturers design requirements and meeting the plumb and sweep requirements of S16.
- .2 Obtain written permission from Departmental Representative prior to field cutting or altering joists or bridging.
- .3 No holes shall be burned, punched or drilled into the joists. Use only approved clamping devices for connecting to the joists.

3.2 TOUCH-UP PAINTING

- .1 Field touch up shop primer and shop top coats to bolts, welds and burned or scratched surfaces at completion of erection.

3.3 INSPECTION AND TESTING

- .1 Inspection and testing of materials and workmanship will be will be carried out by a testing laboratory approved by the Departmental Representative.
- .2 Joist manufacturer shall pay costs of inspection testing.

- .3 Visual welding inspection shall be carried out on all welding as outlined in Clauses 7 and 11 of CSA W59 by an inspector certified to CSA Standard W178.2.
- .4 Random spot radiographic weld testing shall be carried out on 10% of the joists randomly selected from each type designed. The weld tests shall be performed on bottom tension chord splices.
- .5 Should inspection and testing reveal work not conforming to these specifications, the defective work shall be repaired or replaced and re-inspected or tested to the satisfaction of the Departmental Representative.
- .6 A copy of the report prepared by the inspector carrying out the welding inspection and testing shall be sent to the Departmental Representative.
- .7 A technical representative of the primer and top coat manufacturer will also review methods of work to ensure manufacturer's recommendations are being strictly adhered to and shall submit a report to the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 30 00 - Cast-in-place concrete
- .2 Section 05 12 23 - Structural steel for buildings
- .3 Section 05 21 00 - Steel joist framing

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A924/A924M-10a, Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 CSA International
 - .1 CSA S16-09, Design of Steel Structures.
 - .2 CAN/CSA S136-12, North American Specification for the Design of Cold Formed Steel Structural Members.
 - .3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .5 CSA W55.3-08, Certification of Companies for Resistance welding of Steel and Aluminum.
- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 10M-13, Standard for Steel Roof Deck.
 - .2 CSSBI 12M-13, Standard for Composite Steel Deck.
- .5 Design, fabrication and erection to CSA S16 and CAN/CSA-S136.
- .6 Steel decking work to Canadian Sheet Steel Building Institute Standards for Steel Roof Deck and Steel Floor Deck except where specified otherwise.
- .7 Welding to CSA W59 except where specified otherwise.

1.3 DESIGN CRITERIA

- .1 Design steel deck to CSA S136.
- .2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, and uplift as indicated.

- .3 Deflection under live load only shall not exceed 1/360th of span.
- .4 Floor deck to be concrete composite with a total slab thickness of 150 mm.
- .5 Refer to the drawings for depths and minimum gauges.

1.4 SHOP DRAWINGS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Clearly indicate decking plan, profile, dimensions, core thickness, anchorage, spans, supports, projections, openings, and reinforcement details and accessories.
- .3 Shop drawings shall clearly indicate the roof slopes, high points and low points and the deck shall be properly detailed, designed and fabricated to consider roof slopes.
- .4 Every drawing submitted shall bear the signature and stamp of a qualified professional engineer registered in the Province of Ontario.
- .5 Indicate details of temporary shoring of steel deck such as location, time and duration of placement and removal of shoring.
- .6 All shop drawings and material lists are to contain a blank area measuring 70 mm high by 100 mm long located near the bottom right hand corner of the drawing or page. This area is to be reserved for the Engineer's review stamp.

Part 2 Products

2.1 MATERIALS

- .1 Metal: to ASTM A653/A653M galvanized steel sheet to ASTM A924/A924M, Grade A structural quality. Zinc thickness to Z275.
- .2 Pre-moulded closures: closed cell foam rubber, profiled to deck corrugations, 25 mm thick.
- .3 Use of scrap metal, end and side pieces, etc., is not permitted.
- .4 Cover plates, cell closures and flashing: galvanized steel sheet with minimum steel core thickness of 1.22 mm.
- .5 Closures to external walls: pre-moulded type.
- .6 Primer: zinc rich, ready mix primer to CGSB-1.181.
- .7 Stiffened sheet metal angle floor pour stops to be designed by manufacturer to suit overhang.
- .8 Welding shall conform to CSA W59 except where specified otherwise. All welds shall be given a protective coat of zinc rich primer.

