

SPECIFICATIONS

LOADING DOCK CRANE REPLACEMENT CSA15-M2b

Canadian Space Agency
David Florida Laboratory
3701 Carling Ave.
Ottawa, ON, Canada

SUBMITTED FOR: TENDER & CONSTRUCTION

August 2016

SPECIFICATIONS:

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APPENDIX A:

DFL General Campus & Cleanrooms Procedures.

APPENDIX B:

DFL General Project Notes & Procedures.

END

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

Work of this Contract comprises the replacement of 1 (one) Overhead, underrunning Crane at the Loading Dock, located at Canadian Space Agency's David Florida Laboratory 3701 Carling Avenue Ottawa, Building 65, Ontario. The Crane system required under this projects shall be provided (supplied, installed and commissioned) complete in its entirety for a full operating system in every respect. This includes, but not limited to the following: conductors, brackets, power system, electrical mechanical components, all related controls, signage, etc.

1.2 CONTRACT METHOD

- .1 Construct Work under single, stipulated price contract.
- .2 Employ suppliers and subcontractors.
- .3 Relations and responsibilities between Contractor and subcontractors assigned by Owner are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
 - .1 Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations there under.
 - .2 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Engineer.

1.3 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Architect, in writing, any defects which may interfere with proper execution of Work.
- .3 Work of this Project must include provisions for coordinating related work, identified in Contract Documents, for following principal items.

1.4 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3 Maintain fire access/control.
- .4 De-commissioning by Owner of areas affected by work as non-clean room during construction, Contractor to be cognizant that adjacent areas are still clean room environment.

- 1.5 CONTRACTOR USE OF PREMISES
- .1 Limit use of premises for Work, for storage, and for access, to allow:
 - .1 Owner occupancy.
 - .2 Partial owner occupancy.
 - .3 Work by other contractors.
 - .4 Public usage.
 - .2 Co-ordinate use of premises under direction of Owner and/or Engineer.
 - .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
 - .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
 - .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Owner and/or Engineer.
 - .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
 - .7 The approved contractor representative has to be present on site at all times and accompany all sub trade workers. Note: sub-trades are not allowed to be on site or to work without the presence of the approved designated contract representative - no exceptions. Written notification must be provided when requesting a replacement and approved by CSA prior to the replacement taking effect. .
- 1.6 OWNER OCCUPANCY
- .1 Owner will occupy premises during entire construction period for execution of normal operations.
 - .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.
- 1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING
- .1 Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises. Arrange with Owner and Engineer to facilitate execution of work.
 - .1 Accept liability for damage, safety of equipment and overloading of existing equipment.
- 1.8 EXISTING SERVICES
- .1 Notify Owner and Engineer and utility companies of intended interruption of services and obtain required permission.
 - .2 Where Work involves breaking into or connecting to existing services, give Owner and/or Engineer 72 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian vehicular traffic and tenant operations.

- .3 Provide alternative routes for personnel pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide temporary services when directed by Owner and/or Engineer to maintain critical building and tenant systems.
- .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.
- .11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.9 DOCUMENTS
REQUIRED

- .1 Maintain at job site, one copy each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

END OF SECTION

PART 1 - GENERAL

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| 1.1 ACCESS AND EGRESS | .1 | Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations. |
| 1.2 USE OF SITE AND FACILITIES | .1 | Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Owner and/or Engineer to facilitate work as stated. |
| | .2 | Maintain existing services to building and provide for personnel and vehicle access. |
| | .3 | Sanitary facilities are provided by CSA. Keep facilities clean.
.1 Accept liability for damage, safety of equipment and overloading of existing equipment. |
| | .4 | Closures: protect work temporarily until permanent enclosures are completed. |
| | .5 | Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols. |
| 1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING | .1 | Execute work with least possible interference or disturbance to building operations occupants, public and normal use of premises. Arrange with Owner to facilitate execution of work. |
| 1.4 EXISTING SERVICES | .1 | Notify Owner and utility companies of intended interruption of services and obtain required permission. |
| | .2 | Where Work involves breaking into or connecting to existing services, provide Owner and/or Engineer 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends. |
| | .3 | Provide for personnel pedestrian and vehicular traffic. |
| | .4 | Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures. |
| 1.5 SPECIAL REQUIREMENTS | .1 | Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations. |

- .2 Keep within limits of work and avenues of ingress and egress.
- .3 Ingress and egress of Contractor vehicles at site is limited to Area indicated.
- .4 Deliver materials outside of peak traffic hours as directed by owner.
- .5 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.

1.6 BUILDING
SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

END OF SECTION

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE
- .1 Owner to schedule and administer project meetings throughout the progress of the work.
 - .2 Owner to prepare agenda for meetings.
 - .3 Owner to provide physical space and make arrangements for meetings.
 - .4 Owner to preside at meetings.
 - .5 Owner to record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
 - .6 Owner to reproduce and distribute copies of minutes and transmit to meeting participants and, [affected parties not in attendance.
 - .7 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.
- 1.2 PRECONSTRUCTION MEETING
- .1 Within 5 (five) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
 - .2 Senior representatives of Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
 - .3 Establish time and location of meeting and notify parties concerned.
 - .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
 - .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .4 Delivery schedule of specified equipment.
 - .5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .6 Owner provided products.

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

1.3 PROGRESS
MEETINGS

- .1 During course of Work and 2 (two) weeks prior to project completion, schedule progress meetings every week or as deemed necessary by the Owner.
- .2 Contractor, major Subcontractors involved in Work, Consultant and Owner are to be in attendance.
- .3 Notify parties prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within reasonable time after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for affect on construction schedule and on completion date.
 - .12 Other business.

END OF SECTION

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE
- .1 Submit to Engineer 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 Engineer. 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 Engineer, 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 area.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Engineer's review of submittals.
 - .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Engineer review.
 - .10 Keep one reviewed copy of each submission on site.
- 1.2 SHOP DRAWINGS AND PRODUCT DATA
- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles

or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow 5 (five) days for Engineer's & CSA's review of each submission.
- .5 Adjustments made on shop drawings by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Engineer and/or Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 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.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Engineer's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Engineer may reasonably request.

- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Engineer where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Engineer.
 - .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 (three) years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Engineer.
 - .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.
- .14 Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Engineer.
 - .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.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Engineer.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Engineer.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by Engineer, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

- 1.3 SAMPLES
- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
 - .2 Deliver samples prepaid to Engineer's business address.
 - .3 Notify Engineer 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 Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.
 - .6 Make changes in samples which Engineer may require, consistent with Contract Documents.
 - .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.
- 1.4 MOCK-UPS
- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.
- 1.5 CERTIFICATES AND TRANSCRIPTS
- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
 - .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Ontario
 - .1 Occupational Health and Safety Act, R.S.O. 1990 Updated 2005.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 (seven) days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit 1 (one) copie of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and authority having jurisdiction, weekly.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 (five) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 (five) days after receipt of comments from Engineer.
- .8 Departmental Representative review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional

certifications for any new site personnel to Engineer.

- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF
NOTICE

- .1 File Notice of Project with Provincial and Municipal authorities prior to beginning of Work.

1.4 SAFETY
ASSESSMENT

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

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.
- .2 All contractor personnel, including all sub trades, must attend the MANDATORY DFL briefing before starting any work. Any worker who has not attended the briefing cannot commence work - no exceptions.

1.6 REGULATORY
REQUIREMENTS

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

1.7 GENERAL
REQUIREMENTS

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

1.8 RESPONSIBILITY

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

1.9 COMPLIANCE

- .1 Comply with Ontario Health and Safety Act, R.S.O.

REQUIREMENTS

- 1.10 UNFORSEEN HAZARDS .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province having jurisdiction and advise Engineer verbally and in writing.
- 1.11 POSTING OF DOCUMENTS .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province having jurisdiction, and in consultation with Engineer.
- 1.12 CORRECTION OF NON-COMPLIANCE .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Engineer.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.
- 1.13 BLASTING .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Owner or Engineer.
- 1.14 POWDER ACTUATED DEVICES .1 Use powder actuated devices only after receipt of written permission from Owner or Engineer.
- 1.15 WORK STOPPAGE .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Definitions:
 - .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
 - .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
 - .2 Reference Standards:
 - .1 Canada Green Building Council (CaGBC)
 - .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review and approval by Engineer.
 - .3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.
 - .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .5 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by

- vehicles or runoff.
 - .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
 - .7 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 - .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
 - .10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 - .11 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
 - .12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
 - .13 Pesticide treatment plan to be included and updated, as required.
- 1.3 FIRES
- .1 Fires and burning of rubbish on site is not permitted.
- 1.4 DRAINAGE
- .1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.
 - .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
 - .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
 - .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
 - .5 Control disposal or runoff of water containing suspended materials or

other harmful substances in accordance with local authority requirements.

1.5 POLLUTION CONTROL

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

1.6 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Engineer of proposed corrective action and take such action for approval by Engineer.
 - .1 Do not take action until after receipt of written approval by Engineer.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - Products

2.1 NOT USED

- .1 Not used.

2.2 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND
CODES

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

1.2 HAZARDOUS
MATERIAL DISCOVERY

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.
- .2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative

1.3 BUILDING
SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

END OF SECTION

PART 1 - GENERAL

- 1.1 INSPECTION
- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
 - .2 Give timely notice requesting inspection (minimum 48 hours) if Work is designated for special tests, inspections or approvals by Engineer instructions, or law of Place of Work.
 - .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
 - .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.
- 1.2 INDEPENDENT INSPECTION AGENCIES
- .1 Independent Inspection/Testing Agencies will be engaged by Owner for purpose of inspecting and/or testing portions of Work if necessary. Cost of such services will be borne by Departmental Representative.
 - .2 Provide equipment required for executing inspection and testing by appointed agencies.
 - .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
 - .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Owner. Pay costs for retesting and reinspection.
- 1.3 ACCESS TO WORK
- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
 - .2 Co-operate to provide reasonable facilities for such access.
- 1.4 PROCEDURES
- .1 Notify appropriate agency and Departmental Representative/Engineer in advance of requirement for tests, in

order that attendance arrangements can be made.

- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
- .4 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.

1.5 REJECTED WORK

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

1.6 REPORTS

- .1 Submit 4 (four) copies of inspection and test reports to Owner and Engineer.
- .2 Provide copies to subcontractor of work being inspected or tested and/or manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

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

1.8 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Engineer as specified in specific

Section.

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

1.9 MILL TESTS

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

1.10 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to Mechanical and Electrical Sections for definitive requirements.

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES .1 U.S. Environmental Protection Agency (EPA) / Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 INSTALLATION AND REMOVAL .1 Provide temporary utilities controls in order to execute work expeditiously.
.2 Remove from site all such work after use.
- 1.4 WATER SUPPLY .1 Owner will provide continuous supply of potable water for construction use.
.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- 1.5 TEMPORARY HEATING AND VENTILATION .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
.3 Provide temporary heat and ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.
.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
.5 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or

- gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
 - .6 Permanent heating system of building, to be used when available. Be responsible for damage to heating system if use is permitted.
 - .7 On completion of Work for which permanent heating system is used, replace filters, clean and Flush out system.
 - .8 Pay costs for maintaining temporary heat, when using permanent heating system.
 - .9 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
 - .10 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.
- 1.6 TEMPORARY POWER AND LIGHT
- .1 Owner will provide and pay for temporary power during construction for temporary lighting and operating of power tools.
 - .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
 - .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
 - .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 160 lx.
 - .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Engineer provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 (three) months.

1.7 TEMPORARY
COMMUNICATION
FACILITIES

- .1 Provide and pay for temporary telephone fax data hook up, lines and equipment necessary for own use and use of Engineer.

1.8 FIRE
PROTECTION

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

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.
 - .3 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 INSTALLATION AND REMOVAL
- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
 - .2 Remove from site all such work after use.
- 1.4 SCAFFOLDING
- .1 Scaffolding in accordance with CAN/CSA-S269.2.
 - .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, temporary stairs, etc.
- 1.5 HOISTING
- .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
 - .2 Hoists/cranes to be operated by qualified operator.

