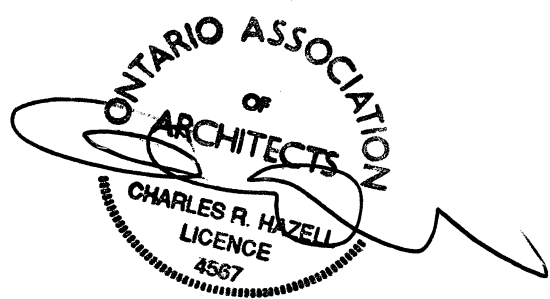


<u>Project Title</u>	PARRY SOUND Onterio Canadian Coast Guard Base 28 Waubeek Street PV Panel Installaion and Roof Replacement Issued for Tender
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<u>Project Number</u>	R.064667.008
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<u>Project Date</u>	2017-09-27
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Architect



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DRAWINGS AND SCHEDULES

Drawing List

No.	Description
	<u>ARCHITECTURAL</u>
A-000	COVER SHEET & SITE PLAN
A-A01	SHOP WING - FLOOR PLAN
A-A02	ADMIN. WING - FLOOR PLAN
A-A03	SHOP WING - ROOF PLAN
A-A04	ADMIN. WING - ROOF PLAN
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A-A07	SHOP WING - R.C.P.
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A-A09	DETAILS
	<u>ELECTRICAL</u>
E-E01	ELECTRICAL LEGENDS, KEY PLAN, ROOF LAYOUT & DRAWING LIST
E-E02	ELECTRICAL GROUND FLOOR, 2ND FLOOR, PENTHOUSE & PART SINGLE LINE DIAGRAM

APPENDICES

Appendix No.	Description
A.1	Structural Feasibility Study, by WSP Canada Inc., October 2017, 3 pages

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 SECTION INCLUDES</u> | .1 | Work sequence. |
| | .2 | Contractor use of premises. |
| | .3 | Owner occupancy. |
| | .4 | Owner furnished items. |
| | .5 | Alterations to existing building or site. |
| <u>1.2 PRECEDENCE</u> | .1 | For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual. |
| <u>1.3 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| <u>1.4 CONTRACT METHOD</u> | .1 | Construct work under Lump Sum Contract. |
| <u>1.5 WORK COVERED BY CONTRACT DOCUMENTS</u> | .1 | Work of this Contract comprises solar panel installation and roof replacement at Parry Sound Canadian Coast Guard Base, located at 28 Waubeek Street, Parry Sound, and further identified as PWGSC Project Number R.064667.008. |
| | .2 | The Contractor shall for the purpose of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects, and for the duration of the Work of the Contract:
.1 Assume the role of Constructor in accordance with the Authority Having Jurisdictions.
.2 Agree, in the event of two or more Contractors working at the same time and space at the work site, without limiting the General Conditions GC3.7, to the Departmental Representative's order to:
.1 Assume, as the Constructor, the responsibility for the Departmental Representative's other Contractors. |

1.6 WORK SEQUENCE

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Coordinate Progress Schedule and coordinate with Owner Occupancy during construction.
- .3 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, and for access, to allow;
 - .1 Owner occupancy.
 - .2 Work by other contractors.
 - .3 Public usage.
- .2 Coordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.8 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not used.

PART 1 - GENERAL

1.1 ACCESS AND
EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders 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 Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Provide sanitary facilities for the duration of the project. Keep facilities clean.
- .5 Use only elevators existing in building for moving workers and material.
 - .1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
 - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS,
ADDITIONS OR
REPAIRS TO EXISTING
BUILDING

- .1 Execute work with least possible interference or disturbance to building operations occupants, and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING
SERVICES

- .1 Notify, Departmental Representative utility companies of intended interruption of services and obtain required permission.

- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and vehicular traffic.
- .4 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

- .1 Carry out noise generating: Work Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays.
- .2 Submit schedule in accordance with Section 01 32 16.
- .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .4 Keep within limits of work and avenues of ingress and egress.
- .5 Deliver materials outside of peak traffic hours 9:00 to 15:00 unless otherwise approved by Departmental Representative.

1.6 SECURITY

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.
- .2 Security clearances:
 - .1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 - .2 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.7 BUILDING
SMOKING ENVIRONMENT

.1

Comply with smoking restrictions. Smoking is not permitted.

PART 2 - PRODUCTS

2.1 NOT USED

.1

Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1

Not Used.

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Coordination Work with other contractors and work by Owner under administration of Departmental Representative.
<u>1.2 RELATED SECTIONS</u>	.1	Section 01 11 00 - Summary of Work.
<u>1.3 DESCRIPTION</u>	.1	Coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work, with progress of Work of other contractors and Work by Owner, under instructions of Departmental Representative.
<u>1.4 PROJECT MEETINGS</u>	.1	Schedule and administer bi-weekly project meetings throughout progress of Work as determined by Departmental Representative.
	.2	Prepare agenda for meetings.
	.3	Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
	.4	Provide physical space and make arrangements for meetings.
	.5	Preside at meetings.
	.6	Record minutes. Include significant proceedings and decisions. Identify action by parties.
	.7	Reproduce and distribute copies of minutes within three days after each meeting and transmit to meeting participants, affected parties not in attendance, and Departmental Representative.

1.5 CONSTRUCTION
ORGANIZATION AND
START-UP

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of the Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Agenda to include following:
 - .1 Appointment of official representative of participants in Work.
 - .2 Schedule of Work, progress scheduling in accordance with Section 01 32 16.
 - .3 Schedule of submission of shop drawings, samples, colour chips in accordance with Section 01 33 00.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00.
 - .5 Delivery schedule of specified equipment in accordance with Section 01 32 00.
 - .6 Site security in accordance with Section 01 52 00.
 - .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements (GC).
 - .8 Record drawings in accordance with Section 01 78 00.
 - .9 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 and 01 78 00.
 - .10 Monthly progress claims, administrative procedures, photographs, and holdbacks (GC).
 - .11 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00.
 - .12 Insurances and transcript of policies (GC).
- .5 Comply with Departmental Representative's allocation of mobilization areas of site; for field offices and sheds, access, traffic, and parking facilities.

- .6 During construction coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: Submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.
- .7 Comply with instructions of Departmental Representative for use of temporary utilities and construction facilities.
- .8 Coordinate field engineering and layout work with Departmental Representative.

1.6 ON-SITE DOCUMENTS

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Amendments and addenda.
 - .4 Reviewed shop drawings.
 - .5 Change orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 Copy of approved Work schedule.
 - .9 Manufacturers' installation and application instructions.
 - .10 Labour conditions and wage schedules.
 - .11 Material Safety Data Sheets.
 - .12 Labour and Material Bonds.
 - .13 All applicable Municipal Permits.

1.7 SCHEDULES

- .1 Submit preliminary construction progress schedule in accordance with Section 01 32 00 to Departmental Representative coordinated with Departmental Representative's project schedule.
- .2 After review, revise and resubmit schedule to comply with revised project schedule.
- .3 During progress of Work revise and resubmit as directed by Departmental Representative.

1.8 CONSTRUCTION PROGRESS MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings.

- .2 Contractor, major subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 4 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include 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.

1.9 SUBMITTALS

- .1 Make submittal to Departmental Representative for review.
- .2 Process change orders through Departmental Representative.
- .3 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

1.10 COORDINATION DRAWINGS

- .1 Provide information required by Departmental Representative for preparation of coordination drawings.
- .2 Review and approve revised drawings for submittal to Departmental Representative.

- | | | |
|-------------------------------------|----|--|
| <u>1.11 CLOSEOUT
PROCEDURES</u> | .1 | Notify Departmental Representative when Work is considered ready for Substantial Performance. |
| | .2 | Accompany Departmental Representative on preliminary inspection to determine items listed for completion or correction. |
| | .3 | Comply with Departmental Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance and for access to Owner-occupied areas. |
| | .4 | Notify Departmental Representative of instructions for completion of items of Work determined in Departmental Representative's final inspection. |

PART 2 - PRODUCTS

- | | | |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative, meeting participants and affected parties not in attendance.
- .8 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 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
 - .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
 - .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
 - .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 Work: in accordance with Section 01 32 16.
- .3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
- .5 Delivery schedule of specified equipment in accordance with Section 01 61 00.
- .6 Site security in accordance with Section 01 52 00.
- .7 Health and safety in accordance with Section 01 35 29.
- .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .9 Record drawings and specifications in accordance with Sections 01 33 00 and 01 78 00.
- .10 Maintenance manuals in accordance with Section 01 78 00.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS
MEETINGS

- .1 During course of Work and 2 weeks prior to project completion, schedule progress meetings.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 4 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days 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.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- | | | |
|-------------------------------------|----|--|
| <u>1.1 RELATED
SECTIONS</u> | .1 | Section 01 77 00 - Closeout Procedures. |
| <u>1.2 PROGRESS
PHOTOGRAPHS</u> | .1 | Viewpoints: interior and exterior locations:
viewpoints determined by Departmental
Representative. |
| | .2 | Frequency: monthly with progress statement as
directed by Departmental Representative. |
| | .3 | Submit all digital files of coloured prints
before final acceptance of buildings. |
| | .4 | Insert C.D. of files in envelopes and identify
with name and number of project. |
| <u>1.3 ELECTRONIC COPY</u> | .1 | Submit electronic copy of colour digital
photography in jpg format, standard
resolution. |
| | .2 | Identification: name and number of project and
date of exposure indicated. |
| | .3 | Number of viewpoints: 4. Locations of
viewpoints determined by Departmental
Representative. |
| | .4 | Frequency: monthly with progress statement and
as directed by Departmental Representative. |

PART 2 - PRODUCTS

- | | | |
|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
- .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
 - .2 Departmental Representative will review and return revised schedules within 5 working days.
 - .3 Revise impractical schedule and resubmit within 5 working days.
-

- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.
 - .4 Mobilization.
 - .5 Roof removal.
 - .6 Roofing.
 - .7 Solar panel installation and connection.

1.6 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.7 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings specified in Section 01 31 19, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE
- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
 - .2 Do not proceed with Work affected by submittal until review is complete.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
 - .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .7 Verify field measurements and affected adjacent Work are co-ordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
 - .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
 - .10 Keep one reviewed copy of each submission on site.
-

- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.
- .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 co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 5 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative 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 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 shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .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 Departmental Representative's review, distribute copies.
- .10 Submit three hard copies and one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit three hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.

- .12 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .13 Submit three hard copies and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .14 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 - .16 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
 - .17 Delete information not applicable to project.
 - .18 Supplement standard information to provide details applicable to project.
-

- .19 If upon review by Departmental Representative, 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.
- .20 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
- .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

- .1 Refer to Section 01 32 00.