2.2 TYPES OF DECKING

- .1 Roof deck: 0.91 mm minimum core thickness, 38 mm deep profile, non-cellular, overlapping side laps with flutes on 152 mm centers, maximum distance between upper flanges to be 67 mm.
- .2 Floor deck: 0.91 mm minimum core thickness, 76 mm deep profile, non-cellular, ribbed faces for concrete bond, upright flute profile, overlapping side laps. Flutes to be on 305 mm or 406 mm centers. Average rib width distance to be not less than twice the deck height.

Part 3 Execution

3.1 ERECTION

- .1 Erection of the steel deck shall be performed by the erection forces of the manufacturer or his approved agents and to his instructions.
- .2 Steel deck shall be placed on the supporting steel framework and adjusted to final position before being permanently fastened. Each unit shall be brought to proper bearing.
- .3 All steel deck shall be welded as follows, except where noted otherwise. All welding shall be done by competent, experienced welding mechanics. All welds shall be given a protective coat of approved paint primer, promptly upon completion.
- .4 Roof deck units shall be welded to supporting members at 150 mm centers in each direction, including both sides of sidelap joints. Roof deck shall also be welded at each intermediate deck support (IDS) with 2 welds and at other locations shown on the drawings and noted in the specifications.
- .5 All sidelaps of roof deck shall be mechanically connected at 250 mm centers.
- .6 Floor units shall be welded to supporting members at 300 mm centers in each direction, including both sides of sidelap joints. Floor units shall also be welded with 2 welds per flute at ends of deck along the building perimeter and along interior openings. At braced bays, floor deck shall be welded at 150 mm centers or with 2 welds per flute. Provide additional welds as shown on the drawings and noted in the specifications.
- .7 All sidelaps of floor deck to be mechanically connected at 600 mm centers.
- .8 Roof and floor deck units shall be lapped at ends not less than 100 mm.
- .9 All deck welds shall be 20 mm diameter fusion welds.
- .10 Supply and install sheet steel cover plates to cover gaps where units abut or change direction and at high and low roof points. Fasten to each side at 150 mm centers (minimum) using #12 screws.
- .11 Supply, install and weld in position sheet metal flashing to close between floor unit and columns.

- .12 Supply and install stiffened galvanized sheet metal angles (min. 12 Ga.), floor thickness x 200 mm minimum at the perimeter of all floor decking and at deck openings as forming for the concrete floors unless noted otherwise.
- .13 Deck shall be fabricated and installed so that it fits the roof slopes indicated on the drawings.
- .14 All deck to span 3 spans minimum unless detailed otherwise.
- .15 Contractor is responsible for additional temporary/permanent support of metal decking, metal edge forms, etc. as required to keep material in proper position during construction.

3.2 CLOSURES

- .1 Provide sheet metal closures as required to contain concrete.
- .2 Where metal decking rests on exterior walls, fill web spaces with neoprene closures.
- .3 Attach metal cell closures and metal flashing at locations required to contain poured concrete.
- .4 Where decking is parallel to steel beams and is terminated at the edges of the beam top flange, install channel or Z closure strips between the beam flange and any top flute which is cut.

3.3 OPENINGS

- .1 Install 64x64x6.4 mm steel angles, perpendicular to flutes, welded to 3 flutes each side of opening for deck openings from 150 mm to 300 mm size. No reinforcement required for openings cut in deck which are smaller than 150 mm square.
- .2 For deck openings over 300 mm, reinforce in accordance with structural steel framing details.

3.4 SUPPORT AT COLUMNS

- .1 Install 75x75x6 mm steel angles on face of steel columns where required to support deck.

3.5 COORDINATION

- .1 Coordinate the extent of metal deck with the architectural drawings and verify requirements of other trades for dimensioning and detailing of roof and floor openings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 ASTM International (ASTM).
 - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM B 209 - 10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 CSA Group (CSA).
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16 - 09, Design of Steel Structures.
 - .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - February 2004.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .7 Aluminum angles to ASTM B 209, 6061-T6 alloy, unequal legs, 3 mm thick X 40 mm X 100 mm

2.2 FABRICATION

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

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Shop coat primer: MPI-INT or EXT 5.1A in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

- .3 Zinc primer: zinc rich, ready mix to MPI-INT or EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

2.4 ISOLATION COATING

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

2.5 SHOP PAINTING

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

2.6 ANGLE LINTELS

- .1 Steel angles: galvanized for exterior use, prime painted for interior use, sizes indicated for openings. Provide 150 mm minimum bearing at ends.
- .2 Weld or bolt back-to-back angles to profiles as indicated.