1.6 SITE
STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.
- .3 No large storage is available on site, storage of small items must have previous arrangements in place.
- .4 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.

1.7 CONSTRUCTION
PARKING

- .1 Parking will be permitted on site in designated areas.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.

1.8 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.
- .2 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific access and security procedures and protocols.

1.9 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
 - .1 Maintain in clean condition.

1.10 EQUIPMENT,
TOOL AND MATERIALS
STORAGE

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

- 1.11 SANITARY FACILITIES
- .1 Sanitary facilities will be assigned for contractors personnel. Others shall not be used. Facilities are to be kept clean.
 - .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- 1.12 PROTECTION AND MAINTENANCE OF TRAFFIC
- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
 - .2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
 - .3 Protect travelling public from damage to person and property.
 - .4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
 - .5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
 - .6 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- 1.13 CLEAN-UP
- .1 Remove construction debris, waste materials, packaging material from work site daily.
 - .2 Clean dirt or mud tracked onto paved or surfaced roadways.
 - .3 Store materials resulting from demolition activities that are salvageable.
 - .4 Stack stored new or salvaged material not in construction facilities.

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-M1978 (R2003), Douglas Fir Plywood.
 - .3 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.
- 1.2 INSTALLATION AND REMOVAL
- .1 Provide temporary controls in order to execute Work expeditiously.
 - .2 Remove from site all such work after use.
- 1.3 HOARDING
- Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols
- 1.4 GUARD RAILS AND BARRICADES
- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, etc.
 - .2 Provide as required by governing authorities.
- 1.5 ACCESS TO SITE
- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
- 1.6 FIRE ROUTES
- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.
- 1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY
- .1 Protect surrounding private and public property from damage during performance of Work.
 - .2 Be responsible for damage incurred.
- 1.8 PROTECTION OF
- .1 Provide protection for finished and partially finished building

BUILDING FINISHES

finishes and equipment during performance of Work.

- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Consultant locations and installation schedule 3 (three) days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.9 WASTE
MANAGEMENT AND
DISPOSAL

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

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Within text of each specifications section, reference may be made to reference standards.
 - .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
 - .3 If there is question as to whether products or systems are in conformance with applicable standards, Engineer reserves right to have such products or systems tested to prove or disprove conformance.
- 1.2 QUALITY
- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
 - .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
 - .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
 - .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Engineer based upon requirements of Contract Documents.
 - .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
 - .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- 1.3 AVAILABILITY
- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE,
HANDLING AND
PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Engineer.
- .9 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Arrange for and pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S
INSTRUCTIONS

- .1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in

complying with these requirements, authorizes Engineer to require removal and re-installation at no increase in Contract Price or Contract Time.

- 1.7 QUALITY OF WORK
- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
 - .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
 - .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Engineer, whose decision is final.
- 1.8 CO-ORDINATION
- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
 - .2 Be responsible for coordination and placement of openings, sleeves and accessories.
- 1.9 CONCEALMENT
- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
 - .2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative
- 1.10 REMEDIAL WORK
- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
 - .2 Perform remedial work by specialists familiar with materials affected. Do not perform in a manner to neither damage nor put at risk any portion of Work.
- 1.11 LOCATION OF FIXTURES
- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
 - .2 Inform Departmental Representative of conflicting installation. Install as directed.
- 1.12 FASTENINGS
- .1 Provide metal fastenings and accessories in same texture, colour and

finish as adjacent materials, unless indicated otherwise.

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

1.13 FASTENINGS - EQUIPMENT

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

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

PART 1 - GENERAL

- 1.1 SURVEY REFERENCE POINTS
- .1 Existing base horizontal and vertical control points are designated on drawings.
 - .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
 - .3 Make no changes or relocations without prior written notice to Departmental Representative.
 - .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- 1.2 EXISTING SERVICES
- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- 1.3 LOCATION OF EQUIPMENT AND FIXTURES
- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
 - .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
 - .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
 - .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.
- 1.4 SUBSURFACE CONDITIONS
- .1 Promptly notify Departmental Representative in writing if subsurface conditions at place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
 - .2 After prompt investigation, should Departmental Representative determine that conditions do differ materially; instructions will be issued for changes in Work as provided in Changes and Change Orders.

END OF SECTION

PART 1 - GENERAL

- 1.1 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate contractor.
 - .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.
- 1.2 MATERIALS
- .1 Required for original installation.
 - .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 PREPARATION
- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
 - .2 After uncovering, inspect conditions affecting performance of Work.
 - .3 Beginning of cutting or patching means acceptance of existing conditions.
 - .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
 - .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.
 - .6 For all hot work (soldering) including any work that could generate sparks, smoke or an excess of dust, request from Departmental Representative a hot-work site permit with a minimum of 72 hours' notice.

- .7 Smoke eaters and powered exhaust fans vented to outside of building must be used during all brazing/welding/soldering/cutting/ grinding activities to minimize contamination and odor to adjacent areas.

1.4 EXECUTION

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

1.5 WASTE
MANAGEMENT AND
DISPOSAL

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

END OF SECTION

PART 1 - GENERAL

**1.1 PROJECT
CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .6 Dispose of waste materials and debris off site.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
- .12 Site clean-up to be carried out on a daily basis by Contractor.
- .13 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others,

and leave Work clean and suitable for occupancy.

- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Remove dirt and other disfiguration from exterior surfaces.
- .11 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .12 Contractor to do a thorough, general cleaning at project completion. Owner will remove owner erected construction tarps and do high-level clean room cleaning.

1.3 WASTE
MANAGEMENT AND
DISPOSAL

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

END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss the Waste Management Plan and Goals.
- .2 PWGSC's Waste Management Goal 75 percent of total Project Waste to be diverted from landfill sites. Provide Engineer documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced.
- .3 Accomplish maximum control of solid construction waste.
- .4 Preserve environment and prevent pollution and environment damage.

1.2 DEFINITIONS

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Inert Fill: inert waste - exclusively asphalt and concrete.
- .3 Materials Source Separation Program (MSSP): consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .5 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .6 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .7 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .8 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or

recycling.

- .9 Separate Condition: refers to waste sorted into individual types.
- .10 Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
- .11 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill. Refer to Schedule A.

1.3 DOCUMENTS

- .1 Maintain at job site, one copy of following documents:
 - .1 Waste Audit.
 - .2 Waste Reduction Workplan.
 - .3 Material Source Separation Plan.
 - .4 Schedules A, B, C, E completed for project.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to [project start-up]:
 - .1 Submit 2 copies of completed Waste Reduction Workplan (WRW).
- .3 Submit before final payment summary of waste materials salvaged for reuse, recycling or disposal by project using deconstruction/disassembly material audit form.
 - .1 Failure to submit could result in hold back of final payment.
 - .2 Provide receipts, scale tickets, waybills, and show quantities and types of materials reused, recycled, co-mingled and separated off-site or disposed of.
 - .3 For each material reused, sold or recycled from project, include amount in tonnes quantities by number, type and size of items and the destination.
 - .4 For each material land filled or incinerated from project, include amount in tonnes of material and identity of landfill, incinerator or transfer station.

1.5 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare WRW prior to project start-up.
- .2 WRW should include but not limited to:
 - .1 Destination of materials listed.
 - .2 Deconstruction/disassembly techniques and

- sequencing.
 - .3 Schedule for deconstruction/disassembly.
 - .4 Location.
 - .5 Security.
 - .6 Protection.
 - .7 Clear labelling of storage areas.
 - .8 Details on materials handling and removal procedures.
 - .9 Quantities for materials to be salvaged for reuse or recycled and materials sent to landfill.
-
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
 - .4 Describe management of waste.
 - .5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
 - .6 Post WRW or summary where workers at site are able to review content.
 - .7 Set realistic goals for waste reduction, recognize existing barriers and develop strategies to overcome these barriers.
 - .8 Monitor and report on waste reduction by documenting total volume and cost of actual waste removed from project.
-
- 1.6 MATERIALS
SOURCE SEPARATION
PROGRAM (MSSP)
- .1 Prepare MSSP and have ready for use prior to project start-up.
 - .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
 - .3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
 - .4 Provide containers to deposit reusable and recyclable materials.
 - .5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
 - .6 Locate separated materials in areas which minimize material damage.
 - .7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
 - .1 Transport to approved and authorized recycling facility or to users of material for recycling.
 - .8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition.
 - .1 Ship materials to site operating under Certificate of Approval or premises of Owner.

- .2 Materials must be immediately separated into required categories for reuse or recycling.

1.7 WASTE
PROCESSING SITES

- .1 Trail Waste Facility
4475 Trail Road (Ottawa)
311 /613-580-2401
- .2 Tomlinson Springhill Landfill
Hyw 31 Springhill Road (Ottawa)
613-822-1867
- .3 Waste Management Inc. Landfill
2301 Carp Road (Ottawa)
613-831-1281
- .4 WSI Waste Services
3354 Navan Road (Ottawa)
613-824-7289

1.8 STORAGE,
HANDLING AND
PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal do not become Contractor's property.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect structural components not removed for demolition from movement or damage.
- .5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

-
- .9 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.
- 1.9 DISPOSAL OF WASTES
- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
- .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.
- 1.10 USE OF SITE AND FACILITIES
- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by existing facility.
- .3 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.
- 1.11 SCHEDULING
- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.
- PART 2 - EXECUTION
- 2.1 NOT USED
- .1 Not used.

PART 3- EXECUTION

- 3.1 APPLICATION
 - .1 Do Work in compliance with WRW.
 - .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

- 3.2 CLEANING
 - .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
 - .2 Clean-up work area as work progresses.
 - .3 Source separate materials to be reused/recycled into specified sort areas.
 - .4 Refer to CSA-DFL "DFL Projects General Notes & Procedures" (attached at end of specifications) for all site specific procedures and protocols.

- 3.3 DIVERSION OF MATERIALS
 - .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Engineer, and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
 - .2 On-site sale of salvaged, recovered, reusable, nor recyclable materials is not permitted.
 - .3 Demolition Waste:

Material Type	Recommended Diversion %	Actual Diversion %
Electrical Equipment	80	
Mechanical Equipment	100	
Metals	100	
Rubble	100	
Wood (uncontaminated)	100	
Other		

- .4 Construction Waste:

Material Type	Recommended Diversion %	Actual Diversion %
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Canadian Space Agency
David Florida Laboratory
Loading Dock Crane Replacement
3701 Carling Avenue Ottawa, ON

CONSTRUCTION/DEMOLITION
WASTE MANAGEMENT AND
DISPOSAL

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Cardboard	100
Plastic Packaging	100
Rubble	100
Steel	100
Wood (uncontaminated)	100
Other	

3.4 CANADIAN
GOVERNMENTAL
DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

.1 Province of Ontario:
<http://www.energy.gov.on.ca/fr/renewable-energy-facilitation-office/resources-and-contacts-2/>

END OF SECTION

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE REQUIREMENTS
- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Engineer's inspection.
 - .2 Engineer's Inspection:
 - .1 Engineer and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Certificates required by Fire Commissioner and the Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel.
 - .6 Work is completed and ready for Final Inspection.
 - .4
 - .5 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Engineer, and Contractor
 - .2 When Work incomplete according to Owner and Engineer, complete outstanding items and request re-inspection.
- 1.2 FINAL CLEANING
- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
 - .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE REQUIREMENTS .1 Pre-warranty Meeting:
- .1 Convene meeting 1 (one) week prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and warranty requirements.
 - .2 Engineer to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide recommended spare parts, list of maintenance manuals, name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 2 (Two) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, 3 (three) final copies of operating and maintenance manuals in English with warranty letter.
 - .3 Provide recommended spare parts, list of maintenance materials and special tools of same quality and manufacture as products provided in Work.
 - .4 Provide evidence, if requested, for type, source and quality of products supplied.
- 1.3 FORMAT .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
 - .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
 - .4 Cover: identify each binder with type or printed title 'Project Record

Documents'; list title of project and identify subject matter of contents.

- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD/DVD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Engineer and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for Engineer 1 (one) record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.

1.6 RECORDING
INFORMATION ON
PROJECT RECORD
DOCUMENTS

- .7 Inspection certificates.
- .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Engineer.
- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Engineer.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress.
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.
 - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by change orders.
 - .6 Details not on original Contract Drawings.
 - .7 References to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.7 EQUIPMENT AND
SYSTEMS

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

-
- 1.8 MATERIALS AND FINISHES
- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
 - .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
 - .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
 - .4 Additional requirements: as specified in individual specifications sections.
- 1.9 MAINTENANCE MATERIALS
- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to site location as directed; place and store.
 - .4 Receive and catalogue items.
 - .2 Submit inventory listing to Departmental Representative.
 - .1 Include approved listings in Maintenance Manual.
 - .2 Obtain receipt for delivered products and submit prior to final payment.
 - .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to site location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Departmental Representative.
 - .2 Include approved listings in Maintenance Manual.
- 1.10 DELIVERY, STORAGE AND HANDLING
- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
 - .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
 - .3 Store components subject to damage from weather in weatherproof enclosures.

1.11 WARRANTIES AND
BONDS

- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.
- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 (thirty) days before planned pre-warranty conference, to Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Warranty shall start after completion of deficiencies, approval of operation and Maintenance manuals by Engineers and personnel training in accordance with Section 01 79 00 - Demonstration and Training.
- .7 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 (ten) days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .8 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .9 Conduct joint 4 (four) month and 9 (nine) month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .10 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone

-
- numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
- .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems, lightning protection systems,.
 - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .4 Contractor's plans for attendance at 4 (four) and 9 (nine) month post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.
 - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .11 Respond in timely manner to oral or written notification of required construction warranty repair work.
 - .12 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Engineer to proceed with action against Contractor.
- 1.12 WARRANTY TAGS
- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Engineer.
 - .2 Attach tags with copper wire and spray with waterproof silicone coating.
 - .3 Leave date of acceptance until project is accepted for occupancy.

- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

END OF SECTION

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE REQUIREMENTS
- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel 1 (one) weeks prior to date of final inspection substantial performance interim completion.
 - .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
 - .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation.
 - .4 Ensure testing and adjusting has been performed and equipment and systems are fully operational.
 - .4 Demonstration and Instructions:
 - .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled agreed upon times, at the equipment designated location.
 - .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - .3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.
 - .5
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit schedule of time and date for demonstration of equipment two weeks prior to designated dates, for Consultant's approval.
 - .3 Submit reports within 1 (one) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
 - .4 Give time and date of each demonstration, with list of persons present.
 - .5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions to be approved by Consultants and Departmental Representative.

1.3 QUALITY
ASSURANCE

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

END OF SECTION

PART 1 - GENERAL

- 1.1 REFERENCES .1 CSA International
.1 CSA S350-[FM1980 (R2003)], Code of Practice for Safety in Demolition of Structures.
.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 21 - Construction/Demolition Waste Management Disposal.
.2 Submit demolition drawings:
.1 Submit for review and approval by Engineer shoring and underpinning drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada, showing proposed method.
- 1.3 SITE CONDITIONS .1 Review "Designated Substance Report" and take precautions to protect environment.
.2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Engineer immediately.
.1 Proceed only after receipt of written instructions have been received from Engineer.
.3 Notify Engineer before disrupting building access or services.
- .1 Not used.

PART 2 - PRODUCTS

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
.3 Notify and obtain approval of utility companies before starting demolition.
.4 Disconnect, cap, plug or divert, as required, existing public utilities

within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

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

3.2 PREPARATION

- .1 Protection of In-Place Conditions:
 - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .3 Protect building systems, services and equipment.
 - .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
 - .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Demolition/Removal:
 - .1 Remove items as indicated.
 - .2 Remove parts of existing building to permit new construction.
 - .3 Trim edges of partially demolished building elements to tolerances as defined Engineer to suit future use.

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 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 Definitions:
 - .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
 - .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
 - .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .2 Reference Standards:
 - .1 Canadian Environmental Protection Act, 1999 (CEPA 1999)
 - .1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
 - .2 Department of Justice Canada (Jus)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) 1992, (c. 34).
 - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
 - .3 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
 - .2 GS-36-00, Commercial Adhesives.
 - .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .2 National Research Council Canada Institute for Research in Construction (NRC-IRC)
 - .3 National Fire Code of Canada-2005.
- .3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2007, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 (two) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures to Consultant for

-
- each hazardous material required prior to bringing hazardous material on site.
- .2 Submit hazardous materials management plan to Consultant that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.
 - .3 Low-Emitting Materials: submit listing of adhesives and sealants and paints and coatings used in building, comply with VOC and chemical component limits or restrictions requirements.
- 1.3 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 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
 - .1 When exporting hazardous waste to another country, ensure compliance with Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.
 - .4 Storage and Handling Requirements:
 - .1 Co-ordinate storage of hazardous materials with Consultant and abide by internal requirements for labelling and storage of materials and wastes.
 - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
 - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
 - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
 - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
 - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
 - .7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.
 - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
 - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
- .11 Store hazardous materials and wastes in closed and sealed containers.
- .12 Label containers of hazardous materials and wastes in accordance with WHMIS.
- .13 Store hazardous materials and wastes in containers compatible with that material or waste.
- .14 Segregate incompatible materials and wastes.
- .15 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
- .16 Store hazardous materials and wastes in secure storage area with controlled access.
- .17 Maintain clear egress from storage area.
- .18 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
- .19 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .20 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .21 When hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Departmental Representative.
 - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Consultant and appropriate provincial authority. Take reasonable measures to control release.
- .22 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .23 Report spills or accidents immediately to Departmental Representative. Submit a written spill report to Consultant within 24 hours of incident.

- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with local regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Description:
 - .1 Bring on site only quantities hazardous material required to perform Work.
 - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
 - .3 Sustainability Characteristics:
 - .1 Adhesives and Sealants in accordance with Section 07 92 00 - Joint Sealants.
 - .2 Adhesives and Sealants: maximum VOC limit to SCAQMD Rule 1168.
 - .4 Primers, Paints, Coatings in accordance with manufacturer's recommendations for surface conditions and Section 09 91 23 - Interior Painting, and 09 91 23.01 - Interior Re-Painting.
 - .1 Primer: maximum VOC limit to SCAQMD Rule 1113.
 - .2 Paints: maximum VOC limit to SCAQMD Rule 1113.
 - .3 Coatings: maximum VOC limit to SCAQMD Rule 1113.

PART 3 - EXECUTION

3.1 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 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
 - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
 - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
 - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
 - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
 - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.

- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 09 91 00 - Painting
- .2 Section 04 50 00 - Under-running Overhead Cranes

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.
 - .2 ASTM A325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .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 CAN/CSA-S16-09, Limit States Design of Steel Structures.
 - .4 CAN/CSA-S136-07 (R2012), 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 W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
- .4 Master Painters Institute
 - .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.
- .5 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Shop Drawings:
 - .1 Provide drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .3 Erection drawings:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
- .4 Fabrication drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Province of Ontario, Canada.
- .5 Source Quality Control Submittals:
 - .1 Submit two (2) copies of mill test reports 4 weeks prior to fabrication of structural steel.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 Provide mill test reports certified by metallurgists qualified to practice in Province of Ontario, Canada.
- .6 Fabricator Reports:
 - .1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.
- .4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Ontario, Canada for non-standard connections.

2.2 MATERIALS

- .1 Structural steel: to CSA-G40.20/G40.21, Grade 350W for wide flange and tube sections and Grade 300W for other material.
- .2 Anchor bolts: to CSA-G40.20/G40.21, Grade 350W (Grade 50 ksi for U.S. sections).
- .3 Bolts, nuts and washers: to ASTM A325.
- .4 Welding materials: to CSA W48 Series CSA W59 and certified by Canadian Welding Bureau.
- .5 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, grey.
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².

2.3 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by continuous welds, intermittent welds and plastic filler where indicated. Grind smooth.

2.4 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 and CAN/CSA-S136 except where members to be encased in concrete.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to SSPC-SP-3 "Power Tool Cleaning".
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces and edges to be field welded.
 - .3 Faying surfaces of slip-critical connections.
 - .4 Below grade surfaces in contact with soil.
- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .6 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 APPLICATION

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

3.2 GENERAL

- .1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 MARKING

- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

3.4 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and CAN/CSA-S136 and in accordance with reviewed erection drawings.
- .2 Field cutting or altering structural members: to approval of Departmental Representative.

- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.5 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .3 Submit test reports to Departmental Representative within 2 weeks of completion of inspection.
- .4 Departmental Representative will pay costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services. If deficiencies were found, costs to re inspect materials and workmanship once it has been corrected will be the contractors' responsibility.

3.6 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 00 - Interior Painting.
 - .1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-3 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

3.7 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS
- .1 Section 07 92 10 Joint Sealants
 - .2 Section 09 21 16 Gypsum Board Assemblies
 - .3 Section 09 91 23 Interior Painting
- 1.2 REFERENCES
- .1 American National Standards Institute/National Particleboard Association (ANSI/NPA)
 - .1 ANSI/NPA A208.1-2009, Particleboard.
 - .2 ASTM International
 - .1 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A 653/A 653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - .3 ASTM C 578-11a, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .4 ASTM C 1289-11, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .5 ASTM C 1396/C 1396M-11, Standard Specification for Gypsum Board.
 - .6 ASTM D 1761-06, Standard Test Methods for Mechanical Fasteners in Wood.
 - .7 ASTM D 5055-11, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
 - .8 ASTM D 5456-11, Standard Specification for Evaluation of Structural Composite Lumber Products.
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
 - .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
 - .3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.
 - .4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.
 - .4 CSA International
 - .1 CAN/CSA-A247-M86(R1996), Insulating Fiberboard.
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .3 CSA O112.9-10, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
 - .4 CSA O121-08, Douglas Fir Plywood.
 - .5 CAN/CSA O122-06(R2011), Structural Glued-Laminated Timber.
 - .6 CSA O141-05(R2009), Softwood Lumber.

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- .7 CSA O151-09, Canadian Softwood Plywood.
 - .8 CSA O153-M1980(R2008), Poplar Plywood.
 - .9 CSA O325-07, Construction Sheathing.
 - .10 CSA O437 Series-93(R2011), Standards on OSB and Waferboard.
 - .11 CAN/CSA-Z809-08, Sustainable Forest Management.
- .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .6 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2010.
 - .7 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1113-A2011, Architectural Coatings.
 - .2 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
 - .8 Sustainable Forestry Initiative (SFI)
 - .1 SFI-2010-2014 Standard.
 - .9 The Truss Plate Institute of Canada
 - .1 Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses 2007.
 - .10 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- 1.4 QUALITY ASSURANCE
- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
 - .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.
 - .3 Sustainable Standards Certification:
 - .1 Certified Wood: submit listing of wood products and materials used in accordance with CAN/CSA-Z809 or FSC or SFI.

- 1.5 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 ground indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.
 - .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 FRAMING STRUCTURAL AND PANEL MATERIALS
- .1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
 - .1 CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .2 Furring, blocking, nailing strips, grounds, rough bucks, and sleepers:
 - .1 S2S is acceptable for all work.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.
 - .3 Plywood, OSB and wood based composite panels: to CSA O325.
 - .4 Douglas fir plywood (DFP): to CSA O121, standard construction.
 - .5 Canadian softwood plywood (CSP): to CSA O151, standard construction.
 - .6 Glass fibre board sheathing: non-structural, rigid, faced, fiberglass, insulating exterior sheathing board.
 - .7 Gypsum sheathing: to ASTM C 1396/C 1396M.

- 2.2 ACCESSORIES
- .1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .2 General purpose adhesive: to CSA O112.9.
 - .3 Nails, spikes and staples: to CSA B111.
 - .4 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
 - .5 Non-proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.
 - .6 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, formed to prevent dishing. Bell or cup shapes not acceptable.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Engineer.
 - .2 Inform Engineer 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 Engineer.
- 3.2 PREPARATION
- .1 Treat surfaces of material with wood preservative, before installation.
 - .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.
 - .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.
- 3.3 INSTALLATION
- .1 Install members true to line, levels and elevations, square and plumb.
 - .2 Construct continuous members from pieces of longest practical length.
 - .3 Install spanning members with "crown-edge" up.
 - .4 Select exposed framing for appearance. Install lumber materials so

that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

- .5 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, electrical equipment mounting boards, and other work as required.
- .6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .7 Install sleepers as indicated.
- .8 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .10 Countersink bolts where necessary to provide clearance for other work.
- .11 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

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

3.5 PROTECTION

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

END OF SECTION

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS .1 Section 09 21 16 Gypsum Board Assemblies
- 1.2 REFERENCES .1 ASTM International
.1 ASTM C 919-08, Standard Practice for Use of Sealants in Acoustical Applications.
.2 Canadian General Standards Board (CGSB)
.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
.3 General Services Administration (GSA) - Federal Specifications (FS)
.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).
.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.
- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Manufacturer's product to describe:
.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each

-
- other.
- .3 Submit 2 (two) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.
- .3 Samples:
 - .1 Submit 2 (two) samples of each type of material and colour.
 - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
 - .4 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.
- 1.4 CLOSEOUT SUBMITTALS
- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
- 1.5 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 off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
 - .4 Develop Waste Reduction Workplan related to Work of this Section.
 - .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.6 SITE CONDITIONS
- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
 - .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.
- 1.7 ENVIRONMENTAL REQUIREMENTS
- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.
 - .2 Engineer will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants. Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

PART 2 - PRODUCTS

- 2.1 SEALANT MATERIALS
- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
 - .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
 - .3 Where sealants are qualified with primers use only these primers.
- 2.2 SEALANT MATERIAL DESIGNATIONS
- .1 Polysulfide two part:
 - .1 Self-levelling to CAN/CGSB-19.24, Type 1, Class B, colour to match adjacent materials.
 - .2 Polysulfide two part:
 - .1 Non-sag: to CAN/CGSB-19.24, Type 2, Class B, colour to match adjacent materials.
 - .3 Silicones one part: to CAN/CGSB-19.13. Mildew resistant, colour to match adjacent materials.
 - .4 Acoustical sealant: to ASTM C 919.
 - .5 Preformed compressible and non-compressible back-up materials:
 - .1 Polyethylene, urethane, neoprene or vinyl foam:
 - .1 Extruded closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
 - .2 Neoprene or butyl rubber:
 - .1 Round solid rod, Shore A hardness 70.

- .3 High density foam:
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
 - .2 Bond breaker tape:
 - .1 Polyethylene bond breaker tape which will not bond to sealant.
- 2.3 SEALANT SELECTION
- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): sealant type: Polysulfied two part. Non sag.
 - .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: sealant type: Polysulfied two part. Non sag.
 - .3 Coping joints and coping-to facade joints: sealant type: Polysulfied two part. Non sag.
 - .4 Cornice and wash (or horizontal surface joints): sealant type: Polysulfide two part. Self-leveling.
 - .5 Exterior joints in horizontal wearing surfaces (as itemized): sealant type: Polysulfide two part. Self-leveling.
 - .6 Interior control and expansion joints in floor surfaces: sealant type: Polysulfide two part. Non Sag.
 - .7 Joints at perimeter of electrical junction boxes in exterior walls: sealant type: Acoustical sealant.
 - .8 Exposed interior control joints in drywall: sealant type: Sealant type: Silicone one part.
- 2.4 JOINT CLEANER
- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
 - .2 Primer: in accordance with sealant manufacturer's written recommendations.
- PART 3 - EXECUTION
- 3.1 EXAMINATION
- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Engineer.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
- 3.2 SURFACE PREPARATION
- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
 - .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
 - .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
 - .4 Ensure joint surfaces are dry and frost free.
 - .5 Prepare surfaces in accordance with manufacturer's directions.
- 3.3 PRIMING
- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
 - .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
- 3.4 BACKUP MATERIAL
- .1 Apply bond breaker tape where required to manufacturer's instructions.
 - .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
- 3.5 MIXING
- .1 Mix materials in strict accordance with sealant manufacturer's instructions.
- 3.6 APPLICATION
- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.

- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

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

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 REFERENCES

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

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: minimum of 5 (five) years proven satisfactory experience. Provide list of last 3 (three) comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
 - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.
- .2 Mock-Ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, and textures.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Engineerural Painting Specification Manual standards.

- .4 Locate where directed
- .5 Allow 24 hours for inspection of mock-up before proceeding with work.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

.3 Health and Safety:

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Construction requirements: in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Engineer for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Schedule painting operations to prevent disruption of occupants.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .2 Submit product data for the use and application of paint thinner.
 - .3 Submit 2 (two) copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.
- .3 Samples:
 - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
 - .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Engineerural Painting Specification Manual standards submitted on following substrate materials:
 - .1 3 mm plate steel for finishes over metal surfaces.
 - .2 13 mm birch plywood for finishes over wood surfaces.
 - .3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
 - .5 10 mm plywood for finishes over wood surfaces.
 - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
 - .4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .1 Lead, cadmium and chromium: presence of and amounts.
 - .2 Mercury: presence of and amounts.
 - .3 Organochlorines and PCBs: presence of and amounts.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation and application instructions.
- .4 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittal] 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 1 (one) - four litre can of each type and colour of primer, stain and 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 and dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.
- .9 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material [in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
 - .4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan (WMP).
 - .5 Place materials defined as hazardous or toxic in designated containers.
 - .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, and applicable Regional and Municipal, regulations.
 - .7 Ensure emptied containers are sealed and stored safely.
 - .8 Unused paint and coating materials must be disposed of at official hazardous material collections site.
 - .9 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .10 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .11 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .12 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
 - .13 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
 - .14 Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by organizations for verifiable re-use or re-manufacturing.

1.8 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces.
 - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for 7(seven) days after completion of application of paint.
 - .4 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
 - .5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from

- existing system is inadequate to meet minimum requirements.
- .6 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved written approval by Engineer and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 Allow new concrete and masonry to cure minimum of 28 days.
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
- .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .4 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 - .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 Materials and resources in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .3 Provide paint materials for paint systems from single manufacturer.
- .4 Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this

project.

- .5 Conform to latest MPI requirements for interior painting work including preparation and priming.
- .6 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Engineerural Painting Specification Manual "Approved Product" listing.
- .7 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Engineerural Painting Specification Manual, compatible with other coating materials as required.
- .8 Provide paint products meeting MPI "Environmentally Friendly", E2 ratings based on VOC (EPA Method 24) content levels.
- .9 Use MPI listed materials having minimum E2 rating where indoor air quality (odour) requirements exist.
- .10 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
 - .1 Water-based and Water clean-up.
 - .2 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
 - .3 Manufactured without compounds which contribute to smog in the lower atmosphere.
 - .4 Do not contain methylene chloride, chlorinated hydrocarbons, or toxic metal pigments.
 - .5 Recycled content of post-consumer or post-industrial waste.
- .11 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .12 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.
- .13 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
 - .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
 - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.
- .14 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
- .15 Recycled water-borne surface coatings to contain 50 % post-consumer material by volume.
- .16 Recycled water-borne surface coatings must not contain:
 - .1 Lead in excess of 600.0 ppm weight/weight total solids.
 - .2 Mercury in excess of 50.0ppm weight/weight total product.
 - .3 Cadmium in excess of 1.0ppm weight/weight total product.
 - .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
 - .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

- .1 Selection of colours from manufacturer's full range of colours.
- .2 Where specific products are available in restricted range of colours, selection based on limited range.
- .3 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 Engineer 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 as indicated.

2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete vertical surfaces: including horizontal soffits:
 - .1 INT 3.1A - Latex G1 and G4 finishes (over sealer).
 - .2 INT 3.1J - Water repellent paintable finish.
 - .3 INT 3.1L - Waterborne light industrial G3 coating.
- .2 Concrete horizontal surfaces: floors and stairs:
 - .1 INT 3.2C - Epoxy finish.
 - .2 INT 3.2F - Concrete floor sealer.
 - .3 INT 3.2G - Waterborne concrete floor sealer.
 - .4 INT 3.2L - Waterborne epoxy floor finish.
- .3 Structural steel and metal fabrications: columns, beams, joists:
 - .1 INT 5.1DD - Alkyd dry wall finish (over quick dry shop primer) for dry locations only.
 - .2 INT 5.1M - Aluminum paint finish.
 - .3 INT 5.1N - Waterborne light industrial coating (over epoxy primer).
 - .4 INT 5.1P - High build epoxy (over epoxy zinc rich primer).
- .4 Steel - high heat: (boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted):
 - .1 INT 5.2C - Inorganic zinc rich coating, maximum 400 degrees C.
- .5 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
 - .1 INT 5.3A - Latex G5 finish.
 - .2 INT 5.3B - Waterborne light industrial G5 coating.
 - .3 INT 5.3G - Aluminum paint finish.
 - .4 INT 5.3K - Waterborne light industrial G5 coating (over waterborne primer).
 - .5 INT 5.3M - High performance Engineer Ural latex G4 finish.
- .6 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - .1 INT 9.2B - High performance Engineer Ural latex G4 finish.
- .7 Canvas and cotton coverings.
 - .1 INT 10.1A - Latex G5 finish.
- .8 Clean room wall paint.
 - .1 Sherwin Williams Pro Industrial Pre-Catalyzed Water Based Epoxy; colour: SW 7651 Front Porch; finish: Egg Shell.

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 Engineerural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report 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 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 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.
- .3 Clean and prepare surfaces in accordance with MPI Engineerural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent [and bleach where applicable] and clean warm

- water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.

- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

- .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes.

- .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 Apply paint by brush, roller, air sprayer and airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.

- .3 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Primer and sealer at secure rooms to extend above drop ceilings to the bottom of structural ceiling.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

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

3.7 SITE TOLERANCES

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

3.8 FIELD QUALITY CONTROL

- .1 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost.
- .2 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .3 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .4 Cooperate with inspection firm and provide access to areas of work.
- .5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested.

3.9 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of 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 REFERENCES

- .1 The Master Painters Institute (MPI)
 - .1 Maintenance Repainting Manual 2004, Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List.
- .2 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-04, Architectural Coatings.

1.2 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: to have a minimum of 5 (five) years proven satisfactory experience. Provide a list of last 3 (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 repainting work.
 - .3 Apprentices: may be employed provided they work under the direct supervision of qualified journeyperson in accordance with applicable trade regulations.
- .2 Conform to latest MPI requirements for interior repainting work including cleaning, preparation and priming.
- .3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners and solvents) shall be in accordance with the latest edition of the MPI Approved Product List and shall be from a single manufacturer for each system used.
- .4 Paint materials such as linseed oil, shellac, reducers and turpentine shall be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.
- .5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
- .6 Standard of Acceptance: when viewed using final lighting source surfaces shall indicate the following:
 - .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.
 - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.
- .7 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide a mock-up in accordance with requirements of Section 01 45 00 - Quality Control.
 - .2 Prepare and repaint mock-up designated interior room, surface or item to requirements specified herein, with specified paint or coating showing selected colours, gloss/sheen,

textures and workmanship to MPI Maintenance Repainting Manual standards for review and approval.

- .3 When approved, repainted room, surface and/or item shall become acceptable standard of finish quality and workmanship for similar on-site interior repainting work.

1.3 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

- .1 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.
- .2 Where indoor air quality (odour) is a problem, use only MPI listed materials having a minimum E2 rating.

1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule a minimum of 48 hours in advance of proposed operations.
- .2 Paint occupied facilities in accordance with approved schedule. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.
- .3 Obtain written authorization from Departmental Representative for changes in work schedule.
- .4 Schedule repainting operations to prevent disruption by other trades if applicable and by occupants in and about building.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide product data and manufacturer's installation/application instructions for each paint and coating product to be used in accordance with the requirements of Section 01 33 00 - Submittal Procedures.
- .2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.
 - .2 Submit WHMIS MSDS - Material Safety Data Sheets for paint and coating materials in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Submit records of products used. List products in relation to finish system and include following:
 - .1 Product name, type and use (i.e. materials and location).
 - .2 Manufacturer's product number.
 - .3 Colour code numbers.
 - .4 MPI Environmentally Friendly classification system rating.
 - .5 Manufacturer's Material Safety Data Sheets (MSDS).

1.6 SUSTAINABLE REQUIREMENTS

- .1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:
 - .1 Deliver and store materials in original containers, sealed, with labels intact.
 - .2 Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
 - .3 Remove damaged, opened and rejected materials from site.
 - .4 Store and handle in accordance with manufacturer's recommendations.
 - .5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30 degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.
 - .6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Engineer. After completion of operations, return areas to clean condition to approval of Engineer.
 - .7 Remove paint materials from storage in quantities required for same day use.
 - .8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
 - .9 Fire Safety Requirements:
 - .1 Provide 1 (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 daily.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).
- .6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- .6 Where paint recycling is available, collect waste materials by type and provide for delivery to recycling or collection facility.
- .7 Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by organizations for verifiable re-use or re-manufacturing.

1.8 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Do not perform repainting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application and until paint has cured sufficiently.
 - .2 Ventilate enclosed spaces in accordance with Mechanical. Where required, provide continuous ventilation for seven days after completion of application of paint.
 - .3 Co-ordinate use of existing ventilation system with Owner /General Contractor and ensure its operation during and after application of paint as required.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements. Use of gas-fired appliances is not permitted.
 - .5 Do not perform painting work unless minimum lighting level of 323 Lux is provided on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, do not perform repainting work when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.
 - .3 Relative humidity within area to be repainted is above 85%.
 - .2 Conduct moisture tests using properly calibrated electronic Moisture Meter, except use simple "cover patch test" on concrete floors to be repainted.
 - .3 Do not perform repainting work when maximum moisture content of substrate exceeds:
 - .1 12% for concrete and masonry (clay and concrete brick/block).
 - .2 15% for wood.
 - .3 12% for plaster and gypsum board.
 - .4 Test painted concrete, masonry and plaster surfaces for alkalinity as required.
- .2 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when 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, unless otherwise pre-approved by specific coating manufacturer.
 - .4 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of the Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.9 MAINTENANCE

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

PART 2 - PRODUCTS

2.1 MATERIAL

- .1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.
- .2 Where required by authorities having jurisdiction, paints and coatings to provide a fire resistant rating.
- .3 Paint materials for repaint systems to be products of single manufacturer.
- .4 Only qualified products with MPI "Environmentally Friendly" E2 rating are acceptable for use on this project.
- .5 Paints, coatings, thinners, solvents, cleaners and other fluids used in repainting, to be as follows:
 - .1 Not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
 - .2 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
 - .3 Be manufactured without compounds which contribute to smog in lower atmosphere.
 - .4 Be manufactured where matter generating 'Biochemical Oxygen Demand' (BOD) in undiluted production plant effluent discharged to natural watercourse or a sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
 - .5 Be manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
- .6 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

- .1 Selection of colours will be from manufacturers full range of colours.
- .2 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .3 First coat in two coat (Premium) repaint 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 with Departmental Representative's written permission.

- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.
- .4 Thin paint for spraying in accordance with paint manufacturer' instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Engineer.
- .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 MPI gloss / sheen standard values:

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

- .2 Gloss level ratings of repainted surfaces shall be as specified herein.

2.5 INTERIOR PAINTING SYSTEMS

- .1 RIN 3.2 - Concrete Horizontal Surfaces: (floors and stairs).
 - .1 RIN 3.2A - Latex Floor Enamel.
 - .2 RIN 3.2F - Concrete Floor Sealer Waterborne.
 - .3 RIN 3.2G - Latex Zone/Traffic Marking.
- .2 RIN 4.2 - Concrete Masonry Units: (Concrete Block and Concrete Brick).
 - .1 RIN 4.2A - LatexG3.
 - .2 RIN 4.2F - Multicolour.
 - .3 RIN 4.2H - High Performance AcrylicG3.
 - .4 RIN 4.2K- Water Repellent (Paintable).
- .3 RIN 5.1 - Structural Steel and Metal Fabrications.
 - .1 RIN 5.1A - Quick dry G5.

- .2 RIN 5.1B - High Performance Acrylic G5.
- .3 RIN 5.1H - Organic Zinc/Epoxy / 2 Component Polyurethane.
- .4 RIN 5.1J - 2 Component Epoxy (Waterborne) G5.
- .5 RIN5.1N - Latex.
- .4 RIN 5.2 - Steel - High Heat: (Boilers, Furnaces, Heat Exchangers, Breeching, Pipes, Flues, and Stacks).
 - .1 RIN 5.2A - Heat Resistant Enamel, Maximum 205 degrees C.
 - .2 RIN 5.2B - Inorganic Zinc Rich, Maximum 400 degrees C.
 - .3 RIN 5.2C - Heat Resistant Aluminum, Maximum 427 degrees C.
 - .4 RIN 5.2D - High Heat Resistant Aluminum, Maximum 593 degrees C.
- .5 RIN 5.3 - Galvanized Metal: (High Contact/High Traffic Areas (Doors, Frames, Railings, Pipes, and Handrails). Low Contact/Low traffic areas (Overhead Decking, Pipes, and Ducts)).
 - .1 RIN 5.3A - Latex (Low Contact/Traffic) G5.
 - .2 RIN 5.3B - High Performance Acrylic G5.
 - .3 RIN 5.3G - Waterborne Dry Fall (Low Contact/Traffic).
 - .4 RIN 5.3K - Waterborne light industrial G5 coating (over waterborne primer)
 - .5 RIN 5.3M - High performance architectural latex G4 finish.
- .6 RIN 5.4 Aluminum:
 - .1 RIN 5.4E - High Performance Acrylic G6.
- .7 RIN 5.5 - Copper.
 - .1 RIN 5.5A - Alkyd G6.
- .8 RIN 6.3 - Dressed Lumber: (Including Doors, Door and Window Frames, and Mouldings).
 - .1 RIN 6.3A - Latex (Semi-Gloss, Gloss).
 - .2 RIN 6.3D - Semi-Transparent Stain/Alkyd Semi-Transparent Stain/Varnish G4.
 - .3 RIN 6.3G - Pigmented Lacquer.
 - .4 RIN 6.3H - Clear Lacquer G4.
 - .5 RIN 6.3S - Fire Retardant Pigmented G4.
 - .6 RIN 6.3T - Fire Retardant, Clear G4.
- .9 RIN 6.4 - Wood Panelling and Casework: (Partitions, Panels, Shelving, and Millwork).
 - .1 RIN 6.4E - Semi-Transparent Stain.
 - .2 RIN 6.4G - Semi-Transparent Stain/Polyurethane Varnish G4.
 - .3 RIN 6.4H - Semi-Transparent Stain/Lacquer G4 Finish (over stain).
 - .4 RIN 6.4S - Fire Retardant Pigmented G4.
 - .5 RIN 6.4T - Fire Retardant, ClearG4.
- .10 RIN 9.2 - Plaster and Gypsum Board: (gypsum wallboard, drywall, and "sheet rock type material").
 - .1 RIN 9.2A - Latex G4.
 - .2 RIN 9.2C - Alkyd insert gloss level Finish.
- .11 RIN 10.1 - Canvas and Cotton Coverings (Pipe and Duct Coverings).
 - .1 RIN 10.1A - Latex G4.
- .12 RIN 10.2 - Bituminous Coated Surfaces: Cast Iron Pipe, and Concrete.
 - .1 RIN 10.2B - Alkyd G4.
- .13 Clean room wall paint.
 - .1 Sherwin Williams Pro Industrial Pre-Catalyzed Water Based Epoxy - SW 7651 Front Porch - Egg Shell.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

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

3.3 PREPARATION

- .1 Perform preparation and operations for interior painting in accordance with MPI Maintenance Repainting Manual requirements except where otherwise specified.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare interior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to 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 stiff bristle brush to remove dirt, oil and surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and to dry thoroughly. Allow sufficient drying time and test surfaces using an electronic moisture meter before commencing work.
 - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
 - .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.
- .4 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminants from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or

brushing/vacuum cleaning as required.

- .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .6 Do not apply paint until prepared surfaces have been accepted by Engineer.
- .7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from distance up to 1000 mm.

3.4 EXISTING CONDITIONS

- .1 Prior to commencing work, examine site conditions and existing interior substrates to be repainted. Report in writing to Engineer and General Contractor damages, defects, or unsatisfactory or unfavourable conditions or surfaces that will adversely affect this 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" and report findings to Engineer and General Contractor. Maximum moisture content not to exceed specified limits.
- .3 Do not commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.
- .4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

<u>Condition</u>	<u>Description</u>
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	<u>Substrate Damage (repair or replacement of surface required).</u>

3.5 PROTECTION

- .1 Protect existing surfaces and adjacent fixtures and furnishings 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 general public and building occupants in and about building.
- .5 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and surface mounted equipment, fittings and fastenings prior to undertaking re-painting operations. Store items and re-install after painting is completed.
- .6 Move and cover furniture and portable equipment as necessary to carry out repainting operations. Replace as painting operations progress.
- .7 As repainting operations progress, place "WET PAINT" signs in occupied areas.

3.6 APPLICATION

- .1 Apply paint by method that is best suited for substrate being repainted using brush roller air sprayer and/or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise. Methods of application as pre-approved by Departmental Representative before commencing work.
- .2 Brush and Roller Application:
 - .1 Apply paint in 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 free of roller tracking and heavy stipple unless approved by Engineer.
 - .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 by continuous mechanical agitation, intermittent agitation frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .4 Back roll spray applications and brush out runs and sags immediately.
 - .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 paint coats in continuous manner and allow surfaces to dry and properly cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Sand and dust between coats to remove visible defects.
- .7 Repaint 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.

- .8 Repaint top, bottom, and vertical edges of doors to be repainted.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Unless otherwise noted, repainting to include exposed to view / previously painted mechanical and electrical equipment and components (panels, conduits, piping, hangers, and ductwork.).
- .2 Touch up scratches and marks and repaint such mechanical and electrical equipment and components with colour, and sheen finish to match existing unless otherwise noted or scheduled.
- .3 Do not paint over name plates or instruction labels.
- .4 Leave unfinished exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish.
- .5 Keep sprinkler heads free of paint.
- .6 Do not paint interior transformers and substation equipment.
- .7 Standard of Acceptance: when viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
 - .1 Walls: no defects visible from distance of 1000 mm at 90 degrees to surface.
 - .2 Soffits: no defects visible from grade at 45 degrees to surface.
 - .3 Final coat to exhibit uniformity of colour and sheen across full surface area.

3.8 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning, supplemented as follows:
 - .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
 - .2 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
 - .3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
 - .4 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as other cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with safety requirements of authorities having jurisdiction and as noted herein.
 - .5 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be recycled or disposed of in manner acceptable to authorities having jurisdiction.
 - .6 Recycle paint and coatings in excess of repainting requirements as specified.

3.9 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on affected exposed surfaces. 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 Engineer.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

- .1 This section covers and includes the provision and installation of under-running single girder electrically operated overhead cranes as hereinafter described.

1.2 RELATED WORK BY OTHERS

- .1 General contractor shall provide the following in accordance with the requirements of the ANSI A17.1 Code plus applicable Model Building Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic cranes. Provincial or local requirements must be used if more stringent.

1.3 QUALITY ASSURANCE

- .1 The crane contractor is a company specializing in manufacturing and installing crane equipment with not less than five years successful experience.
- .2 All designs, clearances, construction, workmanship and material, unless specifically accepted, shall be in accordance with the requirements of the applicable codes and all codes having legal jurisdiction.
- .3 The crane shall follow design and manufacturing procedures, certified in accordance with International Organization for Standardization (ISO9001-2000) to meet product and service requirements for quality assurance for new products.

1.4 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 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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 sections, plates, pipe, tubing and/or bolts and include product characteristics, performance criteria, physical size, finish and limitations.
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- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .3 Provide wiring diagrams.
- .4 Provide Renewal Parts Catalogues and Maintenance Instructions.

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 WARRANTY

- .1 The crane contractor shall guarantee the material and workmanship of the equipment installed by him under these specifications and make good any defects not due to ordinary wear or to improper use which may develop within one year after substantial completion.

1.8 PROPRIETARY INFORMATION

- .1 Any proprietary material, information or data contained in the equipment, or any component or feature thereof, remains the property of CSA. This includes, but is not limited to, tools, devices, manuals, software, source codes, access codes, object codes, passwords and remote monitoring feature.

1.9 MAINTENANCE

- .1 The crane included in these specifications shall receive regular semi-annual maintenance on each unit for a period of twelve (12) months after the completion of work described herein or acceptance thereof by beneficial use, whichever is earlier.
 - .2 Manufacturer trained employees shall make periodic examinations and perform work including necessary adjusting, greasing, oiling and replacing parts to keep the crane in operation, except parts that require replacement because of accidents, vandalism, misuse or negligence by parties other than the manufacturer.
 - .3 The crane contractor shall perform all work under this Agreement, except emergency minor adjustment call-back service, during regular working hours. The crane contractor shall provide emergency minor adjustment call back service, during regular working hours.
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- .4 Should the owner request that examinations, cleaning, lubrication, adjustments, repairs, replacements or emergency minor adjustment call-back service (unless included above) be performed on other than the crane contractor's regular working hours of his regular working days, the crane contractor shall absorb the straight time labour charges and the owner shall compensate the crane contractor for the overtime premium, travel time and expense at his normal billing rates.
- .5 Crane manufacturer is to provide options for a two (2) year service plan, with optional additional three (3) years, with two (2) yearly visits minimum. Any emergency and/or extra visit charges are to be provided on an "as needed" basis.

Part 2 Products / Operations

2.1 ACCEPTABLE MANUFACTURERS

- .1 CSA/DFL cannot pre-approve any crane make during bid process; contractor can provide any make/model as long as it meets all required requirements as stated in project drawings & specifications, crane shop drawing will be reviewed by all
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consultants after contract is awarded.

2.2 CRANE SYSTEMS

- .1 15 tonne overhead crane: under running single girder, electrically operated overhead crane, complete with one (1) only electric wire rope hoist at the following specifications:
 - .1 Class: CMAA "C"
 - .2 Capacity: 15 tonne
 - .3 Span: 14' -11¼"
 - .4 Lift: 42.6' available on hoist
 - .5 Lift speeds: 15.7 & 2.6 FPM
 - .6 Trolley Speeds: 80 & 20 FPM
 - .7 Bridge Speeds: 0-100 FPM VFD
 - .8 Fusible AMPS: 50
 - .9 Control: Retractable 8 pushbutton fixed pendant station on independent track with keyed electronic interlock system
 - .10 Enclosures: CEMA 12
 - .11 Power Supply: 575/3/60
 - .12 Control Voltage: 110V
 - .13 Maximum Static wheel load: 16,000 lbs/PR wheels
 - .14 Bridge weight: 3,650 lbs
 - .15 Trolley weight: 3,000 lbs
 - .16 Operating sound levels: max. 55 dba at floor level
 - .17 Slow down limit switches to be installed on bridge and trolley
 - .18 Paint Finish:
 - .1 Bridge: yellow to match existing
 - .2 Trolley: yellow to match existing
 - .19 Additional features:
 - .1 Mainline contactor activated by e- stop button on pendant
 - .2 Bridge mounted fused disconnect switch
 - .3 Upper & lower hook travel limit switches
 - .4 Bridge and trolley gears to be fully enclosed
 - .5 Hoist overhead limit switch set to 110% of rated load
 - .6 RF control
 - .7 Hook housing and casing made of cast aluminum

2.3 CRANE SYSTEM AND COMPONENTS REQUIREMENTS

- .1 Standards:
 - .1 A bridge, jib, monorail, gantry or overhead travelling crane must meet the design requirements for electrical components and functions of:
 - .1 ASME B30.2: Safety Requirements for Overhead and Gantry Cranes
-

- .2 CSA Standard C22.1-94, Canadian Electrical Code, Part 1, Section 40 and CSA Standard C22.2 No. 33-M, Construction and Test of Electric Cranes and Hoists.
 - .2 A bridge, jib, monorail, gantry or overhead travelling crane must meet the design requirements of:
 - .1 ANSI Standard MH27.1-2003, Specifications for Patented Track Underhung Cranes and Monorail Systems,
 - .1 Crane Manufacturers Association of America (CMAA) Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes - No. 70 (2004), or
 - .2 Crane Manufacturers Association of America (CMAA) Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2004).
 - .3 A bridge, jib, monorail, gantry or overhead travelling crane must meet the safety requirements of:
 - .1 CSA Standard B167-08 (R2014), Safety Standard for Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists, and Trolleys,
 - .1 ANSI Standard ANSI/ASME B30.2-2005, Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist),
 - .2 ANSI Standard ANSI/ASME B30.11-2004, Monorails and Underhung Cranes,
 - .3 ANSI Standard ANSI/ASME B30.16-2003, Overhead Hoists (Underhung), or
 - .4 ANSI Standard ANSI/ASME B30.17-2003, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist).
 - .2 **Identification**
 - .1 A crane or hoist must be permanently identified by the legible display of the manufacturer's name, model and serial number on the structure.
 - .2 Underside of crane girder to include arrow decals identifying directions to match the controls and orientation of the crane, plus a "15 TONNNE" capacity decal.
 - .3 Each major interchangeable structural component of a crane or hoist must be uniquely identified and must be legibly marked to enable confirmation that the component is compatible with the crane or hoist.
 - .3 **Rated capacity indication**
 - .1 The rated capacity of a crane or hoist must be permanently indicated on the superstructure, hoist and load block of the equipment.
 - .2 The rated capacity of a monorail crane must be permanently marked on the hoist and at intervals not exceeding 10 m (33 ft) on the monorail beam.
 - .3 If the rated capacity of a crane or hoist is affected by
 - .1 The vertical or horizontal angle of a boom or jib,
-

- .2 The length of a boom or jib,
 - .3 The position of a load supporting trolley, or
 - .4 The use or position of outriggers to increase the stability of the structure,
 - .5 A load chart must be permanently posted on the crane or hoist or must be issued to the crane or hoist operator who must keep it available at all times when operating the crane or hoist.
- .4 A load chart must indicate the rated capacity for the crane or hoist for the working positions and configurations in use and must be in a legible condition.
- .4 Support structure**
- .1 The rated capacity of a hoist must not exceed the capacity of the structure supporting the hoist.
 - .2 Selector switches or other effective means must be provided to ensure that the supporting structure is not overloaded by simultaneous use of multiple hoists installed on the supporting structure.
- .5 Inspection, maintenance and repair**
- .1 Each crane and hoist must be inspected and maintained at a frequency and to the extent required to ensure that every component is capable of carrying out its original design function with an adequate margin of safety.
 - .2 A crane or hoist must not be used until any condition that could endanger workers is remedied.
 - .3 Any repair to load bearing components of a crane or hoist must be certified by a professional engineer or the original equipment manufacturer as having returned the component to a condition capable of carrying out its original design function with an adequate margin of safety.
 - .4 Maintenance or repair of a crane or hoist must be done by or under the direct supervision of a qualified person.
- .6 Audible warning**
- ~~.1 An effective audible warning device must be installed on a crane or hoist. unless the hoisting equipment is operated using a pendant or remote control and the operator walks in a safe position near the load.~~
- .7 Drop stops**
- .1 A top-running crane, under-running crane, wheel- or rail-mounted gantry crane, tower crane and monorail hoist must have a means to limit the drop of the crane, trolley and bridge truck frames to 25 mm (1 in) if a tire, wheel or axle fails.
 - .2 Drop stops must be able to support the trolley, bridge and gantry with the crane or hoist loaded to its rated capacity and must be certified to be able to do so by the original equipment manufacturer or a professional engineer.
- .8 Rail end stops**
-

- .1 End stops must be provided on crane and hoist tracks and rails to prevent the equipment running off the end of the rail or track.
- .2 The stops must contact the truck frame or be of a height of at least 1/2 the diameter of the wheels if the wheels contact the stops.

.9 Fenders

- .1 Fenders must be provided on a crane or hoist which operates on rails if there is a possibility of injury to workers from contact with the equipment wheels moving along the rail.
- .2 Fenders required must effectively deflect any object from the path of the wheel.

.10 Securing pins

- .1 A heel-pin, sheave-pin, shackle-pin or similar device must be secured against inadvertent dislodgment, in the manner specified by the equipment manufacturer or by the professional engineer who designed and certified the equipment.

.11 Boom stops

- .1 Positive boom stops must be provided on a crane or hoist with a boom that may fall over backward.
- .2 A boom hoist disconnect, shutoff or hydraulic relief must be provided on a crane or hoist to automatically stop the boom hoist when the boom reaches the maximum boom operating angle specified by the manufacturer and before the boom stops are contacted.
- .3 A jib on a crane or hoist must be restrained from backward overturning.

.12 Controls

- .1 Each control for a crane or hoist must have its function clearly identified and must be maintained in good condition.
 - .2 Each control for a crane or hoist that causes load movement must return to neutral when pressure from the operator is released.
 - .3 Each control for a crane or hoist must be located to allow safe operation of the equipment and if the control is not located in a cab it must be located to provide a safe distance between the operator and the load being handled.
 - .4 A retractable pendant control for a crane or hoist must be supported independently from its electrical conductors.
 - .5 A remote control panel for a crane or hoist must be designed to safeguard effectively against the unintended activation of the crane or hoist.
 - .6 A wireless remote control system for a crane or hoist must incorporate
 - .1 Error checking to prevent the controlled equipment from responding to corrupt data, and
 - .2 Identification coding methods to prevent a transmitter other than the designated transmitter for that crane or hoist from operating the equipment.
 - .7 A remote control system for a crane or hoist must be designed to ensure the following:
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- .1 If the power to the remote control system is removed for any reason, all crane or hoist functions stop;
 - .2 If the control signal for any crane or hoist motion becomes ineffective, the crane or hoist motion stops;
 - .3 The remote control panel has an operator controlled emergency stop feature that:
 - .1 Permits the operator to stop all crane or hoist movement regardless of a malfunction within the remote control system, and
 - .2 Requires resetting of the emergency stop feature before equipment operation can resume.
 - .4 Pendant and Wireless Remote Controls shall have 8-button configuration and match existing style in building:
 - .1 Yellow fixed pendant housing
 - .2 Button configuration: top button - Emergency (red button)
 - .3 Second button: Horn (green button)
 - .4 Third button: Hoist up (black button, black arrow on white background)
 - .5 Fourth button: Hoist down (black button, white arrow on black background)
 - .6 Fifth button: Trolley forward (black button, black symbol on white background)
 - .7 Sixth button: Trolley reverse (black button, white symbol on black background)
 - .8 Seventh button: Bridge forward (black button, black symbol on white background)
 - .9 Eight button: Bridge reverse (black button, white symbol on black background)
 - .10 Key switch at bottom of pendant housing with protective bumper
 - .5 The RF wireless control unit will have interlock capabilities from fixed pendant to RF Control pendant. RF controller will be a Panther Transmitter PN-TX-MX* with 8 x 2 step buttons; on/off switch; etc. Button symbols are to match fixed pendant
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- .8 A remote control panel for a crane or hoist must be marked to identify the corresponding base control unit to be used with it.
- .9 The maximum distance between a remote control panel and the crane or hoist being operated by the remote control system must
 - .1 Not exceed the limit specified by the control system manufacturer, and
 - .2 Be communicated to the operator before the operator uses the crane or hoist.

.13 Operator protection

- .1 The operator of a crane or hoist must be protected against hazardous conditions such as falling or flying objects and excessive heat or cold that could adversely affect the health or safety of the operator.

2.4 MATERIALS AND COMPONENTS

- .1 Motors, pumps, valves, fluid tank, hydraulic fluid, microprocessor controller, controls, pushbuttons and wiring shall be UL or CSA approved.
- .2 Spring buffers, attachment brackets and anchors shall be designed and sized according to code with safety factors.

Part 3 Execution

3.1 GENERAL

- .1 Prior to commencing installation, the contractor shall inspect support structures. Verify clearances are of correct size and within tolerance and are ready for work of this section. Notify CSA in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of crane work. Do not proceed with crane installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer. Arrange for temporary electrical power to be available for installation work and testing of crane components.

3.2 INSTALLATION OF SYSTEM

- .1 Coordinate crane work with work of other trades, for proper time and sequence to avoid construction delays.
- .2 Adjust for smooth operation.

3.3 PERMITS AND TESTS

- .1 The contractor shall obtain and pay for all necessary Provincial & Municipal permits and relating to the installation of the crane at his expense; shall make all tests as required by governing codes in effect at the time of the award. The contractor shall be reimbursed for any permits, tests or equipment necessitated by governing authorities after the date of the award.
- .2 The contractor shall perform a final load test as per CSA B167-08; including but not limited to testing the crane motions, holding breaks and travel breaks with the hook carrying 125% of the rated load capacity. A test report shall be prepared that includes the results and readings from the tests specified in CSA B167-08.

3.4 VERIFICATIONS AND INSPECTIONS

- .1 Verification shall be provided demonstrating that the supporting structure has been designed, approved and installed to carry the maximum rated load. The verification shall include a report bearing the seal and signature of a professional engineer, retained by the General Contractor, stating that the supporting structure as installed is capable of handling the maximum rated load.

END OF SECTION

PART 1 - GENERAL

- .1 Section 01 33 00 Submittal Procedures.
- .2 Section 01 61 00 Common Product Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .5 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 Definitions:
 - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
 - .2 CSA Group
 - .1 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
 - .2 CSA Z462-12, Workplace Electrical Safety Standard.
 - .3 CSA Z460-13, Control of Hazardous Energy, Lock-out and Other Methods.
 - .3 Ontario Provincial Standards
 - .1 Ontario Electrical Safety Code (OESC) 25th Edition, 2012, and Electrical Safety Authority Bulletins.
 - .4 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets 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 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit 1 copy of 432 x 559 mm minimum size drawings and product data to authority having jurisdiction.
 - .6 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Certificates:
- .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.
- .5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.

- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assembled control panels and component assemblies.

2.3 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicaid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core and mechanically attached with self-tapping screws.

.2 Sizes as follows:

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

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per nameplate or label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.

2.5 WIRING IDENTIFICATION

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

2.6 CONDUIT AND CABLE IDENTIFICATION

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

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Blue	Green

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for 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

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Disconnects: 1400 mm.

3.5 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

- .2 Measure current on main conductors that are feeding the distribution panel where the new overhead cranes will be connected and submit to the Departmental Representative for review prior connecting.

3.6 PROGRESS CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Leave Work area clean at end of each day.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 61 00 - Common Product Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .5 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 CSA International
 - .1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.
 - .2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan and in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors/cables and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
 - .2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

3.2 CLEANING

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .3 Section 26 05 00 - Common Work Results for Electrical.
- .4 Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .5 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 Ontario Electrical Safety Code (OESC) 25th Edition, 2012.

1.3 PRODUCT DATA

- .1 Provide product data in accordance with Section 01 13 30 Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for reuse and return of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 BUILDING WIRES

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

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform testing before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

3.3 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 13 30 - Submittal Procedures.
- .2 Section 01 61 00 - Common Product Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .5 Section 01 77 00 - Closeout Procedures.

1.2 REFERENCES

- .1 CSA Group
 - .1 CSA C22.1-12, Canadian Electrical Code, Part 1 22nd Edition, Safety Standard for Electrical Installations.
 - .2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).
 - .3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 13 30 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 77 00 - Closeout Procedures.
- .2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect connectors and terminations from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan and in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 CONNECTORS AND TERMINATIONS

- .1 Copper compression connectors to CSA C22.2 No.65 as required sized for conductors.

PART 3 - - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

- .1 Terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required to CSA C22.2 No.41.

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 61 00 - Common Product Requirements.
- .2 Section 01 74 11 - Cleaning
- .3 Section 01 74 21 - Construction Demolition Waste Management and Disposal
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE 837-02, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

- .2 Store and protect grounding equipment from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- .1 Insulated grounding conductors: green insulated, copper conductors, type RW90.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including, conductors, connectors, and accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .7 Bond single conductor, metallic armoured cables to cabinet at supply end.

3.3 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical electrical equipment.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended and on concrete walls.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Secure equipment to masonry, with lead anchors or expandable stainless steel bolts.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts or lead anchors.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole malleable iron steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .7 For surface mounting of two or more conduits use channels at 1.2 m on centre spacing.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Department Representative.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Cleaning.
- .3 Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .4 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.
- .3 Quality assurance submittals:
 - .1 Test reports: submit certified test reports.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.
- .2 Ensure emptied containers are sealed and stored safely for disposal away from children.

PART 2 - PRODUCTS

2.1 CONDUITS

- .1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 50 mm.

2.3 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.4 FISH CORD

- .1 Polypropylene.

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 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in elevator shaft and mechanical and electrical service rooms.
- .3 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
- .4 Minimum conduit size: 19 mm.
- .5 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

- .6 Mechanically bend steel conduit over 19 mm diameter.
- .7 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .8 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

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

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .5 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA C22.2 No.4-04 (R2009), Enclosed and Dead Front Switches (Tri-National standard with ANCE NMX-J-162-204 and UL98).

1.3 SUBMITTALS

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

1.4 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

- .1 Non Fusible, horsepower rated disconnect switch in CSA Enclosure 1 indoor to CAN/CSA C22.2 No.4 size as indicated.
- .2 Provision for padlocking in on and off position by 2 locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Quick-make, quick-break action.
- .5 ON-OFF switch position indication on switch enclosure cover.
- .6 Color grey painted by the manufacturer.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Indicate name of load controlled on size 4 nameplate.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Anchor to wall using standard galvanized U-channels system 41mm x 41mm.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

APPENDIX A:

DFL General Campus & Cleanroom Procedures



GENERAL CAMPUS PROCEDURES

Access & Security:

- Contractors must sign-in to receive an access badge at the guardhouse.
- Contractors must sign-in at DFL contractor's station in the basement.
- All lost badges must be reported to DFL Commissionaire for notification to the guardhouse.
- Contractors must be escorted at ALL times by either a DFL Commissionaire or cleared DFL personnel responsible for the contractor.
- Normal working hours are from 07:00 to 15:30. Any hours before or after are considered 'after-hours' and work required during after-hours must have 72 hours notification with the names of all workers to be provided to the DFL Representative, as Silent Hour Access requests needs to be received at guardhouse.

Site Facilities:

- No large storage available on site, storage of small items must have previous arrangement in place.
- Construction activities must remain within the predefined boundaries unless otherwise permitted in writing.

Clean Room Rules:

- When working in the cleanroom, proper attire must be worn at all times. Attire to be provided by DFL.
- Dust must be kept at a minimum.
- Equipment must be covered in plastic when transporting for loading dock to cleanroom.
- Schedule for cleanroom decommissioning must be provided well in advance.

Communication & Photography:

- No cellular phones permitted in cleanrooms, minimal usage inside the building. 2-way radios permitted but may have periodic interruptions.
- Phone at the Commissionaire's station or basement is permitted for use.
- No cameras permitted on site; any requirement for pictures will come as a request to Project Manager for the Site Photographer services.

Hot Work Permits:

- Any work that will create smoke, dust or heat must be coordinated at a minimum of 72-hours in advance to DFL Project Manager for the issuance of a hot work permit, for each day required.

Workmanship & Ethics:

- Cleanliness is of the utmost importance, it is expected that construction cleanup will be at the end of each day .
- Foul language or improper behavior will not be tolerated.
- Proper building protection must be provided at all times.
- Health and Safety practices must be strictly observed on site at all times.

Company Name

Signature and date



CLEANROOM PROCEDURES

Cleanroom Regulations and Clothing Requirements

- Clean Rooms are all areas within the air showered rooms, except the loading dock(s) and change rooms.
- All other areas are not considered as "Clean Rooms"

Clean Room Entry & Exit Procedures

- Personnel must remove all weather protection clothing (coats, boots etc.) prior to entering any clean room
- Shoes must be cleaned using the shoe cleaner
NOTE: Shoe cleaners are not intended for use on heavily soiled footwear
- All personnel must use the air shower prior to entering the change room
- Personnel must walk on the "Dycem" mats prior to entering the clean room
- Exit from any clean room will be either through the air shower (which does not operate on exit), or via direct exit door

Working Within the Clean Rooms

- When working within the clean room(s), all personnel will:
 - Wear a clean room coat (cloth or disposable), completely fastened
 - Wear a disposable hat ensuring all hair is covered by the hat
 - Ensure footwear is clean
- Any drilling, cutting, grinding, filing or other jobs creating swarf or debris must be done with a HEPA vacuum running at all times to collect all debris generated

Clean Room Containers

- Containers must be constructed from metal, plastic or smoothly finished wood, and must be sealed with urethane or oil based paint
- Insulation, either fixed or removable must be sealed to prevent shedding
- Containers brought into the clean room from the outside must be thoroughly cleaned prior to entry
- NO cardboard boxes or wood are permitted in the clean rooms
- Interior loading dock doors must not be opened while the exterior loading dock door is open

PROHIBITED CLEAN ROOM PRACTICES

- Wearing clean room clothing outside designated clean rooms and controlled areas
- Wearing street clothes in designated clean rooms and controlled areas
- Grooming, eating, drinking or smoking within any designated clean room or controlled area
- Painting or leaving chemical containers and contaminants open or exposed in any designated clean room or controlled area
- Failing to clean job sites at the completion of a job or at the end of a shift
- ADMITTING UNAUTHORIZED PERSONNEL INTO THE DFL SECURED AREAS WITHOUT AUTHORIZATION

Company Name

Signature and date

APPENDIX B:

DFL General Project Notes & Procedures



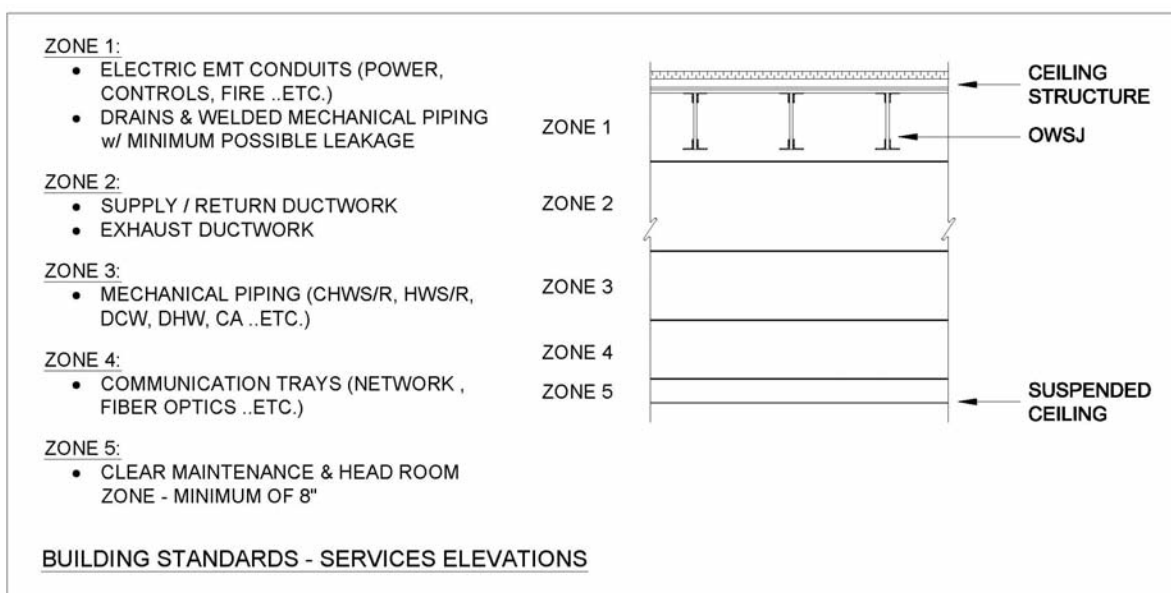
DFL PROJECTS GENERAL NOTES, & PROCEDURES

1. The general contractor shall arrange and pay for all necessary permits, inspections & re-inspections required to be performed by local authorities having jurisdiction including inspection and testing except for building permit to the City of Ottawa which will be applied for by owner. Turn over to the owner all original approval documentation & certificates.
2. Contractor to be responsible for the provision (supply and installation) of all materials, equipment & services shown on the project drawings & specifications as required for a fully operable system, unless changed or replaced by revised drawings, specifications or addenda.
3. The general contractor shall be responsible for all architectural, structural, mechanical, electrical, plumbing & fire protection work. Be responsible for all floor cutting, core drilling, all chases, openings and patching as may be required by all sub trades who may or may not be under his contract agreements.
4. Drawings are not intended to show the details & route of each component to be installed or removed. They are only providing a general overview of the project scope. The contractor shall be responsible to review the site conditions during the tender period and examine the extent of the demolition, removals & new installations to include in the tender price all necessary labor and material required for a fully operable system as intended.
5. All materials and workmanship shall be in accordance with the current codes, by-laws and ordinances of the relevant building authorities where varied by the project spec.
6. All dimensions to be verified on site. Exact location & elevation of equipment is subject to site measurements.
7. Contractor to submit shop drawings for all material, equipment & fixtures to engineer for approval before commencing installation or ordering. All samples to be provided upon CSA request at no additional cost.
8. All supplied materials, fixtures & equipment to be new, free from defects, certified & approved by code. Reuse of any existing parts is not permitted unless approved by owner.
9. CSA shall be given the option of retaining any removed or demolished components or equipment. Coordinate and hand over to CSA project manager as required. Dispose of any remaining or unwanted equipment or services and remove off site in a legal manner and comply with the environmental protection act, Ontario regulations for waste management program. Certificate of disposal to be handed over to owner after removals are done.
10. Install all equipment in full accordance with the manufacturer specifications & recommendations.
11. All trades should be licensed to perform all work shown on the drawings including removals & demolition.
12. Do not damage existing fire separations and fire protections in the project areas. Any damages incurred to existing fire separations and protections shall be restored to approved conditions to meet required rating and codes at no additional costs to the project.
13. Under any circumstances, do not block required access to exits and fire escape routes during the project duration. All existing life safety systems and indicators shall be operational at all times.

14. Smoke eaters & powered exhaust fans vented to outside of building must be used during all brazing / welding / soldering / cutting / grinding activities to minimize contamination & odor to adjacent areas particularly in clean rooms. Provide 72 hour notice to CSA to arrange for hot work permits.
15. Contractor to protect all architectural finishes & flooring during construction, be responsible for any damages to existing surfaces resulting from all project's work. The contractor shall make good all damaged surfaces including any paint touch-ups required. Repair all walls, floors & ceilings in core area where mechanical & electrical services pass through.
16. Exact tarping limits and access routes to be determined on site in coordination with CSA project manager.
 - All tarps to be **new** heavy duty polyethylene, water / mildew / tear resistant, **white**, tight sealed from deck to floor, contractor to provide access zippers or doors as required by CSA, use metal studs as framing supports, no wood materials to be used in tarps construction unless approved by CSA.
 - Approved methods to attach studs / tarps to building as follow:
 - On floors: heavy duty commercial double sided tape to secure metal studs to floors, use of screws or tapcons are not permitted.
 - On drywalls / masonry / metal siding walls: duct or tuck tape is not allowed directly on building finishes as it will damage them when removed; apply masking paint green tape first and then duct / tuck tape on top of it. Studs can be screwed to drywall / masonry walls giving that all holes will be patched & painted (whole wall / area to be painted, small / local paint patches are not permitted).
 - Tarps could be hanged off building steel structural using high strength cable ties, provide heavy gauge unistruts as needed for cross runs or to distribute tarps load.
 - Hanging tarps from building services (ductwork, conduits, pipes, supports, hangers ... etc.) is not permitted.
 - Contractor is responsible for cleaning, patching, repairing & painting all damaged surfaces & tape marks after removing tarps.
17. Provide floor protection to entire project areas before any work starts as follow:
 - Floor to be wiped clean from any debris or dust particles.
 - Provide min. 1/8" foam layer directly on all flooring.
 - Provide hard sheets on top of foam layer, all sheets seams to be duct-taped to prevent debris / dust from getting trapped under the protection sheets. Use of OSB sheets is not permitted.
18. Provide furniture and equipment protection as follow:
 - Office / lab furniture and equipment: to be completely covered and wrapped with **new** heavy duty **clear** plastic roll sheets.
 - Sensitive lab testing equipment: to be completely covered and wrapped with **new** heavy duty **clear** plastic roll sheets, **clean** scaffolding to be erected on top of all lab equipment to protect from possible falling objects.
19. Contractor to provide bilingual construction, access & safety signage, signs to be posted on all project fences & entrances at the start of project and before commencing any work.
20. Access to the site for material, work forces and for waste removal is to be coordinated with CSA project manager, use only elevators designated by CSA and protect them from damage.
21. When testing activities are not underway, large or small loading docks can be used to move materials in and out of the building from 7:00 am to 8:00 am without CSA needing to provide notice to building staff. If access is required after this time or for longer periods, 72 hour notice must be provided to CSA to confirm availability and arrange for proper notices.
22. Sanitary facilities will be assigned for contractor's personnel. Others shall not be used. Keep facilities clean.
23. Only designated areas are to be used for lunch and break time. All other areas are off limits including campus cafeteria.

24. Contractor to respect all building floor loading limitations, coordinate and confirm with CSA project manager prior to bring in any heavy tools, equipment and lifts.
25. General contractor shall be responsible to keep the owner's access areas and corridors clean at all times.
 - Clean and remove all demolition and construction waste from project site on daily basis and upon completion of project.
 - Transport all loose materials in / out of building in clean covered containers.
 - Do not use CSA waste containers. An area will be designated for locating contractor waste bins upon request.
 - Contractor to provide all cleaning equipment & supplies, use of building cleaning equipment or supplies are not permitted.
26. Do not subject any part of the building to any noise, dust or any other unacceptable environmental conditions during the course of the project. Any noisy / dusty / smelly activities shall be done after regular working hours or weekends, coordinate with CSA project manager with a minimum notice of 72 hours.
27. All penetrations through walls and floors shall be saw-cut or core drilled. Jack hammering is not permitted. All walls, floors & ceilings penetrations to be sealed by contractor in accordance with applicable codes & the engineer's requirements. Use of powder actuated tools using explosives is not permitted.
28. Parts noted to be supplied by owner shall be fully installed & supported by contractor at no additional cost.
29. Projects may take place in a cleanroom environment, mandating special measures be taken to reduce laboratory disruption. Class 8 cleanroom standards are to be met for the area surrounding construction at all times and are subject to verification.
30. All personnel must attend mandatory DFL briefing on the first day of project and before starting any work, adhere to the information presented at all times. any person who did not attend this briefing will not be allowed to work on site – no exceptions
31. Improper / unclean / ripped clothing, foul language, improper behavior, smoking in undesignated areas including e-cigarettes will not be tolerated and worker will be escorted off campus immediately – no exceptions.
32. CSA, at their discretion, may request a worker to leave the site if there is demonstrated impaired mental or physical capability affecting his/her work performance and possibly putting others at risk due to consumption of alcohol or illegal substances.
33. DFL is a high profile occupied building, use of music or radio on site is not permitted at all times.
34. All GC & sub-trades workers have to be escorted at all times while in building and on campus.
 - CSA will provide security commissionaires to escort.
 - Prior to project start, GC to provide a full list of all personnel working on the project as well as engineers, suppliers & inspectors if possible to issue necessary forms for site and building access.
 - Provide at least 72 hour notice for any additional names or for after hours or weekend work.
 - Notify CSA immediately of any change in schedule that affects the need for security escorts.
 - Individuals who are not on that list will be denied access with no exceptions.
35. General contractor representative has to be present on site at all times and accompany all sub-trade workers; sub-trades are not allowed to be on site or to work without the presence of approved designated GC representative – no exceptions.
36. Weekend and/or after-hours shutdowns to be scheduled in agreement with CSA project manager. Provide at least 72 hour notice in advance.

37. CSA is committed to ensuring a healthy and safe environment for its employees, contractors and visitors and will align itself with contractors who share in this vision.
- The requirements outlined below are provided as reference and are there to assist the contracting company who performs the work and accepts this commitment completely:
 - Ontario occupational health and safety act:
<http://www.e-laws.gov.on.ca>
 - Infrastructure health and safety association “guide to developing health and safety policies and programs in construction” a comprehensive guide geared to mid- to large-sized general contractors for developing and implementing an effective health and safety program:
<http://www.ihsa.ca>
 - Infrastructure health and safety association “construction health and safety manual”. guidance on hazard controls for Ontario contractors:
<http://www.ihsa.ca>
 - The general contractor will be required to prepare and submit to the CSA project manager a full site specific project health and safety plan, herein called PHSP, prior to the commencement of any works and within 2 weeks of contract award. Plan to be reviewed & approved by CSA before starting any work.
 - The general contractor shall provide CSA project manager a copy of all notices or other written correspondence provided to or received by the Ontario Ministry of Labor (OML) for the duration of the contract.
 - The general contractor shall fully implement the PHSP for the full duration of the contract.
 - A copy of all applicable training certificates must be provided prior to commencing any work. Certificates must show exact company name and address that provided the training. CSA reserves the right to request the course outline from the company that provided the training. If the proof of training does not demonstrate the worker as being competent operators, further training may be requested by the CSA prior to commencing any work at no additional cost.
38. GC to provide a minimum of 48 hour notice to CSA prior for any deliveries. General contractor must be on site to receive the shipment. If the delivery pertains to lifting equipment, one of the qualified contractors scheduled to use the equipment must inspect and receive the lift from the rental company.
39. GC and all his sub-trades are responsible to provide all ladders, scaffolding, lifts, cranes and all other equipment & tools required for project scope including installing & removing tarps & protection materials. Use of building tools, equipment, trollies, forklifts, skids, ladders, lifts, cranes ... etc. are not permitted.
40. Only the use of clean electrical lifts is permitted anywhere inside the building, use of propane / diesel / gas powered lifts are not permitted except when used outside the building.
41. All trades to follow building service elevations standard as follow:



42. General contractor and all trades to strictly follow campus, cleanrooms & CSA/DFL procedures at all times, GC is responsible to distribute all procedures to all his workers & sub-trades.

Company Name

Signature and date