1.6 FEES, PERMITS AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Electrical Code (CEC):
 - .1 Canadian Electrical Code 2015 (CEC).
- .2 Canadian Standards Association (CSA): .1
CSA SCSA-M1980(R2003), Code of Practice for
Safety in Demolition of Structures.
- .3 National Building Code 2015 (NBC):
 - .1 NBC 2015, Division B, Part 8 Safety
Measures at Construction and Demolition Sites.
- .4 National Fire Code 2015 (NFC):
 - .1 NFC 2015, Division B, Part 5 Hazardous
Processes and Operations, subsection 5.6.1.3
Fire Safety Plan.
- .5 Province of Ontario:
 - .1 Ontario Electrical Safety Code 2015
(OESC)
 - .2 Occupational Health and Safety Act
Revised Statutes of Ontario 1990, Chapter O.1
as amended, and Regulations for Construction
Projects, O. Reg. 213/91 as amended.
 - .3 O. Reg. 490/09, Designated Substances.
 - .4 Workplace Safety and Insurance Act, 1997.
 - .5 Municipal statutes and authorities.
- .6 Treasury Board of Canada Secretariat (TBS):
 - .1 Treasury Board, Fire Protection Standard
April 1, 2010
www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316§ion=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan:
Within 7 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
found in work plan.
 - .3 Measures and controls to be implemented
to address identified safety hazards and
risks.

- .3 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
 - .4 Contractor's and Sub-contractors' Safety Communication Plan.
 - .5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
 - .6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 14 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
 - .7 Departmental Representative's 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.
 - .8 Submit names of personnel and alternates responsible for site safety and health.
 - .9 Submit records of Contractor's Health and Safety meetings when requested.
 - .10 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.
 - .11 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.
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- .12 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .13 Submit copies of incident and accident reports.
- .14 Submit Material Safety Data Sheets (MSDS).
- .15 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to commencement of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 WORK PERMIT

- .1 Obtain building permits related to project prior to commencement of Work.
- .2 Obtain Hot Work Permit from Property Manager.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 REGULATORY REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
 - .2 Comply with specified standards and regulations to ensure safe operations at site.
-

1.8 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 either accepting or requesting improvements.
- .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.9 COMPLIANCE
REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter O.1, as amended.

1.10 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.
- .3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

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| <u>1.11 UNFORSEEN
HAZARDS</u> | .1 | Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing. |
| | .2 | Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario. |
| <u>1.12 HEALTH AND
SAFETY CO-ORDINATOR</u> | .1 | Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must: <ul style="list-style-type: none">.1 Have working knowledge of occupational safety and health regulations..2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work..3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan..4 Be on site during execution of Work and report directly to and be under direction of site supervisor. |
| <u>1.13 POSTING OF
DOCUMENTS</u> | .1 | Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative. <ul style="list-style-type: none">.1 Contractor's Safety Policy..2 Constructor's Name..3 Notice of Project..4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable)..5 Ministry of Labour Orders and reports..6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario..7 Address and phone number of nearest Ministry of Labour office..8 Material Safety Data Sheets..9 Written Emergency Response Plan..10 Site Specific Safety Plan..11 Valid certificate of first aider on duty. |
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.12 WSIB "In Case of Injury At Work" poster.
.13 Location of toilet and cleanup facilities.

1.14 CORRECTION OF
NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .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.

1.15 BLASTING

- .1 Blasting or other use of explosives is not permitted.

1.16 POWDER
ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.17 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.
- .2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 GENERAL

- .1 This section specifies general requirements and procedures for fire safety. Additional requirements may be specified in individual sections elsewhere in specifications.

1.2 REPORTING FIRES

- .1 The Departmental Representative will co-ordinate arrangements for the Contractor to be briefed at the pre-construction meeting concerning Building's fire safety protocol.
- .2 Building Manager will supply a copy of "Fire Safety Emergency Evacuation Plan" in effect for this building. Contractor shall comply with outlined fire safety requirements.
- .3 Know location of nearest fire alarm box and telephone, including emergency phone number.
- .4 Report immediately all fire incidents to Fire Department as follows:
 - .1 activate nearest fire alarm box; or
 - .2 telephone.
- .5 Person activating fire alarm box will remain at box to direct Fire Department to scene of fire.
- .6 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.3 FIRE WATCH

- .1 Appoint a Fire Watch at locations where welding and soldering, torching or roofing is to take place.
- .2 A dedicated Fire Watch is not required. A competent person from the workforce on site may be assigned as Fire Watch for duration of work.
- .3 Assign a person who is knowledgeable in the correct use of fire extinguishers on the project.

- .4 Have work inspected by the Fire Watch up to 1.0 hours after work stoppage for each work period.

1.4 INTERIOR AND
EXTERIOR FIRE
PROTECTION AND
ALARM SYSTEMS

- .1 Fire protection and alarm system will not be:
 - .1 obstructed;
 - .2 shut-off; or
 - .3 left inactive at end of working day or shift.
- .2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Departmental Representative.
- .3 Provide and maintain free access to fire extinguishing equipment. Maintain exit facilities. Keep means of egress free from materials, equipment and obstructing.

1.5 FIRE
EXTINGUISHERS

- .1 Supply fire extinguishers, as necessary to protect work in progress and contractor's physical plant on site.

1.6 INSTALLATION
AND/OR REPAIR OF
ROOF TO INCLUDE
CONTRACTORS
PHYSICAL PLANT AT
SITE

- .1 Ensure personnel use and take precautions as follows:
 - .1 Use kettles equipped with thermometers or gauges in good working order.
 - .2 Locate kettles in safe place outside of building. Locate to avoid danger of igniting combustible material.
 - .3 Maintain continuous supervision while kettles are in operation and provide metal covers for kettles to smother any flames in case of fire. Fire extinguishers shall be provided as required in 1.6.
 - .4 Prior to start of work, demonstrate container capacities to Departmental Representative.
 - .5 Use only glass fibre roofing mops.
 - .6 Used roofing mops will not be left unattended on roof and shall be stored away from building and combustible materials.
 - .7 All roofing materials will be stored in location no closer than 3 m to any structures.

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| <u>1.7 BLOCKAGE OF ROADWAYS</u> | .1 | Advise Departmental Representative of any work that would impede fire apparatus response. This includes violation of minimum required overhead clearance. |
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| <u>1.8 SMOKING PRECAUTIONS</u> | .1 | Smoking is not permitted within areas of work or site storage. |
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 | | |
| <u>1.9 RUBBISH AND WASTE MATERIALS</u> | .1 | Rubbish and waste materials are to be kept to minimum. |
| | .2 | Burning of rubbish is prohibited. |
| | .3 | Remove all rubbish from work site at end of work day or shift or as directed. |
| | .4 | Storage:
.1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
.2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles and remove from site daily or at the end of each shift. |
|
 | | |
| <u>1.10 FLAMMABLE AND COMBUSTIBLE LIQUIDS</u> | .1 | Handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada. |
| | .2 | Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires permission of local Building Manager. |
| | .3 | Transfer of flammable and combustible liquids is prohibited within buildings or jetties. |
| | .4 | Transfer of flammable and combustible liquids will not be carried out in vicinity of open flames or any type of heat-producing devices. |
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- .5 Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.
- .6 Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and Fire Department is to be notified when disposal is required.

1.11 HAZARDOUS
SUBSTANCES

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with National Fire Code of Canada.
- .2 Obtain from local Building Manager a "Hot Work" permit for work involving welding, burning or use of blow torches and salamanders, in building or facility.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the local Building Manager. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Building Manager at pre-construction meeting.
- .4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. Building Manager is to be informed prior to and at cessation of such work.

1.12 WELDING,
BURNING AND
CUTTING

- .1 Contractor performing work of this section must notify Departmental Representative in advance of commencing work.
- .2 Use non-combustible shields for electric and gas welding or cutting executed within 3 m of combustible material or in occupied spaces.

- .3 Place cylinders supplying gases as close to work as possible. Secure cylinders in upright position, free from exposure to sun or high temperature.
- .4 Locate fire extinguishing equipment near all welding, cutting and soldering operations.
- .5 Contractor's mechanics shall be properly equipped with required protective clothing, including goggles or welding hood or face mask, gloves, etc.
- .6 Contractor is responsible for the protection of his work and the Departmental Representative 's property.
- .7 Provide Fire Watch on standby with approved fire extinguisher while burning or welding is in progress.

1.13 QUESTIONS
AND/OR
CLARIFICATIONS

- .1 Direct any questions or clarification on Fire Safety in addition to above requirements to local Building Manager.

1.14 FIRE
INSPECTION

- .1 Site inspections by Building Manager will be coordinated through Departmental Representative.
- .2 Allow local Building Manager unrestricted access to work site.
- .3 Co-operate with Building Manager during routine fire safety inspection of work site.
- .4 Immediately remedy all unsafe fire situations observed by Building Manager.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

- | | | |
|---|----|--|
| <u>1.1 REFERENCES AND CODES</u> | .1 | Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015, Canadian Electrical Code (CEC) 2015, Ontario Building Code (OBC) 2012, and Ontario Electrical Code (OEC) 2015 including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative. |
| | .2 | Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents. |
| <u>1.2 HAZARDOUS MATERIAL DISCOVERY</u> | .1 | Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's, other than those identified in Section 01 35 29 are discovered in course of work. |
| <u>1.3 BUILDING SMOKING ENVIRONMENT</u> | .1 | Comply with smoking restrictions. |
| <u>1.4 IAQ - INDOOR AIR QUALITY</u> | .1 | Comply with CSA-Z204-94(R1999), Guideline for Managing Indoor Air Quality in Office Buildings and CSA B651-12(R2017). |
| <u>1.5 ACCESSIBLE DESIGN</u> | .1 | Comply with CSA B651-12(R2017), Accessible Design for the Built Environment, unless specified otherwise. In any case of conflict or discrepancy between the building codes and CSA B651, the requirements of CSA B651 shall apply. |
| <u>1.6 TAXES</u> | .1 | Pay applicable Federal, Provincial and Municipal taxes. |
-

1.7

EXAMINATION

.1

Examine existing conditions and determine conditions affecting work.

PART 2 - PRODUCTS

2.1

NOT USED

.1

Not Used.

PART 3 - EXECUTION

3.1

NOT USED

.1

Not Used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

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

1.2 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 if Work is designated for special tests, inspections or approvals by Departmental Representative 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 may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.3 INDEPENDENT
INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work, above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.
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- .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 Departmental Representative. Pay costs for retesting and reinspection.

1.4 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.

1.5 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative 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 an orderly sequence so as not to cause delay 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.

1.6 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, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS

- .1 Submit 4 copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.8 TESTS

- .1 Furnish test results as may be requested.
- .2 The cost of tests beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

1.9 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.
 - .2 Construct in all locations acceptable to Departmental Representative.
 - .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.
 - .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
-

- .5 If requested, Departmental Representative will assist in preparing a 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.

1.10 EQUIPMENT AND SYSTEMS

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

- | | | |
|--|----|---|
| <u>1.1 SECTION INCLUDES</u> | .1 | Temporary utilities. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 01 52 00 - Construction Facilities. |
| <u>1.3 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
| <u>1.4 INSTALLATION AND REMOVAL</u> | .1 | Provide temporary utilities controls in order to execute work expeditiously. |
| | .2 | Remove from site all such work after use. |
| <u>1.5 WATER SUPPLY</u> | .1 | Departmental Representative will provide continuous supply of potable water for construction use. |
| <u>1.6 TEMPORARY HEATING AND VENTILATION</u> | .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 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.
- .5 Permanent heating system of building may not be used.
- .6 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Departmental Representative.
- .7 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.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 TEMPORARY POWER
AND LIGHT

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Provide and maintain temporary lighting throughout project.