2.7 PIPE RAILINGS

- .1 Steel pipe: nominal outside diameter indicated, formed to shapes and sizes as indicated.
- .2 Galvanize exterior pipe railings after fabrication. Shop coat prime interior railings after fabrication.

2.8 ACCESS LADDERS

- .1 Fabricate as indicated.
- .2 Brackets: sizes and shapes as indicated, weld to stringers, complete with fixing anchors.
- .3 Galvanize finish for exterior, prime paint for interior.
- .4 Galvanize exterior ladders after fabrication.

2.9 CHANNEL FRAMES

- .1 Fabricate frames from steel, sizes of channel and opening as indicated.
- .2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.

.3 Weld steel strap anchors to channel jamb frame.

.4 Finish: galvanized.

2.10 CUSTOM ROOF GUTTERS AND DOWNSPOUTS

.1 Fabricate from steel as indicated.

.2 Weld to form continuous shapes, free from joints as indicated.

.3 Form bottom of gutter with slope to downspout

.4 Finish: Hot dipped galvanized.

2.11 BOLLARDS

.1 Fabricate to dimensions indicated.

.2 Finish: Hot Dipped Galvanized finish; field painted to Section 09 91 13 - Exterior Painting.

.3 Fill with concrete and crown top using 25 MPa, Class F-2 concrete.

.4 Excavate for bollards in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling. Backfill bollards plumb and aligned with lines of building and to locations indicated.

2.12 ALUMINUM ANGLES

.1 Install 40 mm X 100 mm x 3 mm aluminum angles, LLH, to cover gap between top of foundation wall and main floor slab at:

.1 Grid A between Grids 8 and 9.

.2 Grid 11 between Grids A and B.

.2 Mechanically fasten long leg to main floor slab at 600 mm oc.

2.13 IN-FLOOR POST SLEEVE AND CAP

.1 Fabricate to dimensions indicated. I/D to accept standard chainlink fence line-post.

.2 Finish : Hot dipped Galvanized finish.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16 or weld field connection.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.3 CLEANING

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

3.4 PROTECTION

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

1.2 Interior and exterior stairs, ladders and guard rails.

1.3 RELATED REQUIREMENTS

.1 Section 09 91 23 - Interior Painting.

1.4 REFERENCES

.1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)

.1 ANSI/NAAMM MBG 531-09, Metal Bar Grating Manual.

.2 ASTM International

.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A307-12, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

.3 ASTM A325 - 10e1, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

.3 CSA Group (CSA).

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.4 National Association of Architectural Metal Manufacturers (NAAMM)

.1 NAAMM AMP 510-92, Metal Stairs Manual.

.5 Society for Protective Coating (SSPC).

.1 SSPC Systems and Specifications, Volume 2.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for stairs and include

product characteristics, performance criteria,
physical size, finish and limitations.

.3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.
 - .2 Detail and fabricate stairs to NAAMM AMP 510.

2.2 MATERIALS

- .1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.
- .2 Steel plate: to CSA G40.20/G40.21, Grade 260 W.

- .3 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.
- .4 Steel tubing: to CSA G40.20/G40.21, Grade 350W, sizes and dimensions as indicated.
- .5 Metal bar grating: to ANSI/NAAMM MBG 531, steel, Type W-19-4, minimum 25 mm deep bar X minimum 4.7 mm thick bar, with checkered plate nosings.
- .6 Welding materials: to CSA W59.
- .7 Bolts: to ASTM A307.
- .8 High strength bolts: to ASTM A325M.
- .9 Metal Screen: steel wire mesh, square pattern, 40 mm X 40 mm mesh, 3.6 mm diameter wire.

2.3 FABRICATION

- .1 Fabricate in accordance with NAAMM AMP 510.
- .2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.
- .3 Accurately form connections with exposed faces flush:
 - .1 Make mitres and joints tight.
 - .2 Make risers of equal height.
- .4 Grind or file exposed welds and steel sections smooth.
- .5 Shop fabricate stairs in sections as large and complete as practicable.

2.4 BALUSTRADES AND GUARDRAILS

- .1 Construct balusters and handrails from steel angles, channels and expanded mesh.
- .2 Cap and weld exposed ends of balusters and handrails.
- .3 Terminate at abutting wall with end flange.
- .4 Provide hinged gates as indicated, including provisions for locking and fixing in place when in closed position.