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|---|----|--|
| <u>1.8 TEMPORARY
COMMUNICATION
FACILITIES</u> | .1 | Provide and pay for temporary telephone, fax, data, hook up, lines equipment necessary for own use and use of Departmental Representative. |
| <u>1.9 FIRE PROTECTION</u> | .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. |

PART 2 - PRODUCTS

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|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Construction aids.
- .1 Sheds.
- .2 Parking.
- .3 Project identification.

1.2 References

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA Z321-96(R2006), Signs and Symbols for the Workplace.
 - .1 CSA Z797-09(R2014), Code of practice for Access Scaffold.

1.3 SUBMITTALS

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

1.4 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.
- .1 Indicate use of supplemental or other staging area.
- .2 Provide construction facilities in order to execute work expeditiously.
- .3 Remove from site all such work after use.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CSA Z797.
- .1 Provide and maintain scaffolding, ramps, ladders.

1.6 HOISTING

- .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

- .1 Hoists/cranes shall be operated by qualified operator.

1.7 SITE STORAGE/LOADING

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

1.8 CONSTRUCTION PARKING

- .1 Parking may be permitted on site provided it does not disrupt performance of Work.
- .1 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

1.10 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .1 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

- .1 No signs or advertisements, other than warning and health and safety signs, are permitted on site.
 - .1 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
-

- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.12 PROTECTION AND
MAINTENANCE OF
TRAFFIC

- .1 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .1 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .2 Dust control: adequate to ensure safe operation at all times.

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.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Barriers.
	.2	Environmental Controls.
	.3	Traffic Controls.
	.4	Fire Routes.
<u>1.2 INSTALLATION AND REMOVAL</u>	.1	Provide temporary controls in order to execute Work expeditiously.
	.2	Remove from site all such work after use.
<u>1.3 HOARDING</u>	.1	Erect temporary site enclosure using modular freestanding fencing: galvanized, minimum 1.8 m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys. Maintain fence in good repair.
	.2	Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
<u>1.4 GUARD RAILS AND BARRICADES</u>	.1	Provide secure, rigid guard rails and barricades around open shafts, open stair wells, open edges of roofs.
	.2	Provide as required by governing authorities.
<u>1.5 WEATHER ENCLOSURES</u>	.1	Provide weather tight closures to unfinished skylight and other openings in roofs.
<u>1.6 DUST TIGHT SCREENS</u>	.1	Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

- .2 Maintain and relocate protection until such work is complete.

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

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

1.9 FIRE ROUTES .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY .1 Protect surrounding private and public property from damage during performance of Work.

- .2 Be responsible for damage incurred.

1.11 PROTECTION OF BUILDING FINISHES .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

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

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Existing facilities.

1.2 REFERENCES

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

1.3 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any 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 Amount or Contract Time.

1.5 METRIC SIZED MATERIALS

- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.6 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .6 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

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- 1.7 TRANSPORTATION .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.
- 1.8 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 may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.
- 1.9 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 Departmental Representative, whose decision is final.
- 1.10 CO-ORDINATION .1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
-

- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.11 REMEDIAL WORK

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

1.12 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.

1.13 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.

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| <u>1.14 FASTENINGS -
EQUIPMENT</u> | .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. |

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| <u>1.15 PROTECTION OF
WORK IN PROGRESS</u> | .1 | Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative. |
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|------------------------------------|----|--|
| <u>1.16 EXISTING
UTILITIES</u> | .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. |
| | .2 | Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service. |

PART 2 - PRODUCTS

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|---------------------|----|-----------|
| <u>2.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|---------------------|----|-----------|
| <u>3.1 NOT USED</u> | .1 | Not Used. |
|---------------------|----|-----------|

PART 1 - GENERAL

<u>1.1 EXISTING SERVICES</u>	.1	Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
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<u>1.2 LOCATION OF EQUIPMENT AND FIXTURES</u>	.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.

<u>1.3 RECORDS</u>	.1	Record locations of maintained, re-routed and abandoned service lines.
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PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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PART 1 - GENERAL

- 1.1 SUBMITTALS
- .1 Submittals: in accordance with Section 01 33 00.
 - .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.
- 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.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching 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 Submit proposed materials, finishes and installation method for patching to Departmental Representative for approval, prior to patching.
- .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

- .13

Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .14

Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

PART 2 - PRODUCTS

2.1 NOT USED

.1

Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1

Not Used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 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 regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building and work area, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use clearly marked separate bins for recycling.
- .7 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .8 Dispose of waste materials and debris off site.
- .9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 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 Departmental Representative. 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 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .10 Clean roofs, downspouts, and drainage systems.
- .11 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .12 Remove snow and ice from access to roof and work area.

PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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PART 1 - GENERAL

- 1.1 CONSTRUCTION & DEMOLITION WASTE
- .1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 50 % diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
 - .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
 - .1 Provide facilities for collection, handling and storage of source separated wastes.
 - .2 Source separate the following waste:
 - .1 Corrugated cardboard.
 - .2 Wood, not including painted or treated wood or laminated wood.
 - .3 Gypsum board, unpainted.
 - .4 Items indicated in Section 02 41 19, Deconstruction and Waste Products Workplan Summary.
 - .3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
 - .1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested using.
 - .4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.
- 1.2 WASTE PROCESSING SITES
- .1 Province of: Ontario.
 - .1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
 - .2 Telephone: 800-565-4923 or 416-323-4321.
 - .3 Fax: 416-323-4682.

- .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
 - .1 Telephone: 416-657-2797.
 - .2 Fax: 416-960-8053.
 - .3 Email: rco@rco.on.ca.
 - .4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

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|--------------|--------------|
| 2.1 NOT USED | .1 Not Used. |
|--------------|--------------|

PART 3 - EXECUTION

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| 3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT | .1 Government Chief Responsibility for the Environment. |
|--|---|

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment and Energy 135 St Clair Avenue West Toronto, ON M4V 1P5 Environment Canada Toronto, ON	(416) 323-4321 (800) 565-4923 (416) 734-4494	(416) 323-4682

PART 1 - GENERAL

1.1 INSPECTION AND
DECLARATION

- .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an 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 that corrections have been made.
 - .2 Request Departmental Representative's Inspection.
- .2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by PWGSC Fire protection Engineer have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 Work is complete and ready for final inspection.
- .4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 CLEANING

- .1 In accordance with Section 01 74 11.

PART 2 - PRODUCTS

<u>2.1 NOT USED</u>	.1	Not Used.
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PART 3 - EXECUTION

<u>3.1 NOT USED</u>	.1	Not Used.
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PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 As-built, samples, and specifications.
- .1 Equipment and systems.
- .2 Product data, materials and finishes, and related information.
- .3 Operation and maintenance data.
- .4 Warranties.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .1 Copy will be returned after final inspection, with Departmental Representative's comments.
- .2 Revise content of documents as required prior to final submittal.
- .3 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of maintenance manuals and commissioning documentation in English.
- .4 If requested, furnish evidence as to type, source and quality of products provided.
- .5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .6 Pay costs of transportation.

1.3 FORMAT

- .1 Organize data in the form of an 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. 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. Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.4 CONTENTS - EACH
VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission; names,
 - .2 Addresses, and telephone numbers of Contractor with name of responsible parties;
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

1.5 AS-BUILTS AND
SAMPLES

- .1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Amendments and addenda.
 - .4 Change Orders and other modifications to the Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Field test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

- .7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 RECORDING
ACTUAL SITE
CONDITIONS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured 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: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Amendments and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 EQUIPMENT AND
SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .3 Include manufacturer's printed operation and maintenance instructions.
- .4 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .5 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .6 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.
 - .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.
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1.9 STORAGE,
HANDLING AND
PROTECTION

- .1 Store components subject to damage from weather in weatherproof enclosures.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.10 WARRANTIES

- .1 Separate each warranty 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, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties until time specified for submittal.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | Methods and procedures for deconstruction of structures and parts of structures. |
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| <u>1.2 REFERENCES</u> | .1 | Canadian Standards Association (CSA International). |
| | .1 | CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures. |
| | .1 | Federal Legislation. |
| | .1 | Canadian Environmental Assessment Act (CEAA), 1992, c. 37. |
| | .2 | Canadian Environmental Protection Act (CEPA), 1999, c. 33. |
| | .3 | Transportation of Dangerous Goods Act (TDGA), 1992, c. 34. |
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| <u>1.3 DEFINITIONS</u> | .1 | Alternate Disposal: reuse and recycling of materials by designated facility, user or receiving organization which has valid Certificate of Approval to operate. Alternative to landfill disposal. |
| | .1 | Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials. |
| | .1 | Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system. |
| | .2 | Demolition: rapid destruction of structure with or without prior removal of hazardous materials. |
| | .3 | Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health, well being or environment if handled improperly. |
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- .4 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .5 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.
 - .1 Recycling does not include burning, incinerating, or thermally destroying waste.
- .6 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from remodelling 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.
- .7 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .8 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.
- .9 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00.
- .1 Submit copies of certified bills of lading from authorized disposal sites and reuse and recycling facilities for material removed from site to Departmental Representative upon request.
 - .1 Written authorization from Departmental Representative is required to deviate from haulers facilities listed in Waste Reduction Workplan.
- .2 Include following information:
 - .1 Time and date of removal.

- .2 Description of materials.
- .3 Weight, volume, quantity of material.
- .4 Breakdown of reuse, recycling and landfill quantities.
- .5 End destination of materials.

- .3 Workers, haulers and subcontractors must possess current, applicable Certificates of Approval to remove, handle and dispose of wastes categorized Provincially as hazardous.
 - .1 Provide proof of compliance within 24 hours upon written request of Departmental Representative.

1.5 QUALITY ASSURANCE

- .1 Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable provincial regulations.

1.6 STORAGE, HANDLING AND PROTECTION

- .1 Do in accordance with Section 01 74 20.

1.7 SITE CONDITIONS

- .1 Existing Conditions.
 - .1 Should materials resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of deconstruction, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.
 - .2 Label and package component parts of mechanical and electrical material specified for salvage in accordance with Departmental Representative's instructions to prevent damage or loss.
- .1 Protection.
 - .1 Prevent movement, settlement or damage of structures, services, walks, paving, trees, landscaping, and adjacent grades. Provide bracing as required. Repair damage caused by deconstruction as directed by Departmental Representative.

.2 Support affected structures and, if safety of structure being deconstructed or adjacent structures appears to be endangered, take preventative measures. Cease operations and immediately notify Departmental Representative.

.3 Prevent debris from blocking surface drainage system, mechanical and electrical systems.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .1 Demonstrate that tools are being used in manner which allows for salvage of materials in best condition possible.

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS

- .1 Determine if Environmental Assessment (EA) is required under requirements of CEAA.
 - .1 If necessary, employ licensed consultant to perform EA.
 - .2 Communicate findings and conclusions in writing to Departmental Representative prior to start of Work.

3.2 PREPARATION

- .1 Do Work in accordance with Section 01 35 35.
- .1 Locate and protect utility lines. Do not disrupt active or energized utilities traversing premises.
- .2 Disconnect and cap designated mechanical and electrical services as necessary to perform the Work.
- .3 partment Representative.Natural gas supply lines: as directed by
- .4 Protect portions of existing roof system to remain.

3.3 DISASSEMBLY

- .1 Materials removed from structures are property of this Contract.
- .1 Throughout course of deconstruction pay close attention to connections and material assemblies. Employ workmanship procedures which minimize damage to materials and equipment.
- .2 Ensure workers and subcontractors are trained to carry out work in accordance with appropriate deconstruction techniques.
- .3 Project supervisor with previous deconstruction experience must be present on site throughout project.
- .4 Deconstruct in accordance with CSA S350 and other applicable safety standards.
- .5 Workers must utilize adequate fall protection where Departmental Representative considers it necessary.
- .6 Maintain structural integrity of structures.
- .7 Wherever possible, transfer material assemblies from heights to ground level for easier disassembly. Take appropriate measures to ensure safety.
- .8 Separate from waste stream, material in condition suitable for reuse and/or recycling.
- .9 Remove and store materials to be salvaged, in manner to prevent damage.
 - .1 Store and protect in accordance with requirements for maximum preservation of material.
 - .2 Handle salvaged materials as new materials.
 - .3 Do not overload portions of roof and structure with salvged materials.
- .10 Source separate for recycling materials that cannot be salvaged for reuse including roofing, wood, and metal.
- .11 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

- .12 Where existing materials are to be re-used in Work, use special care in removal, handling, storage and re-installation to assure proper function in completed work.
- .13 Roofing:
 - .1 Where sections of roof are to be removed for subsequent work, remove gravel and pavers to expose membrane. where indicated, Cut back minimum of 230 mm outside line of opening or removal area to facilitate future flashing.
 - .2 Fold up or remove metal counter flashings to permit access to top edge of base flashings.
 - .3 Remove ballast, fabric, insulation, membrane, and gypsum board over area to be removed.
 - .4 At curb locations remove flashing to expose cants. Replace cants where necessary and reflash into roof system.
 - .5 Provide areas where roof system has been removed ready for subsequent roofing work.
 - .6 Ensure substrates and remaining roof membrane where existing roof system has been removed are clean, water tight, and ready for subsequent roofing work.
 - .7 At locations where items are removed and a hole in the deck remains. Provide new deck to match existing and fill in area with insulation to provide a smooth surface for subsequent roofing work.
- .14 Sheet metal flashings:
 - .1 Remove sheet metal flashings indicated on drawings.
 - .2 Departmental Representative to inspect sheet metal flashings to determine suitability for reuse. Stockpile sheet metal flashings to be reused.
- .15 Metal Siding: Remove metal siding and all components indicated on drawings ready for subsequent work.

3.4 PROCESSING

- .1 Designate location for processing of materials which eliminates double handling and provides adequate space to maintain efficient material flow.
- .1 Denail, strip, and separate materials to ensure best possible condition of salvaged materials.

- .2 Keep processing area clean and free of excess debris.
- .3 Supply separate, marked disposal bins for categories of waste material. Notify Departmental Representative prior to removal of bins from site.
- .4 Separate processed materials into organized piles for stockpiling. Provide collection area for materials processed. Pile materials on pallets to facilitate transport off-site.

3.5 STOCKPILING

- .1 Remove and stockpile existing roofing components indicated to be removed or salvaged. Clean items to be removed and place into stockpiles, indicating material type and quantity.
- .1 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .2 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible. Do not overload existing roof structure.
- .3 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.6 REMOVAL FROM SITE

- .1 Transport material designated for alternate disposal to approved facilities listed in waste reduction workplan and in accordance with applicable regulations. Do not deviate from facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.
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- .1 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.

3.7 CLEANING AND RESTORATION

- .1 Keep site clean and organized throughout deconstruction.
- .1 Upon completion of project, remove debris, trim surfaces and leave work site clean.
- .2 Upon completion of project, reinstate areas, parking surfaces, walkways, and light standards affected by Work to match condition of adjacent, undisturbed areas.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Wood Protection Association (AWPA):
 - .1 AWPA P5-10, Standard for Waterborne Preservatives.
 - .2 AWPA P8-11, Standard for Oil-Borne Preservatives.
 - .2 Canadian Standards Association (CSA):
 - .1 CSA O80 Series-08(R2012) Consolidation, Wood Preservation.
 - .2 CSA O112 Series M1977(R2006), CSA Standards for Wood Adhesives.
 - .3 CSA O121, Douglas Fir Plywood.
 - .4 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
 - .3 Forestry Stewardship Council (FSC).
 - .4 Sustainable Forestry Initiative (SFI).
 - .5 South Coast Air Quality Management District (SCAQMD):
 - .1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications, Amended January 7, 2005.
- 1.2 QUALITY ASSURANCE
- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
 - .2 Plywood, and particleboard in accordance with CSA and ANSI standards.
- 1.3 ENVIRONMENTAL REQUIREMENTS
- .1 Wood products: CAN/CSA-Z809, SFI or Forestry Stewardship Council (FSC) certified.
 - .2 Panel products:
 - .1 SCAQMD Rule 1168, Adhesives and Sealants Applications.
 - .2 CAN/CSA-Z809, SFI or Forest Stewardship Council (FSC) certified.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Wood: S-DRY, graded and stamped to National Lumber Grades Authority, Standard Grading Rules for Canadian Lumber, S4S.
 - .1 Blocking, furring, strapping, curbs, battens, nailers, and cants: spruce, pine or fir (SPF), 121d. and pine, 113d. Pressure treated with CCA to CAN/CSA 080.9, minimum retention 4.0 kg/m³ by assay.
 - .2 Preservative: chromated copper arsenate (CCA) to AWP A P5 as amended by CAN/CSA-080-Series.
- .2 Preservative treated plywood: Douglas Fir to CSA 0121, G1S good one side, pressure treated with CCA to CAN/CSA 080.9, minimum retention 4.0 kg/m³ by assay.
 - .1 Preservative: chromated copper arsenate (CCA) to AWP A P5 as amended by CAN/CSA-080-Series.
- .3 Fastenings: to CAN/CSA-086.
- .4 Field applied wood preservative: copper naphthenate to AWP A P8, green colour.
- .5 Construction adhesive: to CSA 0112 Series, cartridge loaded.
 - .1 Maximum allowable VOC limit 140 g/L.
 - .2 SCAQMD Rule 1168, Adhesives and Sealants Applications.
- .6 Hardboard; surfaced with fiberglass reinforcing Cement board: cementitious, water durable, mesh on front and back; long edges wrapped; to ANSI A118.9, ASTM C1288 and ASTM C1325, 13 mm thick, 1200 mm wide x maximum practical length. Compressive strength: Not less than 15.51 MPa (2250 lbs. per sq. in.) when tested in accordance with ASTM D2394. Water absorption: Not greater than 8 percent when tested for 24 hours in accordance with ASTM C473.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Apply wood preservative to wood in contact with roofing, concrete and masonry.

- .2 Treat surfaces of pressure treated wood and plywood which are cut or bored after pressure treatment with field applied wood preservative.
- .3 Set items in place plumb, straight and level to a tolerance of 1:600 and rigidly secure in place.
- .4 Construct continuous members from pieces of longest practical length.
- .5 Construct wood roof blocking and curbs as indicated on drawings.
- .6 Replace rotted and damaged wood roof sheathing and fascia panels with wood plywood to match existing thickness.
- .7 Secure exterior work with galvanized or non-ferrous fasteners.

PART 1 - GENERAL

<u>1.1 SAMPLES</u>	.1	Submit one 600 x 600 mm size samples of siding and material, of colour and profile specified, in accordance with Sections 01 33 00 and 01 78 00.
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<u>1.2 DESIGN CRITERIA</u>	.1	Fastener type and spacing to design wind loads and shear values to NBC 2015, Division B
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<u>1.3 PRODUCT DATA</u>	.1	Submit product data sheets in accordance with Sections 01 33 00 and 01 78 00.
	.1	Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, related work.
	.2	Indicate conformance with CSA-S136-16 and CAN3-S157-M83(R2001).

PART 2 - PRODUCTS

<u>2.1 MATERIALS</u>	.1	Aluminum sheet: ASTM B209, H14 Temper, minimum 1.0 mm thick plain, anodizing quality.
	.2	Finish: Prefinished aluminum with factory applied polyvinylidene fluoride. <ul style="list-style-type: none">.1 Class F2S..2 Colour selected by Departmental Representative from manufacturer's standard range..3 Specular gloss: 30 units +/- in accordance with ASTM D523..4 Coating thickness: not less than 22 micrometres..5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:<ul style="list-style-type: none">.1 Outdoor exposure period 2500 hours..2 Humidity resistance exposure period 5000 hours.

- .3 Z-bars or sub-girts, drip closures and notched steel closures: 1.26 mm thick galvanized steel to ASTM A653/A653M-15e1, Z275 zinc coating designation.
- .4 Batt Insulation: Stone wool to CAN/ULC-S702-14, Type 1, friction fit, preformed without membrane, Ecologo certified.
- .5 Rigid Insulation: CAN/ULC-S701, Type 4; Minimum RSI of 0.87, Extruded polystyrene, ship-lapped edges. Thickness: As indicated on Drawings.
- .6 Flashing and accessories: exposed trim, metal closures, cap pieces, etc. of same material and colour as siding.
- .7 Fasteners: self tapping screws, zinc coated steel, prepainted head colour to match siding, neoprene washers.
- .8 Sealant: one component, elastomeric, chemical curing, to CAN/CGSB-19.13-M87 or ASTM C920-14a, Ecologo certified, SWRI validated, colour to match siding.
- .9 Isolation coating: alkali resistant bituminous paint.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Attach sub-girts to structural supports as indicated.
- .2 Install starter strips, inside corners, continuous outside corners, edgings, and drip, cap and sill flashings.
- .3 Install insulation between framing members to friction fit. Fit insulation tight to projections through insulation. Fit batt insulation in area where rigid insulation cannot be installed.
- .4 Install siding and attachments sequentially from starter strips up, to manufacturer's instructions.

- .5 Apply isolation coating to metal surfaces to eliminate galvanic reaction between dissimilar materials.
- .6 Install facing where indicated.
- .7 Install exterior corners, fillers and closure strips with individually formed and profiled work using concealed fasteners.
- .8 Maintain joints in exterior sheets, true to line, tight fitting.
- .9 Apply sealant where detailed, at junction with other materials, around door and window perimeters and at metal flashings.
- .10 Wash down surfaces with mild detergent.

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | Materials and installation for 2 ply SBS modified bituminous roofing for roofing and waterproofing in a protected membrane roofing (PMR) systems. |
| | .2 | Removal of existing roof system as described in Section 02 41 19. |

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| <u>1.2 REFERENCES</u> | .1 | ASTM International Inc.
.1 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
.2 ASTM D6162/D616M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements. |
| | .2 | Canadian General Standards Board (CGSB).
.1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing.
.2 CAN/CGSB-37.29-M89, Rubber-Asphalt Sealing Compound. |
| | .3 | Canadian Standards Association (CSA International).
.1 CSA A231.1/A231.2-14, Precast Concrete Slabs/Precast Concrete Pavers.
.2 CAN/CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Membrane Roofing Systems. |
| | .4 | Underwriters' Laboratories of Canada (ULC).
.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering. |

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| <u>1.3 ADMINISTRATIVE REQUIREMENTS</u> | .1 | Convene pre-installation meeting one week prior to beginning roofing Work, with roofing contractor's representative and Departmental Representative in accordance with Section 01 32 00 to:
.1 Verify project requirements.
.2 Review installation and substrate conditions. |
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- .3 Co-ordination with other building subtrades.
- .4 Review manufacturer's installation instructions and warranty requirements.

1.4 SUBMITTALS

- .1 Submit proof of manufacturer's CCMC Listing and listing number to Departmental Representative.
- .2 Submit product data and manufacturer's written installation instructions in accordance with Section 01 33 00.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.
- .4 Submit product data sheets for all roof system components. Include:
 - .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Limitations.
- .5 Submit shop drawings in accordance with Section 01 33 00.
- .6 Indicate repair methodology, roof system components, flashing, control joints, insulation, penetrations, field fabricated seams details.

1.5 QUALITY ASSURANCE

- .1 Construct mock-ups in accordance with Section 01 45 00.
 - .2 Construct mock-up showing typical method or roof system repair and replacement.
 - .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
 - .2 Locate where directed.
 - .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with roofing Work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.
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- .4 Ensure torching is performed by skilled workers who have successfully completed and passed a course of instruction by membrane manufacturer in torch-applied-membrane techniques.

1.6 FIRE PROTECTION

- .1 Fire Extinguishers:
 - .1 Maintain a minimum of one 4.5 kg cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle,
 - .2 ULC labelled for A, B and C class protection.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle, store and protect materials of this section in accordance with Section 01 61 00.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Stand roll materials on end.
- .4 Remove only in quantities required for same day use.
- .5 Store insulation protected from sunlight and weather and deleterious materials.
- .6 Store materials in accordance with manufacturer's written instructions to prevent damage or loss of performance.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate applicable waste materials for reuse and recycling.
- .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 for recycling.
- .4 Place materials defined as hazardous or toxic in designated containers.

- .5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .6 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .7 Reuses all aggregate and paver materials.

1.9 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

- .1 Temperature, relative humidity, moisture content.
 - .1 Apply membranes only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
 - .2 Do not install membrane when air and substrate temperature remains below 5 degrees C, or when wind chill gives equivalent cooling effect.
 - .3 Install membrane on dry substrate, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system.
- .2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of rubberized asphalt, sealing compounds, primers and caulking materials.

1.10 WARRANTY

- .1 For the Work of this Section 07 55 50 - Modified Bituminous Protected Membrane Roofing the 12 months warranty period prescribed in subsection GC 3.13 of General Conditions is extended to 24 months.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- .1 Compatibility between components of system and adjacent materials is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.
 - .2 Roofing System: to CAN/CSA A123.21 for wind uplift resistance.
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<u>2.2 DECK COVERING</u>	.1	Glass Mat Gypsum Board: to ASTM C1177 thickness to match existing.
<u>2.3 COVERING FASTENERS</u>	.1	Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.
<u>2.4 PRIMER</u>	.1	Asphalt primer: to CGSB 37-GP-9Ma, manufacturer's low VOC primer.
<u>2.5 MEMBRANE</u>	.1	Base sheet: <ul style="list-style-type: none">.1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, glass matt reinforcement, having minimum thickness of 3 mm and nominal weight of 180 g/m²..2 Type 1, fully adhered..3 Class: C - plain surfaced..4 Grade:heavy duty service..5 Top and bottom surfaces:<ul style="list-style-type: none">.1 Poly/Poly..6 Base sheet membrane properties: to CGSB 37-GP-56M.
	.2	Cap sheet: <ul style="list-style-type: none">.1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, glass matt reinforcement, having minimum thickness of 3 mm and nominal weight of 250g/m²..2 Type 1, fully adhered..3 Class: C - Granulated surfaced..4 Grade:heavy duty service..5 Top and bottom surfaces:<ul style="list-style-type: none">.1 Poly/Granulated..6 Base sheet membrane properties: to CGSB 37-GP-56M.
<u>2.6 POLYSTYRENE INSULATION</u>	.1	Extruded polystyrene (XPS) insulation: to CAN/ULC-S701, Type 4, thickness as indicated, complete with shiplapped edges and drainage channels on underside. Replace all existing insulation with new insulation.

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| <u>2.7 SEALERS</u> | .1 | Sealing compound: to CAN/CGSB-37.29, rubber asphalt type. |
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| <u>2.8 FILTER FABRIC</u> | .1 | UV resistant, black woven polyolefin fabric for installation between insulation and stone ballast in protected membrane system. Fabric to meet recommendation of insulation manufacturer. |
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| <u>2.9 BALLAST</u> | .1 | Stone: Reuse existing. Where additional stone is required; 19 to 32 mm size, well graded crushed stone, opaque, non-porous, washed, free from fines, splinters, ice and snow. |
| | .2 | Paving slabs: Reuse existing. Where additional slabs are required; to CSA A231.1/A231.2, size, thickness, and finish to match existing. Support all corners of slabs with a 150 mm x 150 mm x 25 mm thick Type 4 insulation pad to allow drainage. |
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| <u>2.10 ROOF DRAINS</u> | .1 | Reuse existing as requested. |
| | .2 | Where required, Provide new roof drains of spun aluminum body, heavy duty cast aluminum strainer dome and clamping ring. Drain flange to have depressed sump area to facilitate water drainage. Provide mechanical watertight connection to existing drain pipes. |
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| <u>2.11 SOURCE QUALITY CONTROL</u> | .1 | Submit laboratory test reports in accordance with Section 01 45 00. |
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| <u>2.12 Signage</u> | .1 | Aluminum Sheet: AA6061 alloy, T6 Temper, utility sheet, in accordance with ASTM B209 and ANSI H35.1, minimum 1.0 mm thick, finished with weather resistant screened or vinyl graphics as indicated. |
| | .2 | 6 mm stainless steel chain with butt welded links complete with clamp at each for easy removal and reinstallation. |
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PART 3 - EXECUTION

3.1 QUALITY OF WORK .1 Perform removals, examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual.

.2 Do priming in accordance with manufacturers written recommendations.

3.2 SUBSTRATE EXAMINATION .1 Examine substrates and immediately inform Departmental Representative in writing of defects.

.2 Prior to beginning of Work ensure:
.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, contamination and swept clean of dust and debris.
.2 Curbs have been built.
.3 Drains have been installed at proper elevations relative to finished surfaces.
.4 Sleeves, vents, pipes and other items passing through substrates receiving work of this Section are properly and rigidly installed.
.5 Plywood and lumber nailer plates have been installed to walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PREPARATION - PROTECTION .1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water away from face of building until drains or hoppers installed and connected.

.5 Protect new and remaining roofing from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

- .6 Place plywood runways over new work and existing roofing to enable movement of material and other traffic.
- .7 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage. Seal and ballast exposed edges.

3.4 DECK COVERING

- .1 In areas where existing gypsum board has to be replaced, lay Glass Mat Gypsum Board with tightly butted joints. Longitudinal joints must be at right angles to flute direction. Joints occurring along widths of board to be continuously supported on top flange of metal deck.
- .2 Mechanically fasten deck covering to steel deck with self-tapping, non-corroding screws and plates spaced 200 mm on centre each way and to only top flanges of steel deck.

3.5 PRIMING DECK

- .1 Apply Primer to glass matt gypsum board roofing substrate at the rate recommended by manufacturer.

3.6 PROTECTED MEMBRANE ROOFING APPLICATION

- .1 In areas where existing roof membrane has been removed, tie new roof membrane into existing roof membrane to provide a monolithic roof system.
- .2 In areas where existing cant has been replaced, tie new roof membrane into existign roof membrane adn wall flashings to provide a monolithic roof system.
- .3 Base sheet application:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and torch base sheet to substrate.
 - .3 Lap sheets 75 mm for side and 150 mm for end laps.
 - .4 Application to be fully bonded to substrate and free of blisters, wrinkles and fishmouths.

- .4 Cap sheet application:
 - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
 - .2 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
 - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm from those in base sheet.
 - .4 Application to be fully bonded to base sheet and free of blisters, fishmouths and wrinkles.
 - .5 Do membrane application in accordance with manufacturer's recommendations.
- .5 Replace existing roof drains with new roof drains to match existing and flash in new roof drain in accordance with roof system manufacturer's written instructions.
- .6 Remove existing trees/shrubs on roof and repair existing roof membrane in accordance with reviewed shop drawing.
- .7 Tie new roof system to existing roof system in accordance with manufacturer's written instructions.

3.7 INSULATION APPLICATION

- .1 Apply insulation loose laid immediately after application of separation sheet. Butt insulation boards tightly, in parallel rows with staggered end joints. Butt insulation tightly against existing insulation.

3.8 FILTER FABRIC APPLICATION

- .1 Apply continuous layer of filter fabric unbonded over installed insulation lapping joints 200 mm minimum.
- .2 Cut fabric around drains, vents and other penetrations and extend up protrusions and place under metal flashings.

3.9 BALLAST AND PROTECTIVE COVERING

- .1 Apply stone ballast, as soon as possible after placement of fabric, at minimum rate of 75 kg/m².

- .2 Spread stone ballast to an even thickness over entire area. Extend ballast over base of metal flashings by 100 mm.
- .3 Install paving slabs over fabric in locations indicated. Allow space between slabs to permit drainage of surface water. Cut pavers to fit irregularly shaped areas and around protrusions.

3.10 Signage

- .1 Install chain and signage in locations indicated on drawings.

3.11 FIELD QUALITY CONTROL

- .1 Inspections:
 - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
- .2 Costs of tests will be paid by Departmental Representative.

3.12 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Clean to Departmental Representative's approval, soiled surfaces, spatters, and damage caused by Work of this Section.
- .5 Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

PART 1 - GENERAL

1.1 REFERENCES

- .1 The Aluminum Association inc. (AAI)
 - .1 AAI - Aluminum Sheet metal Work in Building Construction - 2002.
 - .2 AAI - DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 2012.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .5 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .7 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule #1168-05, Adhesives and Sealants.

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.
- .3 Shop Drawings:

.1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

- .4 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.3 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative in accordance with Section 01 32 00 to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- .1 Aluminum (metal) sheet: ASTM B209, H14 temper, minimum 1.0 mm thick, plain, anodizing quality.

2.2 PREFINISHED SHEET

- .1 Prefinished aluminum with factory applied polyvinylidene fluoride.
-

- .1 Class F2S.
- .2 Colour selected by Departmental Representative from manufacturer's standard range.
- .3 Specular gloss: 30 units +/- in accordance with ASTM D523.
- .4 Coating thickness: not less than 22 micrometres.
- .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:
 - .1 Outdoor exposure period 2500 hours.
 - .2 Humidity resistance exposure period 5000 hours.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB-37.5.
 - .1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .4 Sealants: In accordance with Section 07 92 00.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .6 Fasteners: of same material as sheet metal, to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA FL' series details and AAI-Aluminum Sheet metal Work in Building Construction.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.

- .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of prefinished metal.

2.6 PANS

- .1 Form pans to receive roofing plastic from prefinished metal sheet metal with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners.
 - .1 Rivet joints.
 - .2 Make pans minimum 50 mm wider than member passing through roof membrane.

2.7 SCUPPERS

- .1 Form scuppers from prefinished sheet metal.
- .2 Sizes and profiles as indicated.
- .3 Provide necessary fastenings.
- .4 Form 600 x 600 mm splash pans from prefinished sheet metal.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install sheet metal work CRCA FL series and AAI-Aluminum Sheet Metal Work in Building Construction.
-

- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints using S-lock forming tight fit over hook strips, as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Turn top edge of flashing into recessed reglet and secure.
- .7 Caulk flashing at cap flashing with sealant.
- .8 Install pans, where shown around items projecting through roof membrane.

3.3 SCUPPERS

- .1 Install scuppers as indicated.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S101-14, Standard Methods of for Fire Endurance Tests of Building Construction and Materials.
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .3 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems.

1.2 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.
- .4 Continuity of Fire Separations: NBC 2015, Division B:
 - .1 Wall, partition or floor assemblies required to be a fire separation shall be: constructed as a continuous element; have a fire resistance rating; have openings protected by a closure; and have penetrations sealed by a firestop.

1.3 SUBMITTALS

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

- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.
- .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Quality assurance submittals: submit following in accordance with Section 01 45 00.
 - .1 Test reports: in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY
ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations with 5 years documented experience.
 - .2 All fire stopping material shall be from one manufacturer.
 - .3 All fire stopping installation work for entire project shall be by a single contractor experienced in firestopping. Individual disciplines shall NOT fire stop their own work.

1.5 DELIVERY,
STORAGE AND
HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 11 01 01 61 00.

- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .2 Storage and Protection:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.
 - .2 Fire stop system rating: FT.
- .2 Service penetration assemblies: systems tested to CAN/ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN/ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

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

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated partitions and walls.
 - .2 Penetrations through fire-resistance rated roofs.
 - .3 Around mechanical and electrical assemblies penetrating fire separations.

PART 1 - GENERAL

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|---|----|---|
| <u>1.1 REFERENCES</u> | .1 | American Society for Testing and Materials International, (ASTM)
.1 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants. |
| <u>1.2 ENVIRONMENTAL CHOICE PROGRAM</u> | .1 | Provide sealant products bearing the 'Ecologo' of the Environmental Choice Program, Department of the Environment, Canadian Environmental Protection Act, Environmental Choice Product Guidelines ECP/PCE-45-92 for Sealants and Caulking Compounds, except maximum VOC 60 g/L during application and curing.

.1 For primers and sealants, indicate VOC in g/L during application and curing. |
| <u>1.3 PRODUCT DATA</u> | .1 | Submit manufacturer's literature indicating recommended surface preparation, sealant selection and primer for each substrate in accordance with Sections 01 33 00 and 01 78 00. |
| <u>1.4 PROJECT CONDITIONS</u> | .1 | Environmental Limitations:
.1 Do not proceed with installation of joint sealants under following conditions:
.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4°C.
.2 When joint substrates are wet.

.1 Joint-Width Conditions:
.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.2 Joint-Substrate Conditions:
.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates. |
-

PART 2 - PRODUCTS

- | | | |
|--|----|--|
| <u>2.1 SEALANTS</u> | .1 | Provide sealant products bearing Ecologo to ECP/PCE-45-92 with maximum VOC 60 g/L. |
| <u>2.2 SEALANT MATERIAL DESIGNATIONS</u> | .1 | Silicones One Part '3'.
.1 To ASTM C920-14a, primerless, Type S, Grade NS, Class 50, SWRI validated. |
| | .1 | Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded open or closed cell foam backer rod.
.2 Size: oversize 30 to 50%.
.2 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/m ³ density, or neoprene foam backer, size as recommended by manufacturer.
.3 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant. |
| <u>2.3 SEALANT SELECTION</u> | .1 | Perimeters of exterior openings where frames meet exterior building elements: Designation 3. |
| | .1 | Seal interior perimeters of exterior openings as detailed on drawings: Designation 3. |
| | .2 | Seal openings in roof flashings and roof openings: Designation 3. |
| <u>2.4 JOINT CLEANER</u> | .1 | Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer. |
| | .1 | Primer: to manufacturer's recommendations. |
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PART 3 - EXECUTION

- | | | |
|--|----|---|
| <u>3.1 PREPARATION OF JOINT SURFACES</u> | .1 | Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants. |
| | .1 | Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair work. |
| | .2 | 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. |
| | .3 | Ensure joint surfaces are dry and frost free. |
| | .4 | Prepare surfaces in accordance with manufacturer's directions. |
| <u>3.2 PRIMING</u> | .1 | Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking. |
| | .1 | Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking. |
| <u>3.3 BACKUP MATERIAL</u> | .1 | Apply bond breaker tape where required to manufacturer's instructions. |
| | .1 | Install joint filler to achieve correct joint depth and shape with approximately 30% compression. |
| <u>3.4 APPLICATION</u> | .1 | Ventilate interior spaces during application and curing of sealants to maintain VOCs less than 50 g/l. Coordinate with building manager to ensure existing ventilation system or temporary ventilation supplies sufficient outside air. |
| | .1 | Sealant. |

- .1 Protect installed work of other trades from staining or contamination.
 - .2 Apply sealant in accordance with manufacturer's application manual and written instructions. Maintain SPC STC rating of assemblies.
 - .3 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint. remove tape after sealant applied.
 - .4 Apply sealant in continuous beads.
 - .5 Apply sealant using gun with proper size nozzle.
 - .6 Use sufficient pressure to fill voids and joints solid.
 - .7 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .8 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .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 Cleanup.
- .1 Clean adjacent surfaces immediately and leave work neat and clean.
 - .2 Remove excess and droppings, using recommended cleaners as work progresses.
 - .3 Remove masking tape after initial set of sealant.

PART 1 - GENERAL

**1.1 REFERENCE
STANDARDS**

- .1 CSA Group
 - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
 - .2 CAN3 C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 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.

1.2 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.

**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 new electrical & solar generation equipment 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 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 on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .4 Certificates:
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment is not available, submit such equipment inspection authorities for special 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.

1.3 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd)

- .4 (Cont'd)
- .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
- .6 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 , as described in PART 3 - FIELD QUALITY CONTROL.
- .6 Sustainable Design Submittals:
 - .1 Estimated energy annual contribution from solar system and estimated payback calculation.

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 solar generation system for incorporation into manual.
 - .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
 - .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
 - .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
 - .4 Post instructions where directed.
 - .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
 - .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

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:

- 1.5 DELIVERY,
STORAGE AND
HANDLING
(Cont'd)
- .3 (Cont'd)
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect equipment and material from nicks, scratches, and damage.
 - .3 Replace defective or damaged materials with new.
 - .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and 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 AC equipment, control and 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 nameplates and 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 equipment is not available, obtain special - ACTION AND INFORMATIONAL SUBMITTALS. Factory assemble control panels and component assemblies.
- 2.3 WARNING SIGNS
- .1 Warning Signs: in accordance with requirements of inspection authorities Departmental Representative.
- 2.4 WIRING
TERMINATIONS
- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

2.5 EQUIPMENT
IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet melamine, matt white finish face, black core, lettering accurately aligned and engraved into core 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.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, breakers and inverters: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.
- .9 Panelboards: indicate source of power, voltage and name of panel.

2.6 WIRING
IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered 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.

2.7 CONDUIT AND
CABLE
IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

2.7 CONDUIT AND
CABLE
IDENTIFICATION
(Cont'd)

- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

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

2.8 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
.1 Paint indoor distribution enclosures light gray.

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 solar generation system 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 Panelboards: as required by Code or as indicated.

-
- 3.5 CO-ORDINATION OF PROTECTIVE DEVICES
- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.
-
- 3.6 FIELD QUALITY CONTROL
- .1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Solar power generation and inverter system including phasing, voltage, grounding and load balancing.
 - .2 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .2 Carry out tests in presence of Departmental Representative.
 - .3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
 - .4 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
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- 3.7 SYSTEM STARTUP
- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
 - .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
 - .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.
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- 3.8 CLEANING
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.

- 3.8 CLEANING
(Cont'd)
- .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.

PART 1 - GENERAL

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| 1.1 REFERENCE
STANDARDS | <ul style="list-style-type: none">.1 CSA International<ul style="list-style-type: none">.1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes and Fittings..2 CAN/CSA C22.2 No. 65-13, Wire Connectors..2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)<ul style="list-style-type: none">.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating). |
| 1.2 DELIVERY,
STORAGE AND
HANDLING | <ul style="list-style-type: none">.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:<ul style="list-style-type: none">.1 Store materials 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. |

PART 2 - PRODUCTS

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| 2.1 MATERIALS | <ul style="list-style-type: none">.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..3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:<ul style="list-style-type: none">.1 Connector body and stud clamp for stranded copper conductors..2 Clamp for stranded copper conductors..3 Stud clamp bolts..4 Bolts for copper conductors..5 Sized for conductors as indicated..4 Clamps or connectors for armoured cable, TECK cable, flexible conduit, as required to: CAN/CSA C22.2 No. 18. |
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PART 3 - EXECUTION

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| <u>3.1 INSTALLATION</u> | .1 | Remove insulation carefully from ends of conductors and cables and: <ul style="list-style-type: none">.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 Install bushing stud connectors in accordance with EEMAC 1Y-2 . |
| <u>3.2 CLEANING</u> | .1 | Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. |

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 26 05 00 - Common Work Results for Electrical. |
| | .2 | Section 26 05 20 - Wire and Box Connectors - (0-1000 V). |
| | .3 | Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings. |
| <u>1.2 PRODUCT DATA</u> | .1 | Provide product data in accordance with Section 01 33 00 - Submittal Procedures. |
| <u>1.3 DELIVERY, STORAGE AND HANDLING</u> | .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

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| <u>2.1 BUILDING WIRES</u> | .1 | Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG. |
| | .2 | Copper conductors: size as indicated, with 600 or 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Non Jacketted. |
| <u>2.2 TECK 90 CABLE</u> | .1 | Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical. |
| | .2 | Conductors: <ul style="list-style-type: none"> .1 Grounding conductor: copper. .2 Circuit conductors: copper. |
| | .3 | Insulation: <ul style="list-style-type: none"> .1 Ethylene propylene rubber EP. .2 Cross-linked polyethylene XLPE. .3 Rating:, 1000 V. |
| | .4 | Inner jacket: polyvinyl chloride material. |
| | .5 | Armour: flat interlocking aluminum. |
| | .6 | Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project. |

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| <u>2.2 TECK 90 CABLE
(Cont'd)</u> | .7 | Fastenings: |
| | .1 | One hole zinc straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm. |
| | .2 | Channel type supports for two or more cables at 1500 mm centres. |
| | .3 | Threaded rods: 6 mm diameter to support suspended channels. |
| | .8 | Connectors: |
| | .1 | Watertight, approved for TECK cable. |

PART 3 - EXECUTION

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| <u>3.1 FIELD QUALITY
CONTROL</u> | .1 | Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical. |
| | .2 | Perform megohm meter tests using method appropriate to site conditions and to approval of Departmental Representative inspection authority. |
| | .3 | Perform tests before energizing electrical system. |

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| <u>3.2 GENERAL CABLE
INSTALLATION</u> | .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 | Conductor length for parallel feeders to be identical. |
| | .4 | Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points. |

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| <u>3.3 INSTALLATION OF
BUILDING WIRES</u> | .1 | Install wiring as follows: |
| | .1 | In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings. |

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| <u>3.4 INSTALLATION OF
TECK 90 CABLE (0
-1000 V)</u> | .1 | Group cables wherever possible on channels. |
| | .2 | Install cable exposed, securely supported by straps hangers. |

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 26 05 00 - Common Work Results for Electrical. |
| <u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u> | .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. |
| <u>1.3 CLOSEOUT SUBMITTALS</u> | .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. |
| <u>1.4 DELIVERY, STORAGE AND HANDLING</u> | .1 | Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions. |

PART 2 - PRODUCTS

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| <u>2.1 EQUIPMENT</u> | .1 | Clamps for grounding of conductor: size as required to electrical grounding system. |
| | .2 | Grounding conductors: bare stranded copper, soft annealed, size as indicated. |
| | .3 | Insulated grounding conductors: green, copper conductors, size as indicated. |
| | .4 | Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors. |
| | .5 | Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to: |
| | .1 | Grounding and bonding bushings. |
| | .2 | Protective type clamps. |
| | .3 | Bolted type conductor connectors. |
| | .4 | Thermit welded type conductor connectors. |
| | .5 | Bonding jumpers, straps. |

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| 2.1 EQUIPMENT
(Cont'd) | .5 (Cont'd) | .6 Pressure wire connectors. |
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PART 3 - EXECUTION

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| 3.1 INSTALLATION
GENERAL | .1 | Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, 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 | Install bonding wire for flexible conduit, connected at one end to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit. |
| | .7 | Connect structural steel and metal supports to ground. |
| 3.2 SYSTEM AND
CIRCUIT GROUNDING | .1 | Install system and circuit grounding connections to neutral of secondary 120/208 V system. |
| 3.3 EQUIPMENT
GROUNDING | .1 | Install grounding connections to typical equipment included in, but not necessarily limited to following list. Breakers, transformers, support systems, PV panels, control panels, distribution panels. |
| 3.4 GROUNDING BUS | .1 | Install copper grounding bus mounted on insulated supports on wall of electrical room. |
| | .2 | Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size 2/0 AWG. |
| 3.5 FIELD QUALITY
CONTROL | .1 | Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical. |

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| 3.5 FIELD QUALITY CONTROL
(Cont'd) | .2 | Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative inspection authority. |
| | .3 | Perform tests before energizing electrical system. |
| 3.6 CLEANING | .1 | Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. |
| | .1 | Leave Work area clean at end of each day. |

PART 1 - GENERAL

**1.1 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 hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

**1.2 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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect hangers and supports from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

**2.1 SUPPORT
CHANNELS**

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Secure equipment to masonry, tile and plaster surfaces with suitable anchors.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

3.1 INSTALLATION
(Cont'd)

- .4 (Cont'd)
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .5 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .6 For surface mounting of two or more conduits use channels at 1500 mm on centre spacing.
- .7 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .9 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .10 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative.
- .11 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

<u>1.1 REFERENCE STANDARDS</u>	.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. 45-M1981 (R2003), Rigid Metal Conduit.
	.3	CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
	.4	CSA C22.2 No. 83 -M1985 (R2003), Electrical Metallic Tubing.
	.5	CSA C22.2 No. 211.2-06 (R2016), Rigid PVC (Unplasticized) Conduit.
<u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u>	.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.
<u>1.3 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

<u>2.1 CABLES AND REELS</u>	.1	Provide cables on reels or coils.
	.1	Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
	.2	Each coil or reel of cable to contain only one continuous cable without splices.
	.3	Identify cables for exclusively dc applications.
<u>2.2 CONDUITS</u>	.1	Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
	.2	Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings .
	.3	Rigid pvc conduit: to CSA C22.2 No. 211.2.

<u>2.2 CONDUITS (Cont'd)</u>	.4	Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.
<u>2.3 CONDUIT FASTENINGS</u>	.1	One hole steel straps to secure surface conduits NPS 2 50 mm and smaller.
	.1	Two hole steel straps for conduits larger than NPS 2 50 mm.
	.2	Beam clamps to secure conduits to exposed steel work.
	.3	Channel type supports for two or more conduits at 1500 mm on centre.
	.4	Threaded rods, 6 mm diameter, to support suspended channels.
<u>2.4 CONDUIT FITTINGS</u>	.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.
<u>2.5 EXPANSION FITTINGS FOR RIGID CONDUIT</u>	.1	Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
	.2	Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
	.3	Weatherproof expansion fittings for linear expansion at entry to panel.
<u>2.6 FISH CORD</u>	.1	Polypropylene.

PART 3 - EXECUTION

<u>3.1 MANUFACTURER'S INSTRUCTIONS</u>	.1	Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
<u>3.2 INSTALLATION</u>	.1	Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
	.2	Surface mount conduits except where indicated.

3.2 INSTALLATION
(Cont'd)

- .3 Use rigid galvanized steel threaded conduit except where indicated.
- .4 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.
- .5 Use rigid pvc conduit where indicated.
- .6 Use flexible metal conduit for equipment subject to vibration.
- .7 Use liquid tight flexible metal conduit for connection to vibrating equipment in damp, wet or corrosive locations.
- .8 Minimum conduit size: 19 mm.
- .9 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .10 Mechanically bend steel conduit over 19 mm diameter.
- .11 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .12 Install fish cord in empty conduits.
- .13 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .14 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 suspended 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 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

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 26 05 00 - Common Work Results for Electrical. |
| <u>1.2 REFERENCE STANDARDS</u> | .1 | CSA International. |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .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 dry type transformers and include product characteristics, performance criteria, physical size, finish and limitations. |
| <u>1.4 CLOSEOUT SUBMITTALS</u> | .1 | Submit in accordance with Section 01 78 00 - Closeout Submittals. |
| | .2 | Operation and Maintenance Data: submit operation and maintenance data for dry type transformers for incorporation into manual. |
| <u>1.5 DELIVERY, STORAGE AND HANDLING</u> | .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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. |
| | .2 | Store and protect dry type transformers from nicks, scratches, and blemishes. |
| | .3 | Replace defective or damaged materials with new. |

PART 2 - PRODUCTS

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| <u>2.1 DESIGN DESCRIPTION</u> | .1 | Design 1. |
| | .1 | Type: ANN. |
| | .2 | 3 phase, 225 kVA, 480 V input, 600 V output, 60 Hz. |

2.1 DESIGN DESCRIPTION (Cont'd)	.1	(Cont'd)
	.3	Voltage taps: standard.
	.4	Insulation: Class H, 150 degrees C temperature rise.
	.5	Basic Impulse Level (BIL): standard.
	.6	Hipot: standard.
	.7	Average sound level: standard
	.8	Impedance at 17 degrees C: standard
	.9	Enclosure: CSA, removable metal front panel.
	.10	Mounting: floor.
	.11	Finish: in accordance with Section 26 05 00 - Common Work Results for Electrical
	.12	Copper windings.
	.13	Winding configuration to be as noted on drawings.
	.14	Voltage Regulation to be 4% or better.

2.2 EQUIPMENT IDENTIFICATION	.1	Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.
	.2	Label size: 7.

PART 3 - EXECUTION

3.1 INSTALLATION	.1	Mount dry type transformers above 75 kVA on floor.
	.2	Ensure adequate clearance around transformer for ventilation.
	.3	Install transformers in level upright position.
	.4	Remove shipping supports only after transformer is installed and just before putting into service.
	.5	Loosen isolation pad bolts until no compression is visible.
	.6	Make primary and secondary connections in accordance with wiring diagram.
	.7	Energize transformers after installation is complete.
	.8	Make conduit entry into bottom 1/3 of transformer enclosure.

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.

3.3 PROTECTION	.1	Protect installed products and components from damage during construction.
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<u>3.3 PROTECTION</u> <u>(Cont'd)</u>	.2	Repair damage to adjacent materials caused by dry type transformers installation.
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END OF SECTION

PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	26 05 00 - Common Work Results for Electrical.
	.2	Section 26 28 16.02 - Moulded Case Circuit Breakers.
<u>1.2 REFERENCE STANDARDS</u>	.1	CSA International
	.1	CSA C22.2 No. 29-2015, Panelboards and Enclosed Panelboards.
<u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u>	.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 panelboards 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 Ontario, Canada.
	.2	Include on drawings:
<u>1.4 CLOSEOUT SUBMITTALS</u>	.1	Electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.
	.1	Submit in accordance with Section 01 78 00 - Closeout Submittals.
<u>1.5 DELIVERY, STORAGE AND HANDLING</u>	.2	Operation and Maintenance Data: submit operation and maintenance data for panelboards for incorporation into manual.
	.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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
	.2	Store and protect panelboards from nicks, scratches, and blemishes.
	.3	Replace defective or damaged materials with new.

PART 2 - PRODUCTS

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| <u>2.1 PANELBOARDS</u> | .1 | Panelboards: to CSA C22.2 No .29 and product of one manufacturer.
.1 Install circuit breakers in panelboards before shipment.
.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand. |
| | .2 | 600 V panelboards: bus and breakers rated for 10,000 A (symmetrical) interrupting capacity or as indicated. |
| | .3 | Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase. |
| | .4 | Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated. |
| | .5 | Minimum of 2 flush locks for each panel board. |
| | .6 | Two keys for each panelboard and key panelboards alike. |
| | .7 | Copper bus with neutral of same ampere rating of mains. |
| | .8 | Mains: suitable for bolt-on breakers. |
| | .9 | Trim with concealed front bolts and hinges. |
| | .10 | Trim and door finish: baked enamel air dried enamel as per colour schedule. |
| <u>2.2 BREAKERS</u> | .1 | Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers. |
| | .2 | Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise. |
| | .3 | Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker. |
| <u>2.3 EQUIPMENT IDENTIFICATION</u> | .1 | Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical. |
| | .2 | Nameplate for each panelboard size 4 engraved as indicated. |
| | .3 | Complete circuit directory with typewritten legend showing location and load of each circuit, mounted in plastic envelope at inside of panel door. |

PART 3 - EXECUTION

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| <u>3.1 INSTALLATION</u> | .1 | Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces. |
| | .2 | Mount panelboards to height specified in Section 26 05 00 - Common Work Results for Electrical or as indicated. |
| | .3 | Connect input sources to circuits. |
| | .4 | Connect neutral conductors to common neutral bus. |
| <u>3.2 CLEANING</u> | .1 | Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning. |
| | .1 | Leave Work area clean at end of each day. |
| <u>3.3 PROTECTION</u> | .1 | Protect installed products and components from damage during construction. |
| | .2 | Repair damage to adjacent materials caused by panelboards installation. |

END OF SECTION

PART 1 - GENERAL

<u>1.1 REFERENCE STANDARDS</u>	.1	Institute of Electrical and Electronics Engineers (ANSI/IEEE)
	.1	IEEE C37.13-2015, Low Voltage AC Power Circuit Breakers Used in Enclosures.
	.2	CSA International
	.1	CSA C22.2 No. 5-16, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.
<u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u>	.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 air circuit breakers 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 Ontario, Canada.
	.1	Indicate on drawings:
	.1	Time-current phase protection co-ordination characteristic curves for breakers.
<u>1.3 CLOSEOUT SUBMITTALS</u>	.1	Submit in accordance with Section 01 78 00 - Closeout Submittals.
	.2	Operation and Maintenance Data: submit operation and maintenance data for air circuit breakers for incorporation into manual.
<u>1.4 DELIVERY, STORAGE AND HANDLING</u>	.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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
	.2	Store and protect air circuit breakers from nicks, scratches, and blemishes.
	.3	Replace defective or damaged materials with new.

PART 2 - PRODUCTS

<u>2.1 AIR CIRCUIT BREAKER</u>	.1	Air circuit breaker: to IEEE C37.13 and CSA C22.2 No. 5.
	.2	Draw outtype, 600 V class.
	.1	Continuous current rating: 1600 A.
	.2	Trip rating: 300 A.
	.3	Interrupting rating: 42 kA, RMS symmetrical.
	.3	Solid-state tripping system consisting of 1 current sensor per pole, 1 solid-state trip unit and self-powered trip actuator. Equipped with long short instantaneous ground fault function and phase overload short circuit and ground fault indication.
	.4	Breakers with normal stored energy, closing mechanism to provide quick-make operation.
	.5	Breakers with on-off indicator and spring charged/discharged indicator.
<u>2.2 OPTIONAL FEATURES</u>	.6	Interlocks to prevent circuit breaker drawout when in closed position and to prevent closing unless fully engaged or in test position.
	.7	Suitable for installation in existing Westinghouse switchgear with Model DS416, serial 86B0840-1B, 125A DC air circuit breaker unit.
	.1	Shunt trip.
	.2	Auxiliary switches: 2 N.O., 2 N.C.
	.3	Undervoltage tripping device with instantaneous time delay.
	.4	Alarm switch.
	.5	Pilot light.
	.6	Control switch.
	.7	Lockout devices.
	.8	Padlocking provision.
	.9	Operation counter.

PART 3 - EXECUTION

<u>3.1 EXAMINATION</u>	.1	Verify existing switchgear and air circuit breakers on site prior to ordering.
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3.2 INSTALLATION .1 Install air circuit breakers as indicated. Coordinate shutdown of switchboard 7 days in advance and perform work to install and connect new breaker on weekend.

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.

END OF SECTION

PART 1 - GENERAL

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| 1.1 REFERENCE
STANDARDS | .1 | CSA International |
| | .1 | CSA C22.2 No. 5-16, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures. |
| 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 circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations. |
| | .3 | Include time-current characteristic curves for breakers with ampacity of 250 A and over or with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage. |
| | .4 | Certificates: |
| | .1 | Prior to installation of circuit breakers in either new or existing installation, Contractor must submit 3 copies of a production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations. |
| | .1 | Production certificate of origin must be submitted to Departmental Representative for approval. |
| | .2 | Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation. |
| | .3 | Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense. |
| | .4 | Production certificate of origin must contain: |
| | .1 | Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate. |
| | .2 | Licensed dealer's name and address and person of distributor responsible for Contractor's account. |
| | .3 | Contractor's name and address and person responsible for project. |
| | .4 | Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate. |
| | .5 | Name and address of building where circuit breakers will be installed: |

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 Storage and Handling Requirements:
 - .1 Store circuit breakers indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect circuit breakers from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 BREAKERS
GENERAL

- .1 Moulded-case circuit breakers, circuit breakers, and accessory high-fault protectors: to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .5 Circuit breakers with interchangeable trips as indicated.
- .6 Circuit breakers to have minimum 10,000 A symmetrical rms interrupting capacity rating.

2.2 THERMAL
MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 SOLID STATE
TRIP BREAKERS

- .1 Moulded case circuit breaker to operate by means of solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time short time instantaneous tripping for phase ground fault short circuit protection.

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| 2.4 OPTIONAL
FEATURES | .1 | Include: |
| | .1 | Shunt trip. |
| | .2 | Auxiliary switch. |
| | .3 | Motor-operated mechanism c/w time delay unit. |
| | .4 | Under-voltage release. |
| | .5 | On-off locking device. |
| | .6 | Handle mechanism. |

PART 3 - EXECUTION

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| 3.1 INSTALLATION | .1 | Install circuit breakers as indicated. |
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| 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. |

PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 26 28 13.01 - Fuses - Low Voltage. |
| <u>1.2 REFERENCE STANDARDS</u> | .1 | CSA Group |
| | .1 | CSA CAN/C22.2 No. 4 -16, Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98). |
| | .2 | CSA C22.2 No. 39-13, Fuseholder Assemblies. |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .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 disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations. |
| <u>1.4 DELIVERY, STORAGE AND HANDLING</u> | .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 indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. |
| | .2 | Store and protect disconnect switches - fused and non-fused from nicks, scratches, and blemishes. |
| | .3 | Replace defective or damaged materials with new. |

PART 2 - PRODUCTS

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| <u>2.1 DISCONNECT SWITCHES</u> | .1 | Fusible, non-fusible,disconnect switch in CSA enclosure 1, to CSA C22.2 No. 4 size as indicated. |
| | .2 | Provision for padlocking in on-off switch position by 3 locks. |
| | .3 | Mechanically interlocked door to prevent opening when handle in ON position. |

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| 2.1 DISCONNECT SWITCHES
(Cont'd) | .4 | Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage. |
| | .5 | Fuseholders: to CSA C22.2 No. 39 suitable without adaptors, for type and size of fuse indicated. |
| | .6 | Quick-make, quick-break action. |
| | .7 | ON-OFF switch position indication on switch enclosure cover. |
| 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

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| 3.1 INSTALLATION | .1 | Install disconnect switches complete with fuses as indicated. |
| 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. |

END OF SECTION

PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 26 05 00 - Common Work Results for Electrical.
<u>1.2 REFERENCE STANDARDS</u>	.1	Ontario Regulation
	.1	ONTARIO OBC-2012, 2012 Ontario Building Code Compendium.
<u>1.3 DESCRIPTION OF SYSTEM</u>	.1	The solar array system consisting of approx. 615 x 340W solar PV panels as indicated. PV panels shall be connected to 480V 3 phase inverters complete with anti islanding relay. Roof mounted arrays as specified shall be designed, manufactured, shipped, installed, adjusted, fully commissioned.
<u>1.4 SHOP DRAWINGS</u>	.1	Submit in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Product Data:
	.1	Submit shop drawings for all solar array components and the complete assembly.
	.2	Submit drawings showing complete layout based on verified field dimensions, dimensional relationships to adjoining work and applied roofing requirements.
<u>1.5 GUARANTEE</u>	.1	Solar PV panels shall be guaranteed for a period of 25 years against defects due to faulty materials and/or workmanship from the date of Certificate of Substantial Performance.
	.2	Inverters shall be guaranteed for a period of 15 years against defects due to faulty materials and/or workmanship from the date of Certificate of Substantial Performance.
	.3	Racking support system shall be guaranteed for a period of 10 years against defects due to faulty materials and/or workmanship from the date of Certificate of Substantial Performance.
	.4	Repair and/or replace when so directed by the Engineer within the aid periods any and all portions of work which fail to perform according to the requirements of these specifications.
<u>1.6 ENGINEERING DESIGN</u>	.1	All structural components and aspects of the solar arrays shall be designed by a professional structural engineer registered in the Province of Ontario.

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| 1.6 ENGINEERING DESIGN
(Cont'd) | .2 | All shop drawings shall bear the stamp of the professional structural engineer retained by the Contractor. |
| | .3 | The structural design of the solar arrays shall include the examination of and the design for the seismic restraint requirements as mandated by the Ontario Building Code for all aspects of the arrays including electrical and mechanical components. |
| | .4 | The structural engineer shall carry out field reviews of the solar array installation and all the components. A written report of the observations made shall be provided and a copy of the report or reports shall be submitted to the Architect. |
| | .5 | The structural engineer shall provide a final report confirming conformance of the completed installation with the structural engineering design. The final report shall be stamped and signed by the structural engineer. |

PART 2 - PRODUCTS

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| 2.1 PHOTOVOLTAIC SOLAR MODULES | .1 | Anodized aluminum frame large format solar module, 2 m high, 1 m wide and maximum weight of 24 kg. 3 mm thick front glass panel with anti-reflection technology. Composite film back cover. |
| | .2 | Minimum output 340W, 9A at 48V, 73 cell, 17% efficiency, c/w junction box and 47" DC solar cable and junction box, protection class IP67 with bypass diodes. |
| | .3 | Ballasted mounting rack structure for PV modules consisting of anodized aluminum rails, concrete block ballast with embedded fittings, stainless steel hardware and grounding lugs. Bonding type hardware, fittings and joiners. Tilt angle for PV modules to be 10°. |

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| 2.2 INVERTER MODULES | .1 | Commercial grade 24 kW, 480V 3 phase output inverter module. CSA certified. |
| | .2 | Transformer-less lightweight design, maximum 45 kg. |
| | .3 | Suitable for vertical or horizontal mounting, operating temperature without derating from -40°C to 55°C, NEMA 4X enclosure. |
| | .4 | Mounting rack similar to PV module mounting structure. |

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| 2.3 ACCESSORIES | .1 | Roof membrane protection pads for placement under concrete blocks. |
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<u>2.3 ACCESSORIES</u> (Cont'd)	.2	Warning signage vertical posts of same material as rack structure at ends of module strings where indicated.
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<u>2.4 ONTARIO DOMESTIC CONTENT</u>	.1	Refer to Ontario Power Authority Table 2 for domestic content requirements. Supporting evidence must be submitted to demonstrate that a target of 60% or greater was achieved.
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PART 3 - EXECUTION

<u>3.1 INSPECTION</u>	.1	Inspect the relevant aspects of the receiving structure on the building. Coordinate with new roofing installation.
	.2	Provide written notice to the Engineer and Contractor of any deviations from workable tolerances. Do not proceed until these conditions are made good.
	.3	Carry out all appropriate field measurements before manufacturing any components or assemblies.

<u>3.2 INSTALLATION</u>	.1	Install all components of the solar array system including PV panels, inverters & racking structure where indicated, as a ballasted system and accordance with local inspection authority. Provide protection pads under concrete blocks.
	.2	Run DC cables on racking system & on surface of roof ballast neatly bundled & tie wrapped, parallel with building lines. Protect cables during installation. Connect to inverters.
	.3	Run AC cables from inverters to building penetrations, surface on roof ballast, parallel to building lines. Cables to be run individually through walls where indicated.
	.4	Seal around individual cables penetrating walls with waterproof mastic sealant.
	.5	Bond all racking associated with specific inverters together with #6 AWG copper with homeruns to ground bar in main electrical room.
	.6	Run AC cables to new PV panel in Main Electrical Room neatly & parallel to building lines. Cut openings in block walls and seal with fire stop caulking.
	.7	Install vertical warning sign posts and supporting hardware connected to support PV structure. Chains and signage to be installed by architectural trades.

<u>3.3 ADJUSTING AND COMMISSIONING</u>	.1	Adjust all components of the solar system to ensure optimum performance.
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END OF SECTION