2.5 FINISHES

- .1 Exterior Finish - Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA G164.

- .2 Interior Finish - Zinc primer: zinc rich, ready mix to MPI-INT or EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11. Final finish to Section 09 91 23.

2.6 SHOP PAINTING

- .1 Clean surfaces in accordance with SSPC Systems and Specifications.
- .2 Apply one coat of shop primer except interior surfaces of pans.
- .3 Apply two coats of primer of different colours to parts inaccessible after final assembly.
- .4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.
- .5 Do not paint surfaces to be field welded.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal stairs and ladders installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative .
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative .

3.2 INSTALLATION OF STAIRS

- .1 Install in accordance with NAAMM AMP 510.
- .2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.
- .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

- .4 Do welding work in accordance with CSA W59 unless specified otherwise.
- .5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Environmental Protection Agency (EPA)
 - .1 EPA 40 CFR, Part 60, Appendix A Method 24: Determination of volatile matter content, water content, density, volume solids, and weight solids of
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - February 2004.
 - .2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.
- .4 National Fire Code of Canada.

1.2 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
 - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
 - .4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
 - .5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
 - .6 paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
 - .7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
 - .8 Standard of Acceptance:
 - .1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.3 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements:

- .1 Provide paint products meeting MPI "Environmentally Friendly" E3 ratings based on VOC (EPA 40 CFR, Part 60, Appendix A Method 24) content levels.
- .2 Green Performance in accordance with MPI Standard GPS-1.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for approval. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Departmental Representative for changes in work schedule.
- .3 Schedule painting operations to prevent disruption of occupants in and about building.

1.5 SUBMITTALS

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

1.6 QUALITY CONTROL

- .1 Provide mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 When requested by Departmental Representative or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.7 MAINTENANCE

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

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
 - .1 Deliver and store materials in original containers, sealed, with labels intact.
 - .2 Labels: to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
 - .3 Remove damaged, opened and rejected materials from site.
 - .4 Provide and maintain dry, temperature controlled, secure storage.
 - .5 Observe manufacturer's recommendations for storage and handling.
 - .6 Store materials and supplies away from heat generating devices.
 - .7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
 - .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
 - .9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.
 - .10 Remove paint materials from storage only in quantities required for same day use.
 - .11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
 - .12 Fire Safety Requirements:

- .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 AMBIENT CONDITIONS

- .1 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
 - .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 - .5 Do not apply paint when:
 - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
 - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 - .3 Surface to be painted is wet, damp or frosted.
 - .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
 - .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 - .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
 - .9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

- .1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide exterior paint products with a VOC range <201 g/L.
- .3 Paint materials for paint systems: to be products of single manufacturer.

- .4 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).
- .5 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

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

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.
- .4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

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

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces will be provided by Departmental Representative after Contract award.

2.5 EXTERIOR PAINTING SYSTEMS

- .1 Galvanized Metal: not chromate passivated / exterior doors and frames
 - .1 EXT 5.3G - Waterborne light industrial coating for moderate chemical resistance.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

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

up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

- .5 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.3 EXISTING CONDITIONS

- .1 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .2 Maximum moisture content as follows:
 - .1 Stucco: 12 %.
 - .2 Concrete: 12 %.
 - .3 Clay and Concrete Block/Brick: 12 %.
 - .4 Wood: 15 %.

3.4 PROTECTION

- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect passing pedestrians, building occupants and general public in and about building.
- .5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.
- .6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:

- .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
- .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
 - .4 Brush out immediately runs and sags.
 - .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.
- .5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

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

- .5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.7 CLEANING

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

3.8 RESTORATION

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.
 - .2 Sustainable requirements for construction and verification.

1.2 REFERENCES

- .1 Environmental Protection Agency (EPA)
 - .1 EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
 - .1 MPI Architectural Painting Specifications Manual, 2004.
- .4 National Fire Code of Canada - 1995

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
 - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Departmental Representative for changes in work schedule.
- .3 Schedule painting operations to prevent disruption of occupants.

1.5 SUBMITTALS

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

- .1 Submit product data and instructions for each paint and coating product to be used.
- .2 Submit product data for the use and application of paint thinner.
- .3 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures . Indicate VOCs during application and curing .
- .3 Samples:
 - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
 - .2 Submit duplicate 200 x 300 mm sample panels of each finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
 - .1 3 mm plate steel for finishes over metal surfaces.
 - .2 13 mm birch plywood for finishes over wood surfaces.
 - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
 - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
 - .4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .1 Lead, cadmium and chromium: presence of and amounts.
 - .2 Mercury: presence of and amounts.
 - .3 Organochlorines and PCBs: presence of and amounts.
 - .5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .6 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation and application instructions.
 - .7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

1.6 MAINTENANCE

- .1 Extra Materials:
 - .1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.
 - .2 Quantity: provide one - four litre can of each type and colour of primer stain finish coating. Identify colour and

paint type in relation to established colour schedule and finish system.

- .3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.
- .2 Acceptance at Site:
 - .1 Identify products and materials with labels indicating:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Storage and Protection:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.8 SITE CONDITIONS

- .1 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or

ventilation conditions are such that airborne particles will not affect quality of finished surface.

- .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
- .3 Apply paint when previous coat of paint is dry or adequately cured.
- .2 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

- .1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Provide interior non-flat paint products with a VOC range <151 g/L.
- .3 Provide interior flat paint products with a VOC range <51 g/L.
- .4 Provide paint materials for paint systems from single manufacturer.
- .5 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .6 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
- .7 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .8 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

- .1 Departmental Representative will provide Colour Schedule after Contract award
- .2 Colour schedule will be based upon selection of five base colours and three accent colours. No more than eight colours will be selected for entire project and no more than three colours will be selected in each area.
- .3 Selection of colours from manufacturers full range of colours.

- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

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

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

- .2 Gloss level ratings of painted surfaces will be provided by Departmental Representative after Contract Award.

2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete vertical surfaces: including horizontal soffits:
 - .1 INT 3.1C - High performance architectural latex finish.
 - .2 INT 3.1G - Waterborne epoxy (tile-like) finish for smooth concrete .
- .2 Concrete horizontal surfaces: floors and stairs:
 - .1 INT 3.2L - Waterborne epoxy floor finish.
- .3 Concrete masonry units: smooth and split face block and brick:
 - .1 INT 4.2D - High performance architectural latex finish.
 - .2 INT 4.2J - Waterborne epoxy (tile-like) finish for dry environments .

- .4 Structural steel and metal fabrications: columns, beams, joists:
 - .1 INT 5.1B - Waterborne light industrial coating.
 - .2 INT 5.1N - Waterborne light industrial coating (over epoxy primer).
- .5 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
 - .1 INT 5.3B - Waterborne light industrial coating.
- .6 Dimension lumber:
 - .1 INT 6.2B - High performance architectural latex finish.
- .7 Dressed lumber: including doors, door and window frames, casings, mouldings:
 - .1 INT 6.3E - Polyurethane varnish finish (over stain).
- .8 Wood paneling and casework: partitions, panels, shelving, millwork:
 - .1 INT 6.4E - Polyurethane varnish finish (over stain).
- .9 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - .1 INT 9.2B - High performance architectural latex finish.
- .10 Acoustic panels and tiles:
 - .1 INT 9.3E High performance architectural latex finish.
- .11 Canvas and cotton coverings.
 - .1 INT 10.1A - Latex finish.
- .12 Special Finishes: Luminous paint to demarcate emergency exits.

2.6 SOURCE QUALITY CONTROL

- .1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
 - .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
 - .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
 - .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Unless otherwise noted, paint all exposed-to-view surfaces that are not prefinished including:
 - .1 structural system: including metal deck, beams, columns, joists, purlins, cross bracing, braces and sag rods.
 - .2 miscellaneous metals
 - .3 masonry
 - .4 drywall
 - .5 doors and frames
 - .6 woodwork

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
- .3 Maximum moisture content as follows:
 - .1 Stucco, plaster and gypsum board: 12 %.
 - .2 Concrete: 12 %.
 - .3 Clay and Concrete Block/Brick: 12 %.
 - .4 Wood: 15 %.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
 - .4 Protect passing pedestrians, building occupants and general public in and about the building.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in

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- secure location and re-installed after painting is completed.
 - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative .
 - .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air .
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
 - .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
 - .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply wood filler to nail holes and cracks.
 - .2 Tint filler to match stains for stained woodwork.
 - .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
 - .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning .
 - .8 Touch up of shop primers with primer as specified.
 - .9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative

3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

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

3.7 SITE TOLERANCES

- .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
- .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 RESTORATION

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

- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION