Part 1 General

1.1 Objective

.1 Work under this contract is to replace the existing built-up roof assemblies at roof sections 0.1, 0.2, 0.3, 1.2A, 1.2B, 2.1, 2.2A, 2.3 and 3.1 and complete maintenance repairs at roof section 1.1, as recommended on page 51 of the IRC report included in Section 00 31 00, at the Canada Centre for Inland Waters Water Treatment Centre Building, located at 867 Lakeshore Road, Burlington.

.2 The completed work shall provide a durable, water and air tight assembly with continuous thermal insulation and adequate rain water drainage.

.3 The site will be available for construction as per approved schedule between Contractor and Departmental Representative.

1.2 Existing Roof Assemblies

.1 Test cuts have found the existing roofing system to consist of (from the bottom-up):

.1 Roof Sections 1.2A, 1.2B and 3.1:

.1 Metal Deck (some areas with concrete deck as shown on drawings)
.2 Gypsum Board
.3 2-ply Asphalt Felt Vapour Retarder
.4 2.0” Polyisocyanurate insulation
.5 0.5” Perlite Insulation
.6 2-Ply Modified Bitumen Membrane with Granule Surfacing

.2 Roof Sections 2.1, 2.2A and 2.3:

.1 Concrete Deck
.2 2-ply Asphalt Felt Vapour Retarder
.3 2.0” Polyisocyanurate insulation
.4 0.5” Fibreboard Insulation
.5 2-Ply Modified Bitumen Membrane with Granule Surfacing.

.2 Note that it is the Contractor’s responsibility to confirm findings prior to bid submittal.

Part 2 Roof Replacement

2.1 General

.1 All roof system materials to be from approved roof system manufacturer for project, or from other manufacturers as approved in writing by approved roof system manufacturer at time of submittal.

.2 Flashing details to the more stringent of the manufacturer’s requirements or as detailed within.

.3 Departmental Representative to choose colour of granules, sealants, metal flashing, etc., from Contractor supplied samples of Manufacturers’ standard colours.

2.2 Preparation for Replacement

.1 Remove existing roof components to expose existing structural deck and vertical substrate surfaces. On concrete decks, sound vapour retarder which is found to be well adhered to the structural roof deck may remain, only upon the Consultant's approval.

.2 Remove damaged or deteriorated woodwork and replace with new materials to match existing.

.3 Install vertical detail overlay board as required by membrane manufacturer and as specified and drawn herein.

.4 Construct a new control joint between roof sections 1.2A and 1.2B.

.5 Refer to roof plan RP2 (note 1) for locations of new and existing scuppers. Two (2) new scupper locations to be added at Roof Sections 1.2B & 3.1.

.6 At all existing scupper locations: Remove existing thru-wall scuppers and pipes and close and seal wall openings. Cut out section of parapet to accommodate new open scupper design. Refer to detail R1-5C.

.7 Roof Section 2.2A skylight to be removed and curb capped over. Refer to Roof Plans and Details.

.8 Existing ducts and louvres to be temporarily removed to accommodate installation of new roof. Modify the opening in accordance with the Mechanical sections.

.9 Verify that all surfaces are prepared and acceptable to receive new material installation, as per manufacturer's written instructions.

2.3 New Roof Assembly R1

.1 Applies to Roof Sections 1.2A, 1.2B, 0.1, 0.2 and 0.3.

.2 Install the following new components, from the bottom up:

.1 **Underlay Board**: 13mm (0.5") thick siliconized gypsum board with fibreglass mat facer.

.2 **Vapour Retarder:** Self-adhered modified bitumen membrane.

.3 **Base Insulation:** 64mm (2.5") polyisocyanurate.

.4 **Tapered Insulation:**

.1 Fully Tapered Polyisocyanurate: As per roof plan drawings, 1% slope to drain, 13mm (0.5") thickness at drains.

.2 Crickets: Polyisocyanurate, 4% slope behind rooftop equipment to suit site conditions.

.5 **Overlay Board:** 6mm (0.25") asphaltic protection board.

.6 **Roof Membrane and Membrane Flashings:**

.1 2-ply SBS modified bitumen membrane.

.1 Field base sheet layer torched in place.

.2 Self-adhered base flashings.

.3 Cap sheet field layer and flashings torched in place.

.3 Applies to Roof Sections 2.2A & 3.1.

.1 All components of this assembly are the same as New Roof Assembly R1, except:

.1 **Base Insulation:** 38mm (1.5") polyisocyanurate.

2.4 New Roof Assembly R3

.1 Applies to Roof Sections 2.1 & 2.3.

.1 All components of this assembly are the same as New Roof Assembly R1, except:

.1 **Underlay Board**: 6mm (0.25") asphaltic protection board.

.2 **Base Insulation:** Two (2) layers of 64mm (2.5") polyisocyanurate (total thickness of base insulation: 128mm (5")).

2.5 Wind Uplift System Performance

.1 Roof system to be adhered with cold applied adhesive(s) as per roof system manufacturer's recommendations, to meet the following minimum wind uplift criteria:

.1 Field of roof: - 1.1kPa (-24 psf)

.2 Edge of roof (3m from edge): - 1.6kPa (-33psf)

.3 Corner of roof (3m in each direction): -3.4kPa (-71psf)

2.6 Walkways

.1 Supply and install membrane walkways (granulated modified bitumen membrane, contrasting colour from field membrane) from roof access locations to serviceable units (surround units). Leave 25mm (1.0") gap between walkway runs with maximum 3000mm (10') runs and at changes in direction. Fully adhere or bond membrane walkway to cap sheet membrane.

2.7 Metal Flashing

.1 Install new pre-finished galvanized sheet metal cap flashings to conceal and protect membrane flashings per details and Section 07 62 00.02 – Sheet Metal Flashing and Trim.

2.8 Roof Perimeter Guard

.1 Supply and install a new metal roof perimeter guard, about 18.3m (60ft) long, along the south parapet of roof section 3.1 on either side of the roof access ladder. Provide engineer stamped shop drawings for the new railing, including securement details to the building structure. New guard shall comply with applicable Ontario Building Code, OH&SA and TSSA requirements.

2.9 Disposal of Materials

.1 Dispose of any excess existing materials to approved disposal sites. Provide disposal site confirmation of receipt of materials. Separate recyclable materials during removal work and bring them to approved sites. Provide copies of receipts from recycling site, including items and weights to the Departmental Representative.

2.10 Drainage

.1 Prior to carrying out the roofing work, verify existing drainage flow, securement of drains in place and connection to existing plumbing, and notify the Departmental Representative and Consultant of any blockage, loose or damaged drain connections or supports.

.2 Replace existing scuppers and provide new roof scuppers at locations indicated on the Roof Plan Drawings. Include downspouts fastened to the exterior building wall and a concrete splash pad at the point of discharge.

2.11 Roof System Detailing

.1 Refer to Roof Plans and Detail Drawings herein, and comply with manufacturer's written requirements.

.2 At structural column penetrations (Roof Section 3.1), flash with PMMA liquid applied membrane flashing.

.3 At canopies 0.1, 0.2 and 0.3, roof assemblies to be replaced with similar detailing to Roof Section 1.2A.

.4 Mechanical Curbs and Sleepers:

.1 Where mechanical units are on roof curbs that will have less than 300mm (12") clearance above the newly completed roof surface, lift mechanical equipment to facilitate the curb build-up and membrane flashings, both membrane and metal, up and over mechanical curbs.

.5 Mechanical Ductwork:

.1 Modify the ductwork leg supports and ductwork roof penetrations to accommodate the new roof assembly thickness.

.6 Mechanical Wall Intake Louvres:

.1 Remove louvres to facilitate re-roofing. Modify the wall opening and ductwork in order to raise and reinstall the louvre 300mm (12") above the surface of the new roof.

.7 Electrical:

.1 Remove and reinstate the existing electrical components following installation of the new roof assembly.

.8 Woodwork:

.1 Leave existing wood blocking/woodwork in place that is in sound condition. Replace damaged/deteriorated woodwork.

.2 Supply and install new woodwork to raise perimeters, curbs etc. to meet height requirements as detailed to achieve a minimum height of 200mm (8") above the new finished roof surface.

2.12 OTHER MINOR REPAIRS

.1 **Concealed Repairs:** Complete minor repairs to address unanticipated conditions as found to be necessary and as directed by Consultant in writing. Payment for this work to

be from a Cash Allowance on basis of time and materials or quoted fixed price, as agreed prior to the work proceeding.

.2 **Debris Removal:** Remove existing and roofing generated debris from the roof and dispose from site.

.3 **Painting:** Clean gas line of roofing contaminants and apply two coats of finish paint at gas line using yellow rust inhibiting exterior grade paint.

.4 **Abandoned Roof Equipment:** Unused roof penetrations and curbs identified by the Departmental Representative to be removed and deck in-filled as follows:

.1 At openings less than 500mm (20") in diameter use metal closure. At openings greater than 500mm (20") in diameter, close deck with new galvanized sheet steel closure of gauge and profile matching existing deck. Secure each end of new steel closure into closest steel framing below with minimum of one #12 sheet metal screw per flute (as per Section 07 62 00.03).

.2 Paint sheet steel that will be exposed to interior to match existing ceiling colour as agreed with the Departmental Representative.

.5 **Conduit Supports:** Secure existing conduits to premanufactured pipe supports. Alternately, secure conduits over new pressure treated wood sleeper with galvanized clamps at a minimum 1200mm (48") on centre, and use a compatible adhesive to adhere layer of 25mm (1") thick extruded polystyrene insulation to the wood blocking.

.6 **Cable Tray:** support cable tray on wood blocking secured to a concrete paver on 25mm (1") extruded polystyrene insulation.

.7 **Gas Pipe Supports:** Secure existing gas line to premanufactured pipe supports.

.8 **Steel Deck Corrosion Repairs:** Where directed by the Consultant, clean steel deck free of corrosion products and coat with a rust inhibiting paint. Notify the Consultant where existing steel deck is unsound. Where directed, replace steel decking with new to match gauge, profile and securement. Secure each end of new steel decking into closes steel framing below with minimum of one #12 sheet metal screw per flute.

.9 **Roof Maintenance Repairs:** At Roof Section 1.1, provide a three (3) person maintenance crew, complete with all equipment and materials, to perform miscellaneous roof repairs where directed on site by the Consultant. Include for one, eight (8) hour work day to include all overhead, profit, travel and expenditure. Typical maintenance type repairs include, but are not necessarily limited to, those identified in: Roof Condition Assessment Report, prepared by IRC Building Sciences Group, dated August 10, 2016.

2.13 INTERIOR PROTECTION

.1 Follow Section 01 35 13.04 – Interior Protection Protocol.

.2 Confirm interior protection requirements with the Departmental Representative.

.3 Overnight security, during tarping work, to be coordinated by a security contractor approved by the Departmental Representative.

.4 Carry cost for security contractor and all other costs related to security during tarping work.

.5 Where deck is exposed in larger areas, and where impact to overall tenant activities is identified, provide permanent interior protection for duration of project, and remove at

end of project. Installation of tarps to be coordinated with Departmental Representative and tenant in space after hours, and removal at end of project before tenant opens for business.

2.14 WARRANTIES

.1 Refer to section 07 53 00 – Modified Bituminous Membrane Roofing.

Part 3 Products

3.1 NOT USED

.1 Not used.

Part 4 Execution

4.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 53.01 Rough Carpentry for Roofing

.2 Section 07 52 16 Modified Bituminous Membrane Roofing

.3 Section 20 05 05 Mechanical Work General Instructions

.4 Section 20 05 10 Basic Mechanical Materials and Methods

.5 Section 20 05 25 Mechanical Insulation

.6 Section 20 05 35 Demolition and Revision Work

.7 Section 23 11 23 Natural Gas Piping System

.8 Section 23 30 00 HVAC Air Distribution

.9 Section 26 05 00 Common Work Results for Electrical

.10 Section 26 05 05 Selective Demolition for Electrical

.11 Section 26 05 21 Wires and Cables (0-1000 V)

.12 Section 26 05 22 Connectors and Terminations

.13 Section 26 05 29 Hangers and Supports for Electrical Systems

.14 Section 26 05 31 Splitters, Junction, Pull Boxes and Cabinets

.15 Section 26 05 32 Outlet Boxes, Conduit Boxes and Fittings

.16 Section 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings

.17 Section 26 05 36 Cable Trays for Electrical Systems

.18 Section 26 27 26 Wiring Devices

.19 Section 26 28 20 Ground Fault Circuit Interrupters

.20 Section 28 46 00 Fire Detection and Alarm

1.2 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 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 Contractor shall provide and maintain temporary sanitary facilities for their own use for the project duration. Keep facilities clean.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.5 EXISTING SERVICES

.1 Notify, Departmental Representative of intended interruption of services and durations 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 Access into and out of the building shall not be restricted by the work. Provide temporary protections where required to maintain building access.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

1.7 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 Obtain requisite clearance, as instructed, for each individual required to enter premises.

.3 Site Access: Normal working hours 7.00am to 6.00pm.

.1 Contractor superintendent shall be present at all times during construction, escort individuals to site and be responsible for all employees’ access. Contractor superintendent will be provided with an access card after reliability check performed by PWGSC/EC. All contractor employees shall sign-in and out daily at security desk.

.2 Contractor may work after hours only with pre-arrangement with Departmental Representative. Owners site representative will be required and security deployed for all after hours work.

1.8 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.

END OF SECTION

Part 1 General

1.1 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.7 Prepare schedule jointly with Departmental Representative, Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.8 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 Section 07 52 16 include allowance of $ 5,000 for purchase and installation of materials at localized repair areas on roof section 1.1, as identified by the Consultant.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 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 four days in advance of meeting date to Consultant and 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 meeting participants, Departmental Representative, affected parties not in attendance, and Consultant.

.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 Consultant, Departmental Representative, Contractor, major Subcontractors, roofing materials manufacturer representative, tapered insulation manufacturer representative, 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 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Delivery schedule of equipment and materials.

.6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.8 Owner provided products.

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work, Consultant and Departmental Representative are to be in attendance.

.3 Notify parties minimum five days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 06 10 53.01	Rough Carpentry for Roofing
.2	Section 07 52 16	Modified Bituminous Membrane Roofing
.3	Section 07 62 00.03	Sheet Metal Flashing and Trim for Roofing
.4	Section 07 92 13.01	Elastomeric Joint Sealants for Roofing
.5	Section 20 05 05	Mechanical Work General Instructions
.6	Section 20 05 10	Basic Mechanical Materials and Methods
.7	Section 20 05 25	Mechanical Insulation
.8	Section 20 05 35	Demolition and Revision Work
.9	Section 23 11 23	Natural Gas Piping System
.10	Section 23 30 00	HVAC Air Distribution
.11	Section 26 05 00	Common Work Results for Electrical
.12	Section 26 05 05	Selective Demolition for Electrical
.13	Section 26 05 21	Wires and Cables (0-1000 V)
.14	Section 26 05 22	Connectors and Terminations
.15	Section 26 05 29	Hangers and Supports for Electrical Systems
.16	Section 26 05 31	Splitters, Junction, Pull Boxes and Cabinets
.17	Section 26 05 32	Outlet Boxes, Conduit Boxes and Fittings
.18	Section 26 05 34	Conduits, Conduit Fastenings and Conduit Fittings
.19	Section 26 05 36	Cable Trays for Electrical Systems
.20	Section 26 27 26	Wiring Devices
.21	Section 26 28 20	Ground Fault Circuit Interrupters
.22	Section 28 46 00	Fire Detection and Alarm

1.2 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.

1.3 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, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.5 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.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum activity types as follows:

.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Roof Replacement, up to Finished Membrane, for Each Roof Section.
.6 Sheet Metal Installation.
.7 Electrical Shut Downs.
.8 Mechanical Shut Downs.
.9 Close-out.

1.7 CT SCHEDULE REPORTING

.1 Update Project Schedule on a bi-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.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, 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.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Submit to Consultant and 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 Consultant and 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 Consultant and 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 Consultant's or Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant or Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been 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 days for Consultant and Departmental Representative review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative or Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative and Consultant prior to proceeding with Work.

.6 Make changes in shop drawings as Consultant or Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative and Consultant in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.9 After Consultant's and Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant or Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant or Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant or 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.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant or 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.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Consultant or 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.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant or Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 If upon review by Departmental Representative and Consultant, no errors or omissions are discovered or if only minor corrections are made, an electronic copy 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.

.21 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 and Consultant 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 and Consultant 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 01 45 00 - Quality Control.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution prior to mobilization and as directed by Departmental Representative or Consultant.

.2 Project identification: name and number of project and date of exposure indicated.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 The following protocol is to draw attention to safety requirements when doing roof work over occupied space. As work is proceeding over occupied spaces, the roofing contractor ("Contractor") has the responsibility of protecting the interior occupants and spaces.

.2 It is to be reviewed and signed by the Contractor's employee(s) that will be:

.1 On site full-time during the course or work;

.2 Responsible for the implementation of all safety measures in order to fulfill the Contractor's obligations with regards to site safety.

1.2 SPECIFICATION REFERENCES

.1 Specific requirements for re-roofing can be found in the following sections:

.1 01 00 00 General Requirements

.2 01 21 13 Instructions to Bidders

.3 01 35 13.03 Special Project Procedures – Re-Roofing

.4 02 41 13.01 Preparation for Re-Roofing

.2 Additional requirements may be described in Section 01 11 01 – Scope of Work

Part 2 Protocol

2.1 CONTRACTOR RESPONSIBILITIES DURING THE BID PROCESS:

.1 Review all interior spaces and conditions affected by the work overhead, including all interior locations of roof travel and areas of roof replacement work.

.2 Determine all ceiling types within the areas.

2.2 CONTRACTOR RESPONSIBILITIES PRIOR TO PROJECT START UP AND PRE-CONSTRUCTION MEETING:

.1 Similar to Bid process, complete a review of all interior spaces and conditions affected by the work overhead, including all interior locations of roof travel and areas of roof replacement work.

.2 Determine all ceiling types within the areas, and securement of all interior items (ceilings, lighting, etc.).

.3 Determine and document any critical items that could be affected by the overhead work, and propose measures to protect such items.

.4 Identify the type of interior protection to be installed and phases of installation and removals, specifically at locations of exposed decks (tarps over interior furnishings at different locations during the work, or more permanent tarps at upper areas underside decks and above sprinklers). Clear tarps only to be installed, for the benefit of fire watch and hazard assessment.

.5 Discuss the process needed to notify tenants of the work, and of phases of interior protection work (normal work hours, after hours, etc.) and related security / access needs.

.6 Discuss the processes for emergency response to interior damage.

.7 Provide written plan outlining the protective measures that will be taken, as well as emergency response procedure associated with interior space

2.3 ROOFTOP AND INTERIOR MEASURES TO TAKE TO AVOID INTERIOR DAMAGE:

.1 Any openings are to be temporarily closed in with fire retardant batt insulation, with additional sealant to prevent fumes / liquids to enter the building.

.2 All debris is to be cleaned up on an ongoing basis from exposed deck surfaces.

.3 Air intakes are to be temporarily shut down and sealed to prevent fumes from entering the building. Note that some equipment may need to be operational at all times, and discussions on measures to take to deflect / dampen fumes are to be discussed and resolved prior to project start up.

.4 Assign a worker to enter the premises, with the assistance of Departmental Representative, to inspect the interior at times during the roof removal processes.

.5 Temporarily cordon off interior spaces where roof removal operation is proceeding and remove immediately upon completion of the phase of removal work.

2.4 EMERGENCY RESPONSE TO INTERIOR DAMAGE:

.1 If damage to interior property occurs, the roofing contractor is to immediately address the damage, temporarily seal off the area from access, and notify the Departmental Representative and Consultant of the situation.

.2 In the event of a spill/leak, clean-up to proceed only with pre-approved cleaning agents, that will not pose a health and safety issue for the occupants. Cleaning to be performed in the presence of Departmental Representative.

.3 Cleanup products to be used shall be listed at time of pre-construction, with associated MSDS sheets. All listed and approved cleaning products must be available on site before work begins.

2.5 INTERIOR DAMAGE THAT RESULT IN STOPPING THE WORK:

.1 Any damage that poses a life safety issue to the occupants / workers is deemed sufficient to stop the work.

.2 The Departmental Representative and Consultant are to be notified immediately upon such damage, and Contractor is to comply with directives given by Departmental Representative. The contractor is responsible to notify all other authorities having jurisdiction as part of their professional obligations.

.3 Resumption of roof work activities cannot proceed until the Departmental Representative and Consultant are satisfied that the interior spaces are safe to occupy, as well as authorities having jurisdiction.

.4 Any associated costs of cleanup, Contractor time loss, tenant or client material losses and time loss, etc., will be the responsibility of the Contractor

Part 3 Execution

.1 MANUFACTURER'S INSTRUCTIONS

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

.2 INSTALLATION

.1 Install sheet metal work as detailed and in accordance with CRCA FL series details.

.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”).

.2 Provide self-adhesive membrane to tie into adjacent assemblies.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.

.1 Flash joints using S-lock seams forming tight fit over hook strips, as detailed.

.5 Lock end joints and caulk with sealant.

.6 Insert metal flashing under cap flashing and into reglets to form weather tight junction.

.7 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm (1”). Lead wedge flashing securely into joint.

.8 Caulk flashing at reglet with sealant.

.9 Install pans, where shown around items projecting through roof membrane.

.10 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.

.11 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

.3 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at minimum 750 mm (29”) on centre with eaves trough spikes through spacer ferrules.

.1 Slope eaves troughs to downpipes as indicated.

.2 Solder joints watertight.

.2 Install downpipes and provide goosenecks back to wall.

.1 Secure downpipes to wall with straps at minimum 1800 mm (70”) on centre; minimum two straps per downpipe.

.2 Connect downpipes to drainage system (where existing) and seal joint with plastic cement.

.3 Install splash pans as indicated.

.4 SCUPPERS

.1 Install scuppers as indicated.

.5 CLEANING

.1 Proceed in accordance with Section 01 00 00 General Requirements, Part 11 Cleaning.

.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.

3.2 CONTRACTOR ACKNOWLEDGMENT:

	PRINT NAME	SIGNATURE	DATE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canada Centre for Inland Waters.

.1 Building and Property Technical Services (BPTS) – Lock Out Tag Out (LOTO) Reference.

.2 Canadian Standards Association (CSA): Canada

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Building Code 2010 (NBC):

.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.4 National Fire Code 2010 (NFC):

.1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.5 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.6 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2005.

.2 Workplace Safety and Insurance Act, 1997.

.3 Municipal statutes and authorities.

.7 Treasury Board of Canada Secretariat (TBS):

.1 Treasury Board, Fire Protection Standard April 1, 2010, https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.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.

.4 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 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.

.1 Emergency and Fire Evacuation Route: The Contractor shall obtain training on procedures of evacuating the site under emergency and/or fire situations. Contractor training and sign-off is required prior to initiating site work.

.5 Contractor's and Sub-contractors' Safety Communication Plan.

.6 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.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 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.

.4 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.

.5 Submit names of personnel and alternates responsible for site safety and health.

.6 Submit records of Contractor's Health and Safety meetings when requested.

.7 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, bi-weekly.

.8 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.9 Submit copies of incident and accident reports.

.10 Submit Material Safety Data Sheets (MSDS).

.11 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 beginning of Work.

1.4 WORK PERMITS

.1 Obtain building permits related to project prior to commencement of Work.

.2 Worker Profile Sheet: The Contractor shall submit to the Departmental Representative a completed Worker Profile Sheet complete with all attachments including copies of licenses, certificates and permits for supporting qualifications to perform required work for a given project for each individual worker requiring access to the site. The completed Worker Profile Sheets are required for each individual worker prior to working on site.

.3 Hot Work Permit: The Contractor shall submit a completed Hot Work Permit to the Departmental Representative for review and approval. The Departmental Representative’s approval is required prior to initiating hot work.

.4 Lock Out and Tag Out (LOTO) – Isolation Procedures: The Contractor shall submit a completed LOTO Isolation Form (Zero Energy) to the Departmental Representative for review and approval for all work requiring LOTO. The Departmental Representative's approval of isolation form is required prior to initiating LOTO work.

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

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.

1.9 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 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

.3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province of Ontario and advise Departmental Representative verbally and in writing.

.2 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in accordance with Acts and Regulations of the Province of Ontario and advise Departmental Representative verbally and in writing.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province of Ontario, and in consultation with Departmental Representative.

1.13 CORRECTION OF NON-COMPLIANCE

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

.2 Provide [Consultant] [DCC Representative] [Departmental Representative] with written report of action taken to correct non-compliance of health and safety issues identified.

.3 [DCC Representative] [Departmental Representative] [Consultant] may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 BLASTING

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

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2010, National Fire Code of Canada (NFC) 2010 and Ontario Building Code (OBC) 2016, including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.

.2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code

.1 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.

1.4 BUILDING SMOKING ENVIRONMENT

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

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Except as otherwise specified, [Constructor] will apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:

.1 Regulatory requirements and fees in force on date of Bid submission, and

.2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 06 10 53.01	Rough Carpentry for Roofing
.2	Section 07 52 16	Modified Bituminous Membrane Roofing
.3	Section 07 62 00.03	Sheet Metal Flashing and Trim for Roofing
.4	Section 07 92 13.01	Elastomeric Joint Sealants for Roofing
.5	Section 20 05 05	Mechanical Work General Instructions
.6	Section 20 05 10	Basic Mechanical Materials and Methods
.7	Section 20 05 25	Mechanical Insulation
.8	Section 20 05 35	Demolition and Revision Work
.9	Section 23 11 23	Natural Gas Piping System
.10	Section 23 30 00	HVAC Air Distribution
.11	Section 26 05 00	Common Work Results for Electrical
.12	Section 26 05 05	Selective Demolition for Electrical
.13	Section 26 05 21	Wires and Cables (0-1000 V)
.14	Section 26 05 22	Connectors and Terminations
.15	Section 26 05 29	Hangers and Supports for Electrical Systems
.16	Section 26 05 31	Splitters, Junction, Pull Boxes and Cabinets
.17	Section 26 05 32	Outlet Boxes, Conduit Boxes and Fittings
.18	Section 26 05 34	Conduits, Conduit Fastenings and Conduit Fittings
.19	Section 26 05 36	Cable Trays for Electrical Systems
.20	Section 26 27 26	Wiring Devices
.21	Section 26 28 20	Ground Fault Circuit Interrupters
.22	Section 28 46 00	Fire Detection and Alarm

1.2 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-94, Stipulated Price Contract.

1.3 INSPECTION

.1 Allow Departmental Representative and Consultant 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 or Consultant 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 or Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.4 ACCESS TO WORK

.1 Allow access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant or Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative and Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Mock-ups may remain as part of Work.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.2 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, temporary stairs, and/or ladders to access roof areas.

1.3 HOISTING

.1 Provide, operate and maintain hoists [cranes] required for moving of materials and equipment.

.2 Hoists to be operated by qualified operator.

1.4 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.5 CONSTRUCTION PARKING

.1 Parking will be permitted on site at areas designated by the Departmental Representative.

.2 Provide and maintain adequate access to project site.

.3 Clean runways and taxi areas where used by Contractor's equipment.

1.6 SECURITY

.1 Contractor is responsible for securing the work area and exterior roof access set-up by the Contractor for purposes of this work.

1.7 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

.3 Roof materials stored outside shall be covered with tarps to protect from weather.

1.8 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.9 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.

.2 Construction sign 1200 x 2400mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, name of Owner, Consultant, Departmental Representative and Contractor, of design style established by the Departmental Representative.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Locate project identification sign where indicated by the Departmental Representative and construct as follows:

.1 Build concrete foundation, erect framework, and attach signboard to framing.

.2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.

.3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

.6 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

.7 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.8 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.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.2 Protect travelling public from damage to person and property.

.3 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.4 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.5 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

1.11 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.2 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around roof openings or roof penetrations.

.2 Provide as required by governing authorities.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished areas of work.

.2 Design enclosures to withstand wind pressure and snow loading, if applicable.

1.4 FIRE ROUTES

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

1.5 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.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 06 10 53.01	Rough Carpentry for Roofing
.2	Section 07 52 16	Modified Bituminous Membrane Roofing
.3	Section 07 62 00.03	Sheet Metal Flashing and Trim for Roofing
.4	Section 07 92 13.01	Elastomeric Joint Sealants for Roofing
.5	Section 20 05 05	Mechanical Work General Instructions
.6	Section 20 05 10	Basic Mechanical Materials and Methods
.7	Section 20 05 25	Mechanical Insulation
.8	Section 20 05 35	Demolition and Revision Work
.9	Section 23 11 23	Natural Gas Piping System
.10	Section 23 30 00	HVAC Air Distribution
.11	Section 26 05 00	Common Work Results for Electrical
.12	Section 26 05 05	Selective Demolition for Electrical
.13	Section 26 05 21	Wires and Cables (0-1000 V)
.14	Section 26 05 22	Connectors and Terminations
.15	Section 26 05 29	Hangers and Supports for Electrical Systems
.16	Section 26 05 31	Splitters, Junction, Pull Boxes and Cabinets
.17	Section 26 05 32	Outlet Boxes, Conduit Boxes and Fittings
.18	Section 26 05 34	Conduits, Conduit Fastenings and Conduit Fittings
.19	Section 26 05 36	Cable Trays for Electrical Systems
.20	Section 26 27 26	Wiring Devices
.21	Section 26 28 20	Ground Fault Circuit Interrupters
.22	Section 28 46 00	Fire Detection and Alarm

1.2 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, the Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 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 incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.5 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.

.3 Store products subject to damage from weather in weatherproof enclosures, or cover with tarps. New materials stored on the roof must be covered with tarps.

.4 Materials stored on the roof surface shall be elevated off the roof.

.5 Protect the new and existing roof membrane with plywood or insulation.

.6 Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative and Consultant.

.8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation of products, due to failure in complying with these requirements, authorizes the Consultant or Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 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 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.

1.9 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.10 CONCEALMENT

.1 Before concealing pipes, ducts or wiring, inform Consultant for review. Notify the Departmental Representative and Consultant if there is interference. Install as directed by Departmental Representative.

1.11 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. 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 and Consultant 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.

1.14 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

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

1.16 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.

.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

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

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 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Restore work with new products in accordance with requirements of Contract Documents.

.9 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for all waste materials and debris.

.5 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 FINAL CLEANING

.1 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for use.

.2 Prior to final review remove surplus products, tools, construction machinery and equipment.

.3 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.4 Remove dirt and other disfiguration from exterior surfaces.

.5 Clean and sweep roofs.

.6 Sweep and wash clean paved areas.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative and Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Consultant's and Departmental Representative inspection.

.2 Consultant's and Departmental Representative Inspection:

.1 Consultant, Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems affected by the work: tested, adjusted and fully operational.

.4 Operation of systems: demonstrated to Owner's personnel.

.5 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Consultant, Departmental Representative, and Contractor.

.2 When Work incomplete according to Consultant or Departmental Representative, complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting at project completion with Consultant, contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, one copy of operating and maintenance manuals in English.

.3 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content with Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in .dxf and pdf format on CD or flash drive.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: as required to supplement product data.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Consultant or Departmental Representative, one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant or Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Field changes of dimension and detail.

.3 Changes made by change orders.

.4 Details not on original Contract Drawings.

.5 Referenced Standards to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain Consultant site visit reports, manufacturer's site visit reports, inspection certifications, and that required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

1.7 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 Additional requirements: as specified in individual specifications sections.

1.8 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Consultant and Departmental Representative for review and approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.7 Conduct joint 6 month and 12 month warranty inspection, measured from time of acceptance, by Departmental Representative.

.8 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Contractor's plans for attendance at 6 and 12 month post-construction warranty inspections.

.9 Respond in timely manner to oral or written notification of required construction warranty repair work.

.10 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the installation of wood nailers, curbs, built-up dividers, cants and plywood as defined in the scope of work and drawings.

1.2 RELATED SECTIONS

.1 01 00 00 General Requirements

.2 01 11 00 Scope of Work.

.3 07 52 16 Modified Bituminous Membrane Roofing.

.4 07 62 00.03 Sheet Metal Flashing and Trim for Roofing

.5 07 92 00 Joint Sealants.

1.3 REFERENCE STANDARDS

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)

.1 ANSI/NPA A208.1- Particleboard.

.2 ASTM International

.1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.4 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM D 5055, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.6 ASTM D 5456, Standard Specification for Evaluation of Structural Composite Lumber Products.

.7 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3, Hardboard.

.2 CAN/CGSB-71.26, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 Canadian Wood Council

.1 Wood Design Manual, Current Edition

.2 Engineering Guide for Wood Frame Construction

.5 CSA International

.1 CAN/CSA-A123.2, Asphalt Coated Roofing Sheets.

.2 CSA B111, Wire Nails, Spikes and Staples.

.3 CSA O86 Engineered Design in Wood

.4 CSA O112.9, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.5 CSA O121, Douglas Fir Plywood.

.6 CSA O141, Softwood Lumber.

.7 CSA O151, Canadian Softwood Plywood.

.8 CSA O153, Poplar Plywood.

.9 CSA O325, Construction Sheathing.

.10 CAN/CSA-S406, Construction of Preserved Wood Foundations.

.11 CAN/CSA-Z809, Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001, FSC Principle and Criteria for Forest Stewardship.

.7 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

.8 National Research Council Canada (NRC)

.1 National Building Code of Canada (NBC).

.9 Sustainable Forestry Initiative (SFI)

.1 SFI Standard.

.10 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S706, Standard for Wood Fibre Insulating Boards for Buildings.

1.4 SUBMITTALS

.1 In accordance with section 01 00 00 General Requirements, Part 4 Submittal Procedure.

1.5 QUALITY CONTROL

.1 In accordance with section 01 00 00 General Requirements, Part 6 Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

.1 In accordance with section 01 00 00 General Requirements, Part 10.3 Delivery, Storage and Handling.

Part 2 Products

2.1 WOOD PRODUCTS

.1 Lumber identification shall be by grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

.2 All lumber shall be Grade #2 or Grade #1.

.3 Plywood shall be exterior grade.

2.2 ACCESSORIES

.1 General purpose adhesive: to CSA O112.9.

.2 Nails, spikes and staples: to ASTM F1667.

.3 Bolts: Diameter as indicated on details, complete with nuts and washers.

.4 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.1 Fasteners securing wood to concrete or masonry shall provide a minimum embedment into the substrate of 38mm.

.5 Fasteners securing wood to wood shall be hot dipped galvanized, and provide a minimum 30mm embedment into the element being secured to.

.1 Spiral framing nails.

.2 No. 12 wood screw. Alternatively epoxy coated or stainless steel screws may be used.

.6 Adhesive for use at wood joints:

.1 Urethane based adhesive, or approved equivalent

.7 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

.8 Sill Plate Gasket: Closed cell polyethylene foam gasket in width to match sill plate width, 6 mm thick.

.9 Fasteners securing wood to steel elements shall be sized to fully penetrate the steel element a minumum 20mm, and so as not to damage other elements below.

.1 Self -tapping Screw: No. 12 stainless steel screw. Light Duty, non-structural blocking to steel deck

.2 Stainless Steel Expansion Anchors: Medium Duty, for securing to steel deck.

.10 Wall fasteners shall be suitably coated to prevent corrosion with exposure to moisture, and compatible with elements that it contacts, preventing galvanic corrosion between dissimilar metals.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 EXISTING WOOD CONSTRUCTION

.1 Existing blocking may be reused if found to be in sound condition, free of excess moisture or rot. Replace deteriorated wood elements with sections to match existing lines and levels.

.2 Remove wood elements at a minimum 3 sample locations per 150m to establish existing fastening patterns and conditions.

.3 Check that fastening of existing elements complies with the specified minimum. Check fasteners for deterioration or loss of connection.

.4 Provide new fasteners to secure areas where deficient.

3.3 SYSTEMS INTEGRATION

.1 Install air barrier and vapour retarder sheeting around framing members to ensure continuity of protection and to lap and seal to main sheets.

.2 Install insulation in exterior wall framing cavities that will not be accessible after completion of framing.

.3 Install sill plate gasket in continuous lengths between concrete surfaces and wood framing.

3.4 CONSTRUCTING NEW WOOD BLOCKING

.1 Discard wood with defects which may impair the quality of the work. Do not use wood lengths shorter than 300mm.

.2 Where layered lumber is employed, offset joints between layers 300mm. Weave corners.

.3 Construct elements to required levels, with lines and members plumb and true.

.4 Leave expansion gaps of 3mm between the ends of adjoining wood members.

.5 Where pressure treated wood is field cut, the cut ends shall treated with wood preservative.

3.5 FASTENING & SECUREMENT

.1 Secure non-structural blocking and nailers with fasteners spaced a maximum 500mm o.c.

.2 Parapets, sleepers and curbs shall be secured with fasteners spaced a maximum of 300mm o.c. Stagger fasteners to each side of element.

.3 Plywood shall be fastened at 450mm maximum spacing in each direction, and secured to every supporting element (joist or stud).

3.6 WOOD PARAPETS

.1 The top of all parapet walls that will be receiving metal flashings shall be sloped 1:24 towards the inside.

3.7 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 Conventional 2-ply SBS modified bituminous membrane roofing system.

1.2 RELATED SECTIONS

.1 01 11 00 Summary of Work.

.2 06 10 00 Rough Carpentry.

.3 07 62 00 Sheet Metal Flashing and Trim.

.4 07 92 00 Joint Sealants.

1.3 REFERENCE STANDARDS

.1 ASTM International Inc.

.1 ASTM C472 Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete.

.2 ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.

.3 ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.4 ASTM C726, Standard Specification for Mineral Fiber Roof Insulation Board.

.5 ASTM C840 Standard Specification for Application and Finishing of Gypsum Board.

.6 ASTM C1177/C1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.7 ASTM C1396/C1396M, Standard Specification for Gypsum Board.

.8 ASTM D41, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

.9 ASTM D312, Standard Specification for Asphalt Used in Roofing.

.10 ASTM D448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

.11 ASTM D6162, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.12 ASTM D6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.13 ASTM D6164, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.14 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

.15 ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

.16 ASTM E108 Standard Test Methods for Fire Tests of Roof Covering.

.17 ASTM E661 Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

.2 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 CAN/CGSB-51.33, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA)

.1 CRCA Roofing Specifications Manual.

.4 Canadian Standards Association (CSA International)

.1 CSA A123.21, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems

.2 CSA-A123.4, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.

.3 CSA A231.1, Precast Concrete Paving Slabs.

.4 CSA O121, Douglas Fir Plywood.

.5 CSA O151, Canadian Softwood Plywood.

.5 Factory Mutual (FM Global)

.1 FM Approvals - Roofing Products.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.7 Underwriters Laboratories' of Canada (ULC)

.1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.2 CAN/ULC-S702.2, Standard for Mineral Fibre Thermal Insulation for Buildings.

.3 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.4 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings

1.4 SUBMITTALS

.1 In accordance with section 01 33 00 Submittal Proceedures.

1.5 QUALITY CONTROL

.1 In accordance with section 01 45 00 Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

.1 In accordance with section 01 61 00 Common Product Requirements.

1.7 CONTRACTOR GUARANTEE

.1 As per CCDC2 (2008) and as specified herein, guarantee work of this Section for a period of TWO (2) years, and of Section 07 62 00.03 SHEET METAL FLASHING & TRIM FOR ROOFING for flashing contiguous with roofing for a period of ONE (1) year, against deficiencies in quality of work and materials. Deficiencies to include, but are not be restricted to leaking, failure to stay in place, lifting, delamination, deformation, and breaking of weathertight seals.

.2 Contractor's guarantee to include replacement of all damaged roof assembly materials relating to deficiencies in quality of work or materials.

1.8 MANUFACTURER'S WARRANTY

.1 Membrane Manufacturer Full System Labour, Material and Workmanship Warranty. Any leaks through any element of the roofing system shall be repaired, upon notification of leakage, to match the specified conditions and quality at no cost to the Owner for Twenty (20) Years.

1.9 MANUFACTURER'S FIELD SERVICES

.1 Arrange for initial job start-up site attendance, periodic site attendance of membrane manufacturer's technical representative during installation work, together with written report.

.2 Contractor to, at all times, enable and facilitate access to work site by said representative.

.3 Notify Consultant of date and time of inspection, a minimum of 48 hours prior to inspection. Provide one copy of manufacturer's report to Consultant within 48 hours of inspection being carried out.

1.10 COMPATIBILITY

.1 Compatibility between roofing materials is an essential requirement of contract. Single source of products from:

.1 IKO Industries, Siplast or Soprema.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

Part 2 Products

2.1 DECK OVERLAY

.1 To ASTM C472, ASTM C473, ASTM C518, ASTM C1177, ASTM D3273, ASTM E84, ASTM E96, ASTM E661, ASTM E136. Having UL790 & UL1256 Classifications.

.1 Fiberglass Mat Faced Gypsum Roof Board: with the following properties:

.1 Thickness: 12.7mm (1/2 inch).

.2 Width: 1219mm (4 feet_.

.3 Length: 1219mm (4 feet) or 2438mm (8 feet).
.4 Weight: 9.76 kg/sq.m (2.0 lb/sq. ft).
.5 Surfacing: Fiberglass mat with non-asphaltic coating.
.6 Flexural Strength, Parallel: 80 lbf, minimum.
.7 Flute Span: 5 inches.
.8 Permeance: greater than 23 perms.
.9 R-Value: 0.56.
.10 Water Absorption: Less than 10 percent of weight.
.11 Compressive Strength: 900 pounds per square inch.
.12 Surface Water Absorption: Not more than 2 grams.

2.2 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9Ma.

2.3 VAPOUR RETARDER

.1 To ASTM D2178 & ASTM E96.

.2 Self-adhesive SBS modified bitumen vapour retarder, top face surfaced with high strength tri-laminate polyethylene film. Minimum thickness of 31.5 mils (0.8mm).

2.4 POLYISOCYANURATE INSULATION

.1 To ASTM C209, ASTM D1621, ASTM D1622, ASTM D1623, ASTM D2126, ASTM D2842, ASTM E84, CSA A123.21 & CAN/ULC-S704.

.2 Polyisocyanurate with fibreglass coated facing on both top and bottom surfaces, flame spread classification: less than 500, thickness as indicated within Section 01 11 00 Summary of Work.

.3 Flat and fully tapered panels as per Section 01 11 00 Summary of Work, roof plans and shop drawings.

2.5 SEALANTS AND MASTICS

.1 To CAN/CGSB-37.5-M89 & ASTM D4586.

.2 Solvent-based SBS modified bitumen containing mineral fibres, compatible with bituminous materials.

2.6 OVERLAY BOARD

.1 To ASTM C472, ASTM C1278, ASTM D994 & ASTM E154

.2 Support panel with asphaltic core covered by asphalt-saturated glass mat reinforcement, thickness as indicated within Section 01 11 00 Summary of Work.

2.7 BASE SHEET MEMBRANE (FIELD)

.1 To CAN/CGSB-37.56-M.

.2 SBS modified bitumen, composite reinforcement, both sides covered with thermofusible plastic film, to meet requirements of manufacturer's twenty (20) year Full System Labour, Material and Workmanship Warranty.

2.8 BASE SHEET MEMBRANE (FLASHINGS)

.1 To CAN/CGSB-37.56-M.

.2 Self-adhesive, SBS modified bitumen, top side covered with thermofusible plastic film, to meet requirements of manufacturer's twenty (20) year Full System Labour, Material and Workmanship Warranty.

2.9 CAP SHEET

.1 To CAN/CGSB-37.56-M.

.2 SBS modified bitumen, composite reinforcement, bottom side covered with thermofusible plastic film, top side covered with granules, to meet requirements of manufacturer's twenty (20) year Full System Labour, Material and Workmanship Warranty.

.3 Colour of surface granules to be approved by the Departmental Representative from manufacturer's standard colour range.

2.10 FLAME STOP MEMBRANE

.1 To CAN/CGSB-37.56-M & ASTM D903.

.2 Self-adhesive, SBS modified bitumen, glass mat reinforcement, sanded surface.

2.11 BOARD ADHESIVE

.1 To ASTM D2556, and for Wind Uplift Resistance Testing: CSA A123.21-14, FM 4470 & FM PLPDS 1-29.

.2 Polyurethane adhesive, low-rise, two-component.

2.12 RETRO-FIT DRAINS

.1 To CSA B79 & ASME A112.6.4.

.2 Copper drain and flange, bolted drain body, cast aluminum vandal proof dome strainer with hinged access gate, integrated or separate membrane clamping ring, stainless steel under deck clamp, "U-Flow" type seal or integrated seal, removable flow control device w/ 3 openings, diameter of leader to suit diameter of existing opening.

2.13 SOIL PIPE PENETRATION FLASHING

.1 To CSA B272-93.

.2 Minimum 12" (305 mm) high, 0.064" (1.6 mm) mill finish 1100-0T alloy aluminum, diameter to suit existing pipe penetration, with removable cap, pre-molded urethane insulation liner, and integrated base seal and vandal proof cap. Provide 20 year warranty against leaks, condensation and defects in materials and/or manufacture.

2.14 B-VENT PENETRATION FLASHING

.1 To CSA B272-93.

.2 12" (305 mm) high with integral deck flange and matching two piece collar, 0.064" (1.6 mm) mill finish 1100-0T alloy aluminum, diameter to suit "B" Vent diameter. Provide 20 year warranty against leaks, condensation and defects in materials and/or manufacture.

2.15 HOT PIPE PENETRATION FLASHING

.1 To CSA B272-93.

.2 12" (305 mm) high with 1/4" (6 mm) dia. perforations at top of flashing, integral deck flange and matching two piece collar, 0.064" (1.6 mm) mill finish 1100-0T alloy aluminum, diameter to suit hot pipe, galvanized steel sleeve deck protection. Provide 20 year warranty against leaks, condensation and defects in materials and/or manufacture.

2.16 CONDUIT PENETRATION FLASHING

.1 To CSA B272-93.

.2 12" (305 mm) high flashing, 6061-T4 aluminum with mill finish with opening to suit flexible conduit and air handling unit auxiliary wire opening to suit (if required). Provide 20 year warranty against condensation and defects in materials and/or manufacture.

2.17 EXHAUST VENT PENETRATION FLASHING

.1 To CSA B272-93.

.2 12" (305 mm) high Exhaust Vent Flashing, 0.064" (1.6 mm) mill finish 1100-0T alloy aluminum, diameter to suit penetration, pre-molded urethane insulation liner, hood and perforated collar. Provide 20 year warranty against leaks, condensation and defects in materials and/or manufacture.

2.18 FASTENERS

.1 No. 10 galvanized ardox roofing nails of length to penetrate base 25mm (1"). Incorporate 25mm (1") min. nailing disc for backnailing or nails with solid caps.

.2 Use copper, aluminum or stainless nails as most compatible with materials being secured.

.3 Screws, hex head with neoprene washers. Provide lead shields as required for anchoring.

2.19 SCUPPERS

.1 24ga prefinished metal with 127mm (5") flanges.

2.20 DOWNSPOUTS

.1 24ga prefinished metal, minimum 102mm x 102mm (4"x4") square or 127mm (5") diameter round.

.2 Continuous 25mm (1") wide vertical clean-out slot on front face.

.3 Angled outlet at bottom minimum 305mm (12") from wall and maximum 152mm (6") above splashpad / grade.

.4 Secure to wall with straps and fasteners at minimum two (2) locations, at connection to scupper/gutter outlet, at connection/transition to angled outlet, at each section connection point, at each directional change and at maximum 762mm (30”) o.c.

2.21 TERMINATION BAR

.1 30mm x 2mm (1.3" x 0.10") thick aluminium bar pre-punched at 152mm (6”) on center, with integral caulk ledge.

2.22 GAS LINE SUPPORTS

.1 Premanufactured recycled UV-resistant HDPE resin body with a foam base platform of 25mm (1") thick, 25lb density closed cell polystyrene and provision to install 19mm (3/8") or 13mm (1/2") threaded rod with complete height adjustability. All components to suit size/weight of pipe.

2.23 CONCRETE PAVERS

.1 Precast concrete pavers to be 610mm x 610mm x 38mm (24"x 24” x 1.5”) for access ladders and doors. Precast pavers to be 406mm x 406mm x 38mm (16” x 16” x 1.5”) for splash pads at downspout locations.

.2 Pavers to be set on 560mm x 560mm x 38mm (22” x 22” x 1.5”) OR 381mm x 381mm x 38mm (15"x 15” x 1.5") Type IV extruded polystyrene insulation pads. Underside of extruded polystyrene pads to have 13mm x 13mm (1/2” x 1/2”) saw-cut channelled at 152mm (6”) o.c. Insulation pads to be 52mm (2”) smaller on all sides than overlying concrete paver to ensure protection for U.V. degradation.

2.24 STEEL RUST INHIBITING PRIMER

.1 Anti-corrosion, general purpose, fast air drying, lead-free alkyd primer. Specially formulated for exterior steel coating with long lasting and durable properties.

2.25 RAPID SETTING CONCRETE PATCHING MORTAR

.1 To ASTM C78, ASTM C109, ASTM C666 & ASTM C882.

.2 Rapid-setting, rapid hardening, magnesium phosphate material used to repair concrete and masonry surfaces, bondable to properly prepared concrete to provide a durable repair which is resistant to freeze-thaw cycles.

Part 3 Execution

3.1 INSPECTION

.1 Inspect roof deck surfaces.

.1 Report any defects to Consultant which would impair work of this section.

.2 Report any concerns with roof deck slope that are likely to resulting in ponding water.

.2 Ensure decks are acceptable to manufacturer and roof inspection agency.

.3 Ensure that decks are clean and free of old roofing materials, dirt, water, screws, nails, metal shavings, filings, and wood.

.4 Dry all surfaces prior to application of roofing.

3.2 PREPARATION

.1 Construct perimeter terminations of roof membrane using pressure treated plywood backing and wood blocking as detailed and in accordance with Section 06 10 53.01 – Rough Carpentry for Roofing.

.2 Lift mechanical units during re-roofing to allow for continuity of membrane as shown on the Details. Coordinate shutdown, disconnection and reconnection of units, as required, with the Departmental Representative.

3.3 PROTECTION OF ROOF SURFACES

.1 Protect finished roof membrane from damage, punctures or tears. Ensure that only authorized persons and traffic allowed on roofing.

.2 If traffic or work necessary over roof surfaces protect full area of traffic or work with 13mm (0.5”) thick plywood.

.3 Do not erect scaffolding on roof surfaces at any time.

.4 Protect all exposed roof areas that have not been completed.

3.4 TEMPORARY SEAL

.1 Provide adequate temporary protection of exposed materials and surfaces to prevent damage to interior until application of new membrane has been completed.

.1 At end of each day’s work, seal exposed edges at perimeter of waterproofing membrane with mastic.

.2 Contractor will be held responsible for any damage as result of not adequately protecting exposed surfaces.

3.5 PRIMER

.1 Apply asphalt primer in accordance with manufacturer’s directions to wood, metal, and concrete surfaces prior to application of membranes.

.1 Allow sufficient time to dry.

3.6 GENERAL VAPOUR RETARDER INSTALLATION

.1 Repair any damage to vapour retarder prior to applying remainder of roof system components.

.2 Extend vapour retarder 150mm (6”) on vertical surfaces.

.3 Seal vapour retarder termination to building air barrier, where possible; otherwise, seal termination to solid substrate. Install vapour retarder flashing continuously around penetrations.

.4 Apply membrane to ensure removal of air pockets, wrinkles, fishmouths, splits, etc and to attain good adhesion.

3.7 GENERAL INSULATION INSTALLATION

.1 Stagger base insulation boards minimum 300mm (12") to produce horizontal overlaps at joints.Butt boards tightly together.

.2 Score and cut insulation to fit around roof penetrations and deck irregularities.

3.8 BASE INSULATION ADHERED WITH COLD ADHESIVE

.1 Apply adhesive per Manufacturers printed instructions, to meet minimum uplift resistance as per Section 01 11 00 – Summary of Work.

.2 Fully adhere insulation by laying into adhesive, butting boards tightly together and pressing down firmly.

.3 Ensure board is fully adhered prior to installing additional boards.

3.9 TAPERED INSULATION

.1 Install sumps around drains prior to base insulation.

.2 Install fully tapered insulation over base insulation with specified adhesive.

3.10 MODIFIED BITUMEN GENERAL INSTALLATION REQUIREMENTS

.1 Use membrane manufacture's recommended tools and accessories. Keep tools clean and in good order.

.2 Start roof applications at lowest point to ensure that water runs over laps of membrane. Lay sheets at right angles to slope.

.3 Use chalk line to lay-out straight lines where not provided by sheets.

.4 Plan work so that sheet edges are not in line vertically or horizontally. Offset/stagger all seams minimum of 100mm (4").

.5 Unroll rolls and allow membrane to relax for minimum of 15 minutes prior to installation.

.6 Align sheet to provide straight and parallel seams. Roll from both ends prior to welding in place.

.7 At all end/side laps, cut corner piece off selvage edge that will be covered by next roll. Cut piece to be width of lap 75mm (3") and extended along selvage edge 150mm (6").

.8 Adhere membrane fully to substrate, with no air pockets, wrinkles, fish-mouths or tears.

.9 Seam laps to be no less than 75mm (3") at sides and 150mm (6") at ends and to comply with manufacturer requirements.

.10 After installation of base and cap sheets, check adhesion at lap seams. Remove and replace poorly adhered sheets.

.11 Have manufacturer' representative approve base sheet and flashing application prior to application of cap sheet.

.12 Install membrane type to suit site conditions, such as self-adhering membranes where torch applications are not practical. Review changes to membrane types with consultant prior to proceeding with change.

3.11 MODIFIED BITUMEN TORCH APPLICATION

.1 Install self-adhered fire/flame stop tape or 150mm (6") wide, continuous strips of self adhered modified bitumen base sheet membrane across all seems/joints of field and perimeters, prior to membrane torch work.

.2 Torch weld modified bitumen sheets in accordance with recommendations of membrane manufacturer. During torch application, melt under-surfaces of membrane, forming asphalt bead and push it out in front of sheet.

.3 Point torch flame to inside of roll on selvage edge of adjacent sheet to prevent burning of granules and blowing excessive asphalt out at seam.

.4 Prevent burning membrane, its reinforcement, or adjacent surfaces not being welded.

.5 Use roller during torching to press membrane to assure proper welding.

.6 When torch applying membrane maintain consistent, continuous asphalt bleed along seams, no less than 3mm (1/8") and no greater than 6mm (1/4") in width.

.7 Where seam is required at granulated surface, embed granules to assure proper adhesion. Mark extent of lap with chalk line. Use torch to heat and soften bitumen and round nosed roofing trowel to embed surface granules.

.8 Repair local problems with seams with torch and adhere.

3.12 MODIFIED BITUMEN SELF-ADHERING APPLICATION

.1 Unroll and position roll. Re-roll sheet half way from each end.

.2 Cut protective film on one side and peel away on back of section of roll to be adhered. Peel lower part of protective film back on itself.

.3 Unroll half of roll while pulling on upper part of protective sheet. Self-adhesive part will then come in contact with substrate. Immediately apply pressure on membrane with steel roller, approximately 27 kg (60 lb.) in weight.

.4 Re-roll second half of roll and retrieve lower part of protective sheet. Repeat above steps.

.5 Seal joints that are not bonded with hot air gun and rounded end trowel. Do not use open flame on, near or adjacent to wood or other combustible materials.

3.13 MODIFIED BITUMEN FLASHING APPLICATION

.1 Laid flashings in strips 1m (40") wide to vertical surfaces. Stagger side laps of membrane cap flashing 300mm (12") from side laps of membrane base flashing and from side and end laps of roof membrane cap sheet.

.2 Unless otherwise shown on drawings, extend flashings up and over parapets and mechanical unit curbs and down outside face minimum 50mm (2").

.3 Extend base sheet flashing onto field of roof minimum 150mm (6").

.4 Extend cap sheet flashings onto field of roof minimum of 100mm (4") beyond base sheet flashings, for total of 250mm (10"). Use torch to heat and soften bitumen and round nosed roofing trowel to embed surface granules on granulated surfaces that are to be overlapped.

.5 Seal termination edge of cap flashing on field of roof with termination caulk. Where cap flashing terminates on vertical surface, seal edge with termination caulk, minimum 6x6mm (0.25”x0.25”) fillet within 48 hours of installing membrane flashings. Do not wait until time of sheet metal installation. Tool to assure proper adhesion.

3.14 METAL FLASHING

.1 In accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.

3.15 INSTALLATION OF ACCESSORIES FLASHINGS

.1 Follow manufacturers printed instructions for installation.

.2 Bed flashings into continuous 3mm thick bed of flashing adhesive. Extend flashing adhesive minimum of 150mm (6") beyond edges of flange and 50mm (2") up outside of projection. Allow time for adhesive to flash off.

.3 Install flashing into adhesive, ensuring that base is securely embedded in adhesive.

.4 Adhere stripping plies to flashing flange surface with flashing adhesive as recommended by membrane manufacturer. Cover flange completely. Extend flashing at least 150mm onto roofing membrane. Ensure complete bond and continuity without wrinkles and voids. Lap sheeting ends 100mm (4”).

.5 Insulate void between penetration and sleeve with mineral wool batt insulation.

.1 Seal top of sleeve to penetration.

.6 Install sheet metal cap at stand pipes and exhaust stacks to completely protect and shed water beyond sleeve.

.1 Seal joints in compliance with Section 07 92 13 – Elastomeric Joint Sealants for Roofing.

.1 Cut back insulated ducts/pipes and seal metal cap back to duct/pipe body.

.2 Reinstate insulation and protective coating, where required.

3.16 REQUIREMENTS FOR STACK JACKS

.1 For stack jacks flashing with removable caps, fill joint between penetration and insulation with jute, expanding urethane or fibre glass insulation, and seal joint with plastic cement.

.2 Seal removable caps to inside of plumbing stacks to prevent warm air from condensing and collecting within flashing space.

.3 For gasketed topped stack jacks, seal junctions of gasket to aluminum flashing and penetration with sealant as per Section 07 92 00 – Elastomeric Joint Sealants for Roofing.

3.17 DUCT INSULATION AND WATERPROOFING

.1 Refer to Section 20 05 25 Mechanical Insulation.

3.18 GAS PIPE

.1 Refer to Section 23 11 23 Natural Gas Piping System.

.2 Remove existing supports and keep pipe level through-out roof construction

.3 Install specified supports where not using existing in conformance with applicable manufactures recommendations. Install supports at all joints and directional changes in pipe and provide minimum spacing in accordance to CAN/CSA B149.1 (latest edition) – Natural Gas & Propane Installation Code.

3.19 FOAM GASKET

.1 Adhere singled sided form gasket tape to underside of unit flange prior final installation over roof curb.

.2 Do not install gasket until membrane and sheet metal flashings are complete to avoid damaging gasket

3.20 DRAIN INSTALLATION

.1 Check to ensure that existing plumbing flows freely.

.1 Notify Consultant if any obstruction to flow is encountered prior to installing new drain.

.2 Adjust roof drains to ensure positive flow of water off membrane. Grind or cut away existing drain flanges to ensure proper seating of new drain.

.3 Ensure drain insert maintains positive seal to existing plumbing.

3.21 DRAINS MEMBRANE FLASHING

.1 Install new deck drains at current drain locations and connect to existing plumbing, as required.

.2 Clean surface of drain body and prime. Embed drain flange into layer of plastic roofing cement over base sheet.

.3 Install reinforcing base sheet over drain flange that is minimum 150mm (6”) wider than drain flange on all sides.

.4 Install cap sheet over all.

3.22 RAINWATER LEADERS

.1 Attach rainwater leaders securely at maximum 1.8m (6’-0”) centre to centre, minimum 3 fastening clips per section.

.2 Install splash pads at water discharge locations.

3.23 CLEANUP

.1 Clean up at end of each day and deposit waste in containers.

.2 Upon completion of work, remove all roofing equipment; surpass materials, tools and debris from job site.

.3 Clean out roof drains.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 Sheet metal flashing and trim for all roofing related projects.

1.2 RELATED SECTIONS

.1 01 00 00 General Requirements

.2 01 11 00 Scope of Work.

.3 06 10 00 Rough Carpentry.

.4 07 52 16 Modified Bituminous Membrane Roofing.

.5 07 92 00 Joint Sealants.

1.3 REFERENCE STANDARDS

.1 The Aluminum Association Inc. (AAI).

.1 AA Aluminum Design Manual Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.

.2 AAI DAF45, Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)

.1 AAMA 611 Voluntary Specifications for Anodized Architectural Aluminum.

.2 AAMA 621 Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Substrates.

.3 AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

.4 AAMA 2604 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

.5 AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

.3 American National Standards Institute (ANSI)

.1 ANSI/SPRI/FM 4435/ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

.4 ASTM International

.1 ASTM A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A606/A606M, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

.3 ASTM A 653/A 653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A755/A755M Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

.5 ASTM A 792/A 792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.6 ASTM B32, Standard Specification for Solder Metal.

.7 ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.8 ASTM B 370, Standard Specification for Copper Sheet and Strip for Building Construction.

.9 ASTM D 523, Standard Test Method for Specular Gloss.

.10 ASTM D1970/D1970M Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

.11 ASTM D4587 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings.

.12 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.32, Sheathing, Membrane, Breather Type.

.6 Canadian Roofing Contractors Association (CRCA)

.1 Roofing Specifications Manual.

.7 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI S8-2008 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.

.2 CSSBI B17-2002 Barrier Series Prefinished Steel Sheet: Product Performance & Applications.

.3 CSSBI Sheet Steel Facts #12 Fastener Guide for Sheet Steel Building Products.

.8 CSA Group

.1 CSA A123.3, Asphalt Saturated Organic Roofing Felt.

.2 CSA A123.22 Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

.9 FM Global

.1 Property Loss Prevention Data Sheets 1-49 Perimeter Flashing.

.10 Green Seal Environmental Standards

.1 Standard GS-11, Paints, Coatings, Stains, and Sealers.

.2 Standard GS-36, Adhesives for Commercial Use.

.11 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.12 Sheet Metal and Air Conditioning Contractors Association of North America (SMACNA)

.1 Architectural Sheet Metal Manual (2012).

.2 Residential Sheet Metal Guidelines (2001)

1.4 SUBMITTALS

.1 In accordance with section 01 00 00 General Requirements, Part 4 Submittal Procedure.

1.5 QUALITY CONTROL

.1 In accordance with section 01 00 00 General Requirements, Part 6 Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

.1 In accordance with section 01 00 00 General Requirements, Part 10.3 Delivery, Storage and Handling.

1.7 APPROVAL

.1 Do not install metal work until membrane flashings have been inspected and accepted by Consultant. Colour to be determined by Departmental Representative.

.2 In all cases and prior to fabrication of finished product, supply and install sample for approval by Departmental Representative.

1.8 CONTRACTOR GUARANTEE

.1 Guarantee flashing in conjunction with membrane roofing for ONE (1) year. Submit on same form as for membrane roofing guarantee.

Part 2 Products

2.1 BASE SHEET METAL MATERIALS

.1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.

.2 Zinc coated (Galvanized) steel sheet: Thickness as shown on details, commercial quality hot dip process to ASTM A653/A653M, with Z275 designation zinc coating.

.3 Aluminum-zinc alloy coated (Galvalume) steel sheet: Thickness as shown on details, commercial quality hot dip process to ASTM A792/A792M, grade AZ150 coating, fine spangle surface, not chemically treated for paint finish.

.4 Stainless steel sheet: Thickness as shown on details, to ASTM A240/A240M, Type 304 with No. 4: 120-150 mesh finish.

.5 Weathering steel sheet: to ASTM A606 high strength low alloy cold rolled architectural use grade, 1.2 mm minimum thickness.

.6 Aluminum sheet: to ASTM B209 plain pattern, thickness in accordance with non-residential AA Aluminum Design Manual Part VIII Aluminum Sheet Metal Work in Building Construction guidelines, unless specified otherwise.

.1 For sheet aluminum fabrications to be anodized, fabricate from minimum 0.8 mm thick sheet.

.7 Copper sheet: to ASTM B 370, cold rolled, 0.8mm (16oz) thickness..

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied two-coat polyvinylidene fluoride resin on specified steel sheet substrate conforming to ASTM A755:

.1 Finished on one side with wash coat on back.

.2 10000 series colour selected by Departmental Representative from standard range.

.3 Exposed coating thickness: dry film coating system thickness not less than 22 micrometres.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Pourable sealer: proprietary two-part polyurethane pourable sealer designed for sealing penetration pockets.

.3 Self-adhesive membrane underlay and tie-in membrane for metal flashings: To CSA A123.22 or ASTM D1970, as specified in membrane roofing section.

.4 Sealants: In accordance with Section 07 92 00, in colour to match flashing finish colour.

.5 Cleats and hook strips: of same material, and temper as sheet metal, continuous. Thickness 0.87mm (22ga).

.1 Provide continuous hook strip at outside of parapets.

.6 Nails: of same material as sheet metal, flat head roofing nails of length and thickness suitable for application.

.7 Screws:

.1 Where exposed, use Hex Head screws with 13mm (1/2") dome and neoprene washers as supplied by Weather Guard, or equal.

.2 Fasteners for masonry and concrete: Tapcon fasteners with “Climaseal” corrosion resistant finish, or an approved equivalent, of sufficient length to provide a minimum 38mm (1.5”) penetration into substrate.

.8 Solder: to ASTM B32, lead free.

.9 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.10 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Shop fabricate sheet steel flashings and other sheet steel work in accordance with applicable CRCA 'FL' series details and SMACNA architectural details.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.1 For aluminum sheet metal flashing, trim and fabrications to be anodized, complete forming prior to anodizing.

.3 Form sections square, true, and accurate to size, free from distortion, oil canning and other defects detrimental to appearance and performance, and to dimensions indicated / required.

.4 Fabricate cap flashings, starter strips, and base counter flashings less than 305mm (12”) in height in 2438mm (96”) maximum lengths. Form counter flashings between 305mm and 610mm (12” and 24”) in height in 1219mm (48”) maximum lengths.

.5 Provide a counter flashing and an intermediate vertical flashing where cap flashing is greater than 610 m (24”) above top of roofing membrane. Form vertical flashings in 1219mm (4”) maximum lengths.

.6 Provide an "S-Lock" joint at all end joints and at all horizontal joints between cap flashing and vertical flashing and between vertical flashing and base counter flashing.

.7 Hem all exposed edges at least 13mm (1/2”) for appearance and stiffness.

.8 Provide a horizontal stiffening “V” on all face metal exceeding 229mm (9”) in girth. Centre V-break in mid-span of panel. Cross Break metal face flashing on all parapet flashings exceeding 457mm (18”) in girth.

.9 Mitre and form standing seams at all corners. Make allowance for movement at joints.

.10 Apply isolation coating to metal surfaces to be embedded in concrete or mortar joints.

2.5 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of material and to thickness shown on details.

2.6 PANS

.1 Form pans to receive roofing plastic from copper sheet metal with minimum 75 mm (3”) upstand above finished roof and 100 mm (4”) continuous flanges with no open corners.

.1 Solder joints.

.2 Make pans minimum 50 mm (2”) wider than member passing through roof membrane.

2.7 REGLETS AND CAP FLASHINGS

.1 Form recessed reglets of prefinished sheet metal to be built-in concrete and/or masonry for base flashings as detailed and in accordance with CRCA FL series details.

2.8 EAVES TROUGHS, DOWNPIPES & SCUPPERS

.1 Form eaves troughs and downpipes from type and thickness of metal as specified and detailed herein.

.2 Sizes and profiles as indicated.

.3 Provide goosenecks, outlets, strainer baskets and necessary fastenings.

.1 Provide splashpads as specified and detailed herein.

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 as detailed and in accordance with CRCA FL series details.

.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”).

.2 Provide self-adhesive membrane to tie into adjacent assemblies.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.

.1 Flash joints using S-lock seams forming tight fit over hook strips, as detailed.

.5 Lock end joints and caulk with sealant.

.6 Insert metal flashing under cap flashing and into reglets to form weather tight junction.

.7 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm (1”). Lead wedge flashing securely into joint.

.8 Caulk flashing at reglet with sealant.

.9 Install pans, where shown around items projecting through roof membrane.

.10 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.

.11 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.3 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at minimum 750 mm (29”) on centre with eaves trough spikes through spacer ferrules.

.1 Slope eaves troughs to downpipes as indicated.

.2 Solder joints watertight.

.2 Install downpipes and provide goosenecks back to wall.

.1 Secure downpipes to wall with straps at minimum 1800 mm (70”) on centre; minimum two straps per downpipe.

.2 Connect downpipes to drainage system (where existing) and seal joint with plastic cement.

.3 Install splash pans as indicated.

3.4 SCUPPERS

.1 Install scuppers as indicated.

3.5 CLEANING

.1 Proceed in accordance with Section 01 00 00 General Requirements, Part 11 Cleaning.

.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.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This Section specifies the materials and methods for work involving sealants.

1.2 RELATED SECTIONS

.1 01 11 00 Scope of Work.

.2 06 10 00 Rough Carpentry.

.3 07 52 16 Modified Bituminous Membrane Roofing.

.4 07 62 00.03 Sheet Metal Flashing & Trim for Roofing.

1.3 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM C919, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.13, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).

.4 CAN/CGSB-19.17, One-Component Acrylic Emulsion Base Sealing Compound.

.5 CAN/CGSB-19.24, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS)

.1 FS-SS-S-200, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.4 ENVIRONMENTAL CONDITIONS

.1 Apply primers and sealants only to surfaces which are structurally sound and completely dry, at air and material temperatures within acceptable range established by manufacturer's specifications. Should it become necessary to apply sealants at temperatures below 5°C, inform the Consultant and consult the sealant manufacturer’s representative. Proceed on their written instructions only.

.2 When working in cold temperatures, only clean/prime as much surfaces that can be sealed before frost and/or condensation re-occur

1.5 QUALIFICATIONS

.1 Surface preparation and sealant installation shall be carried out by a recognized specialized applicator who is thoroughly trained and competent in all aspects of this work

1.6 SUBMITTALS

.1 In accordance with section 01 00 00 General Requirements, Part 4 Submittal Procedure.

1.7 QUALITY CONTROL

.1 In accordance with section 01 00 00 General Requirements, Part 6 Quality Control.

1.8 DELIVERY, STORAGE AND HANDLING

.1 In accordance with section 01 00 00 General Requirements, Part 10.3 Delivery, Storage and Handling.

1.9 COLOUR

.1 Colour of the sealants shall be approved by the Departmental Representative during the mock-up.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Polyurethane Sealants (for roof accessories)

.1 Type S, Grade NS, Class 25, moisture curing polyurethane sealant, conforming to ASTM C 920 and CAN/CGSB-19-13-M.

.2 Silicone Sealants (for metal to metal joints)

.1 Type S, Grade NS, Class 50, moisture curing silicone sealant, conforming to ASTM C 920 and CAN/CGSB-19-13-M.

2.2 SOLVENTS AND PRIMERS

.1 Solvents/cleaners for surfaces to receive sealant shall be compatible with the surfaces to receive the cleaner (i.e. solvent). The sealant manufacturer shall recommend and approve in writing the cleaner type(s) for each sealant in the project.

2.3 ACCESSORIES

.1 Joint backing shall be used to control depth of joint to recommended thickness of sealant and to prevent three sided adhesion.

.1 Backer Rod: extruded polyolefin foam, non-gassing and have a diameter 25% larger than joint width.

.2 Bondbreaker Tape: pressure sensitive adhesive tape which will not bond to the sealant.

.2 Void Fillers

.1 Unless otherwise specified, insulation for packing into large voids and cavities shall be light weight resilient, inorganic fibrous batts.

.3 Miscellaneous

.1 Cloths for solvent cleaning of surfaces prior to application of sealants shall be clean, white, solvent resistant cloths. Coloured cloths shall not be used. Change cloths frequently as they become soiled during cleaning.

Part 3 Execution

3.1 GENERAL

.1 Consult and follow sealant manufacturer's project recommendations.

3.2 SURFACE PREPARATION

.1 Remove all existing sealant to expose a sound substrate, without damaging adjacent finishes or causing damage to the substrate.

.1 For Concrete and Masonry Surfaces, remove dust, paint, loose mortar and other foreign matter by brushing and vacuuming or blowing air.

.2 For Ferrous & Metal Surfaces, remove dust, silt, scale, oxidation and coating by scraping, wire brushing or grinding.

.2 Clean all surfaces to receive sealant by wiping with a clean cloth saturated with recommended cleaning solvent and by following immediately with another clean cloth to wipe the surface dry (2 rag method). Clean only as much area as can be sealed in one 1 hour. If cleaned areas are exposed to rain or contaminants (dirt, dust, etc.), the surface must be cleaned again.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 JOINT BACKING

.1 At large open cavities fill cavity with the approved void filler prior to the installation of the backer rod.

.2 Install backer rod or apply bond breaker tape prior to sealant installation.

.3 Tightly install backer rod without stretching, twisting, braiding or puncturing its outer skin.

.4 Use an approved installation tool that is blunt surfaced and developed to accurately set the backer rod at the required depth to achieve recommended sealant profile.

.5 Joint backing must be thoroughly dry. Do not install more joint backing/bond breaker tape that can be sealed in one working day.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 SEALANT BEAD PROFILE

.1 Maintain the minimum and maximum sealant depths as recommended by the manufacturer. Provide sealant depth that is ½ the joint width where possible within these limits. Increase average sealant size as required to accommodate application tolerances.

.2 Unless otherwise approved by the Consultant, joint widths shall be greater than 10mm. Identify any joint widths less than this width to the Consultant for direction.

.3 For joints wider than 19mm, application of sealant in several passes may be required (depend on joint configuration, weather conditions, access and material type). Follow the sealant manufacturer's recommendations for maximum joint width and application methods.

3.7 SEALANT APPLICATION

.1 Apply sealant using equipment approved by, and in accordance with the manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Use sufficient pressure to fill voids and joints solid.

.5 Immediately after application, tool the sealant to ensure firm, full contact with the faces of the joint. Neatly tool the surfaces to a slight concave profile. Avoid pulling the sealant out of the joint by frequent cleaning of the tooling instrument. Surface of sealant to be smooth, free from ridges, wrinkles, sags, air pockets and embedded impurities.

.6 Ensure existing drainage holes provided for wall systems are not blocked by the sealant material.

.7 Cure sealants in accordance with sealant manufacturer's instructions.

.8 Do not cover up sealants until proper curing has taken place.

3.8 CLEANING

.1 Remove sealant smears and droppings on completion of sealant installation in affected areas.

.1 For non-porous surfaces (i.e. metal), it is recommended to immediately remove all excess sealant adjacent to the joint as work progresses with a cleaning solvent recommended by the sealant manufacturer.

.2 For porous surfaces, it is recommended to allow sealant to develop initial cure, then remove by abrasion or other mechanical means. Caution should be exercised to maintain original surface integrity.

.2 Remove masking tape immediately after tooling of joints.

.3 Cleaning solutions and methods to be recommended in advance by the sealant manufacturer.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Division 00 and Division 01 apply to and are a part of this Section.

1.2 APPLICATION

.1 This Section specifies requirements that are common to Mechanical Divisions work Sections and it is a supplement to each Section and is to be read accordingly. Where requirements of this Section contradict requirements of Divisions 00 or 01, conditions of Division 00 or 01 to take precedence.

.2 Be responsible for advising product vendors of requirements of this Section.

1.3 DEFINITIONS

.1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls and partitions.

.2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.

.3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.

.4 "provision" or "provide" (and tenses of "provide") – means supply and install complete.

.5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify and certify.

.6 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery and administer supply of products; distribute to areas; and include manufacturer's supply of any special materials, standard on site testing, initial start-up, programming, basic commissioning, warranties and manufacturers' assistance to Contractor.

.7 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, and remove obsolete materials; patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by Departmental Representative and reviewed with Consultant.

.8 "barrier-free" – means when applied to a building and its facilities, that building and its facilities can be approached, entered and used by persons with physical or sensory disabilities in accordance with requirements of local governing building code.

.9 "BAS" – means building automation system; "BMS" – means building management system; "FMS" – means facility management system; and "DDC" means direct digital controls; references to "BAS", "BMS", "FMS" and "DDC" generally mean same.

.10 "governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules and regulations that apply to and govern work and to which work must adhere.

.11 "OSHA" and "OHSA" – stands for Occupational Safety and Health Administration and Occupational Health and Safety Act, and wherever either one is used, they are to be read to mean local governing occupational health and safety regulations that apply to and govern work and to which work must adhere, regardless if Project falls within either authority's jurisdiction.

.12 "Mechanical Divisions" – refers to Divisions 20, 21, 22, 23, 25 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Mechanical Contractor, unless otherwise noted.

.13 "Electrical Divisions" – refers to Divisions 26, 27, 28 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Electrical Contractor, unless otherwise noted.

.14 "Consultant" – means person, firm or corporation identified as such in Agreement or Documents, and is licensed to practice in Place of the Work, and has been appointed by Departmental Representative to act for Departmental Representative in a professional capacity in relation to the Work.

.15 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.

.16 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Consultant.

1.4 DOCUMENTS

.1 Documents for bidding include but are not limited to issued Drawings, Specifications and Addenda.

.2 Specification is arranged in accordance with CSI/CSC 50 Division Sections MasterFormat.

.3 Drawings and Specifications are portions of Contract Documents and identify labour, products and services necessary for performance of work and form a basis for determining pricing. They are intended to be cooperative. Perform work that is shown, specified, or reasonably implied on the drawings but not mentioned in Specification, or vice-versa, as though fully covered by both.

.4 Review Drawings and Specifications in conjunction with documents of other Divisions and, where applicable, Code Consultant’s report.

.5 Unless otherwise specifically noted in Specifications and/or on Drawings, Sections of Mechanical Divisions are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and Sections are to be read as a whole.

.6 Drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of building is to be taken on site. Do not scale Drawings, and do not use Drawings for prefabrication work.

.7 Drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, offsets, fittings, transformations and similar products required as a result of obstructions and other architectural and/or structural details but not shown on Drawings.

.8 Locations of equipment and materials shown may be altered, when reviewed by Consultant, to meet requirements of equipment and/or materials, other equipment or systems being installed, and of building, all at no additional cost to Contract.

.9 Specification does not generally indicate specific number of items or amounts of material required. Specification is intended to provide product data and installation requirements. Refer to schedules, Drawings (layouts, riser diagrams, schematics, details) and Specification to provide correct quantities. Singular may be read as plural and vice versa.

.10 Starter/motor control centre (MCC)/variable frequency drive (VFD) schedule drawings are both mechanical and electrical, and apply to work of Mechanical Divisions and Electrical Divisions. Be responsible for reviewing starter, MCC, VFD, and motor specification requirements prior to Bid submission. Confirm and coordinate exact scope of work and responsibility of work between Mechanical Divisions and Electrical Divisions.

.11 Drawings and Specifications have been prepared solely for use by party with whom Consultant has entered into a contract and there are no representations of any kind made by Consultant to any other party.

.12 When scale and date of Drawings are the same, or when discrepancy exists within Specification, include most costly arrangement to take precedence.

.13 In case of discrepancies or conflicts between Drawings and Specification, documents will govern in following order:

.1 Specification;

.2 Drawings of larger scale;

.3 Drawings of smaller scale;

.4 Drawings of later date when scale of Drawings is same.

1.5 EXAMINATION OF DOCUMENTS AND SITE

.1 Carefully examine Documents and visit site to determine and review existing site conditions that will or may affect work, and include for such conditions in Bid Price.

.2 Report to Consultant, prior to Bid Submittal, any existing site condition that will or may affect performance of work as per Documents. Failure to do so will not be grounds for additional costs.

.3 Upon finding discrepancies in, or omissions from Documents, or having doubt as to their meaning or intent, immediately notify Consultant, in writing.

1.6 WORK STANDARDS

.1 Where any code, regulation, bylaw, standard, contract form, manual, printed instruction, and installation and application instruction is quoted it means, unless otherwise specifically noted, latest published edition at time of submission of Bids adopted by and enforced by local governing authorities having jurisdiction. Include for compliance with revisions, bulletins, supplementary standards or amendments issued by local governing authorities.

.2 Where regulatory codes, standards and regulations are at variance with Drawings and Specification, more stringent requirement will apply unless otherwise directed by Departmental Representative and reviewed with Consultant.

.3 Supplementary mandatory specification and requirements to be used in conjunction with project include but are not limited to following:

.1 Air-Conditioning, Heating and Refrigeration Institute (AHRI);

.2 Air Movement and Control Association (AMCA);

.3 American Iron and Steel Institute (AISI);

.4 American National Standards Institute (ANSI);

.5 American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., (ASHRAE);

.6 American Society of Mechanical Engineers (ASME);

.7 American Society of Testing and Materials (ASTM);

.8 American Water Works Association (AWWA);

.9 Associated Air Balance Council (AABC);

.10 Building Industry Consulting Services, International (BICSI);

.11 Canadian Gas Association (CGA);

.12 Canadian General Standards Board (CGSB);

.13 Canadian Standards Association (CSA);

.14 Electrical and Electronic Manufacturers Association of Canada (EEMAC);

.15 Electrical Safety Authority (ESA);

.16 Electronic Industries Association (EIA);

.17 Factory Mutual Systems (FM);

.18 Illuminating Engineering Society (IES);

.19 Institute of Electrical and Electronic Engineers (IEEE);

.20 International Standards Organization (ISO);

.21 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS);

.22 National Building Code of Canada (NBC);

.23 National Electrical Manufacturers Association (NEMA);

.24 National Environmental Balancing Bureau (NEBB);

.25 National Fire Protection Association (NFPA);

.26 National Standards of Canada;

.27 NSF International;

.28 Occupational Health and Safety Act (OHSA);

.29 Ontario Electrical Safety Code (OESC);

.30 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA);

.31 Technical Standards and Safety Authority (TSSA);

.32 Thermal Insulation Association of Canada (TIAC);

.33 Underwriters' Laboratories of Canada (ULC);

.34 Workplace Hazardous Materials Information System (WHMIS);

.35 Material Safety Data Sheets by product manufacturers;

.36 local utility inspection permits;

.37 Codes, standards, and regulations of local governing authorities having jurisdiction;

.38 additional codes and standards listed in Trade Sections;

.39 Departmental Representative's standards.

.4 Provide applicable requirements for barrier free access in accordance with latest edition of local governing building code.

.5 Where any governing Code, Regulation, or Standard requires preparation and submission of special details or drawings for review they are to be prepared and submitted to appropriate authorities. Be responsible for costs associated with these submittals.

.6 Unless otherwise specified, install equipment in accordance with equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions. Notify Consultant in writing of conflicts between Contract Documents and manufacturer's instructions.

.7 Work is to be performed by journeyperson tradesmen who perform only work that their certificates permit, or by apprentice tradesmen under direct on site supervision of experienced journeyperson tradesman. Journeyperson to apprentice ratio is not to exceed ratio determined by the Board as stated in Ontario College of Trades and Apprenticeship Act or local equivalent governing body in Place of the Work.

.8 Journeyperson tradesmen are to have a copy of valid trade certificates available at site for review with Consultant at any time.

.9 Experienced and qualified superintendent is to be on-site at times when work is being performed.

.10 Protect existing areas above, below and adjacent areas of Work from any debris, noise, or interruptions to existing services to satisfaction of Departmental Representative and reviewed with Consultant. Maintain in operation existing services to these areas to allow Departmental Representative to continue use of these areas. If services that are required to be maintained run through areas of renovations, provide necessary protection to services or reroute, in coordination with Departmental Representative and Consultant. Include for required premium time work to meet these requirements.

.11 Work being performed within occupied spaces and work affecting surfaces adjacent to occupied spaces may need to be performed after regular business hours. For areas where spaces are used by Departmental Representative on a 24 hours basis or over various hours, coordinate hours of work with Departmental Representative on a regular basis to suit Departmental Representative's schedule. Execute work at times confirmed with and agreed to by Departmental Representative and reviewed with Consultant, so as not to inconvenience Departmental Representative's occupation or in any way hinder Departmental Representative's use of building. Include for required premium time work to meet these requirements.

.12 Coordinate work inspection reviews and approvals with governing inspection department to ensure construction schedule is not delayed. Be responsible for prompt notification of deficiencies to Consultant and submission of reports and certificates to Consultant.

.13 Properly protect equipment and materials on site from damage and defacement due to elements and work of trades, to satisfaction of Departmental Representative and reviewed with Consultant. Equipment and materials are to be in new condition upon Substantial Performance of the Work.

.14 Mechanical piping system work, including equipment, must comply in all respects with requirements of local technical standards authorities and CSA B51, Boiler, Pressure Vessels and Pressure Piping Code. Where required, mechanical work products are to bear a CRN number.

.15 Electrical items associated with mechanical equipment are to be certified and bear stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, etc., or bear a stamp to indicate special electrical utility approval.

1.7 PERMITS, CERTIFICATES, APPROVALS AND FEES

.1 Contact and confirm with local authorities having jurisdiction including utility providers, requirements for approvals from such authorities. Obtain and pay for permits, certificates, and approvals required to complete Work.

.2 Be responsible for ensuring that authorities having jurisdiction which require on-site inspection of work, have ample notification to perform inspection, with sufficient lead time to correct deficiencies in a manner that will not impede schedule of completion of Work. If any defect, deficiency or non-compliant is found in work by inspection, be responsible for costs of such inspection, including any related expenses, making good and return to site, until work is passed by governing authorities.

.3 Obtain and submit to Consultant, approval/inspection certificates issued by governing authorities to confirm that Work as installed is in accordance with rules and regulations of local governing authorities and are acceptable.

.4 Include in each copy of operating and maintenance instruction manuals, copies of approvals and inspection certificates issued by regulatory authorities.

1.8 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

.1 Professional engineers retained to perform consulting services with regard to Project work, i.e. seismic engineer, fire protection engineer or structural engineer, are to be members in good standing with local Association of Professional Engineers, and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of governing authorities in Place of the Work.

.2 Retained engineer's professional liability insurance is to protect Contractor's consultants and their respective servants, agents, and employees against any loss or damage resulting from professional services rendered by aforementioned consultants and their respective servants, agents, and employees in regards to the Work of this Contract.

.3 Unless otherwise specified in Division 00 or 01, liability insurance requirements are as follows:

.1 coverage is to be a minimum of $1,000,000.00 CDN inclusive of any one occurrence;

.2 insurance policy is not to be cancelled or changed in any way without insurer giving Departmental Representative minimum thirty days written notice;

.3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the Place of the Work;

.4 retained consultants are to ascertain that sub-consultants employed by them carry insurance in the form and limits specified above;

.5 evidence of the required liability insurance in such form as may be required is to be issued to Departmental Representative, Departmental Representative's Consultant, and Municipal Authorities as required prior to commencement of aforementioned consultant's services.

1.9 WORKPLACE SAFETY

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for products where required, and maintain one copy at site in a visible and accessible location available to personnel.

.2 Comply with requirements of Occupational Health and Safety Act and other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations. When working in confined spaces, comply with requirements of Occupational Health and Safety Act - Ontario Regulation 632, "Confined Spaces" and any other applicable Ministry of Labour requirements.

1.10 PLANNING AND LAYOUT OF WORK

.1 Base installation layout, design, terminations, and supply of accessories, on Contract Documents with specific coordination with reviewed shop drawings.

.2 Plan, coordinate, and establish exact locations and routing of services with affected trades prior to installation such that services clear each other as well as other obstructions. Generally, order of right of way for services to be as follows:

.1 piping requiring uniform pitch;

.2 piping 100 mm (4") dia. and larger;

.3 large ducts (main runs);

.4 cable tray and bus duct;

.5 conduit 100 mm (4") dia. and larger;

.6 piping less than 100 mm (4") dia.;

.7 smaller branch ductwork;

.8 conduit less than 100 mm (4") dia..

.3 Unless otherwise shown or specified, conceal work in finished areas, and conceal work in partially finished and/or unfinished areas to extent made possible by the area construction. Install services as high as possible to conserve headroom and/or ceiling space. Notify Consultant where headroom or ceiling space appears to be inadequate prior to installation of work.

.4 Do not use Contract Drawing measurements for prefabrication and layout of piping, sheet metal work and such other work. Locations and routing are to generally be in accordance with Contract Drawings, however, prepare layout drawings for such work. Use established bench marks for both horizontal and vertical measurements. Confirm inverts, coordinate with and make allowances for work of other trades. Accurately layout work, and be entirely responsible for work installed in accordance with layout drawings. Where any invert, grade, or size is at variance with Contract Drawings, notify Consultant prior to proceeding with work.

.5 Prepare plan and interference drawings (at a minimum drawing scale of 1:50 or ¼"=1' 0") of work for coordination with each trade Contractor. Arrange for preparation of detailed section drawings of ceiling spaces of corridors and any other congested areas. Sections are to be cross referenced with plan drawings so that trades may make use of section drawings. Section drawings to indicate lateral and elevation dimensions of major services within ceiling space. Lateral dimensions are to be from grid lines and elevations from top of floor slab. Obtain from Consultant, engineering drawings for this use. Contractors' interference drawings are to be distributed among other Trade Contractors. Submit drawings to Consultant for review. Failure of General Contractor to prepare and coordinate overall interface drawings of trades does not relieve respective Division Contractor of responsibility to ensure that work is properly planned and coordinated.

.6 Carry out alterations in arrangement of work that has been installed without proper coordination, study, and review, even if in accordance with Contract Documents, in order to conceal work behind finishes, or to allow installation of other work, without additional cost. In addition, make necessary alterations in other work required by such alterations, without additional cost.

.7 Shut-off valves, balancing devices, air vents, equipment and similar products, particularly such products located above suspended ceilings must be located for easy access for servicing and/or removal. Products which do not meet this location requirement are to be relocated to an accessible location at no additional cost.

.8 Be responsible for making necessary changes, at no additional cost, to accommodate structural and building conditions that were missed due to lack of coordination.

1.11 PHASING

.1 Include for scheduling, coordination, and construction phasing to suit project as specified in Division 01 and on drawings. Review exact phasing requirements with Consultant prior to start of Work.

.2 Phasing and scheduling of Work is required in order to maintain existing building operations. Include costs (including costs for "off hours" work) for scheduling, co-ordination, and construction phasing to suit this project as specified in Division 01 and on drawings. Review phasing requirements with Consultant prior to start of Work.

.3 Co-ordinate with architecture for the work phasing of roof replacement.

1.12 COORDINATION OF WORK

.1 Review Contract Documents and coordinate work with work of each trade. Coordination requirements are to include but not be limited to following:

.1 requirements for openings, sleeves, inserts and other hardware necessary for installation of work;

.2 concrete work such as housekeeping pads, sumps, bases, etc., required for work, and including required dimensions, operating weight of equipment, location, etc.;

.3 depth and routing of excavation required for work, and requirements for bedding and backfill;

.4 wiring work required for equipment and systems but not specified to be done as part of mechanical work, including termination points, wiring type and size, and any other requirements.

.2 Ensure materials and equipment are delivered to site at proper time and in such assemblies and sizes so as to enter into building and be moved into spaces where they are to be located without difficulty.

.3 Wherever possible, coordinate equipment deliveries with manufacturers and/or suppliers so equipment is delivered to site when it is required, or so it can be stored within building, subject to available space as confirmed with Departmental Representative and reviewed with Departmental Representative, and protected from elements.

.4 Ensure proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Comply with code requirements with regards to access space provision around equipment. Remove and replace any equipment which does not meet this requirement.

.5 Where work is to be integrated, or is to be installed in close proximity with work of other trades, coordinate work prior to and during installation.

1.13 PRODUCTS

.1 Be responsible for ordering of products (equipment and materials) in a timely manner in order to meet project-scheduling timelines. Failure to order products to allow manufacturers sufficient production/delivery time to meet project-scheduling timelines is an unacceptable reason to request for other suppliers or substitutions.

.2 Provide Canadian manufactured products wherever possible or required and when quality and performance is obtainable at a competitive price. Products are to be supplied from manufacturer's authorized Canadian representative, unless otherwise noted. Unless otherwise specified, products are to be new and are to comply with applicable respective Canadian standards. References to UL listings of products to include requirements that products are to be also Underwriters Laboratories of Canada (ULC) listed for use in Canada. Products are to meet or exceed latest ANSI/ASHRAE/IES 90.1 standards, as applicable. Do not supply any products containing asbestos materials or PCB materials.

.3 Systems and equipment of this Project are to be "State of the Art" and be most recent and up to date series/version of product that is available at time of shop drawing review process. Products that have been stored or "on shelf" for an extended period of time will not be accepted. Software is to be of latest version available and be provided with updates available at time of shop drawing review process. Systems are to be designed such that its software is backwards compatible. Future upgrades are not to require any hardware replacements or additions to utilize latest software.

.4 Products scheduled and/or specified have been selected to establish a performance and quality standard, and, in some instances, a dimensional standard. In most cases, base specified manufacturers are stated for any product specified by manufacturer's name and model number. Where acceptable manufacturers are listed, first name listed is base specified company. Bid Price may be based on products supplied by any of manufacturers' base specified or named as acceptable for particular product. If acceptable manufacturers are not stated for a particular product, base Bid Price on product supplied by base specified manufacturer.

.5 Documents have been prepared based on product available at time of Bidding. If, after award of Contract, and if successful manufacturer can no longer supply a product that meets base specifications, notify Consultant immediately. Be responsible for obtaining other manufacturers product that complies with base specified performance and criteria and meets project timelines. Proposed products are subject to review and consideration by Consultant and are considered as substitutions subject to a credit to Contract. In addition, if such products require modifications to room spaces, mechanical systems, electrical systems, etc., include required changes. Such changes are to be submitted in detail to Consultant for review and consideration for acceptance. There will be no increase in Contract Price for revisions. Above conditions supplement and are not to supersede any specification conditions with regards to substitutions or failure to supply product as per issued documents.

.6 Listing of a product as "acceptable" does not imply automatic acceptance by Consultant and/or Departmental Representative. It is responsibility of Contractor to ensure that any price quotations received and submittals made are for products that meet or exceed specifications included herein.

.7 If products supplied by a manufacturer named as acceptable are used in lieu of base specified manufacturer, be responsible for ensuring that they are equivalent in performance and operating characteristics (including energy consumption if applicable) to base specified products. It is understood that any additional costs (i.e. for larger starters, larger feeders, additional spaces, etc.), and changes to associated or adjacent work resulting from provision of product supplied by a manufacturer other than base specified manufacturer, is included in Bid Price. In addition, in equipment spaces where equipment named as acceptable is used in lieu of base specified equipment and dimensions of such equipment differs from base specified equipment, prepare and submit for review accurately dimensioned layouts of rooms affected, identifying architectural and structural elements, systems and equipment to prove that equipment in room will fit properly meeting design intent. There will be no increase in Contract Price for revisions.

.8 In addition to manufacturer's products base specified or named as acceptable, other manufacturers of products may be proposed as substitutions to Consultant for review and consideration for acceptance, listing in each case a corresponding credit for each substitution proposed. However, base Bid Price on products base specified or named as acceptable. Certify in writing to Consultant that proposed substitution meets space, power, design, energy consumption, and other requirements of base specified or acceptable product. It is understood that there will be no increase in Contract Price by reason of any changes to associated equipment, mechanically, electrically, structurally or architecturally, required by acceptance of proposed substitution. Consultant has sole discretion in accepting any such proposed substitution of product. Indicate any proposed substitutions in areas provided on Bid Form. Do not order such products until they are accepted in writing by Consultant.

.9 Where products are listed as "or approved equal", certify in writing that product to be used in lieu of base specified product, at least meets space, power, design, energy consumption, and other requirements of base specified product and is equivalent or better than base specified product. When requested by Consultant, provide full design detail drawings and specifications of proposed products. Acceptance of these "or approved equal" products is at sole discretion of Consultant. It is understood that there will be no increase in Contract Price by reason of any changes to associated equipment, mechanically, electrically, structurally or architecturally, required by acceptance of approved equal product. There must be no increase in Contract price due to Consultant's rejection of proposed equivalent product.

.10 Whenever use of product other than base specified product is being supplied, ensure corresponding certifications and product information (detailed catalogue and engineering data, fabrication information and performance characteristics) are submitted to Consultant for review. Failure of submission of these documents to Consultant in a timely manner to allow for review will result in base specified product to be supplied at Consultant's discretion, at no additional cost to Contract.

.11 Products supplied by a manufacturer/supplier other than a manufacturer listed as acceptable may be considered for acceptance by Consultant if requested in writing with full product documentation submitted, a minimum of 10 working days prior to Bid closing date.

.12 Any proposed changes initiated by Contractor after award of Contract may be considered by Consultant at Consultant's discretion, with any additional costs for such changes if accepted by Departmental Representative and reviewed with Consultant, and costs for review, to be borne by Contractor.

.13 Whenever use of product other than based specified products or named as acceptable is being supplied, time for process of submission of other products and Consultant's review of products will not alter contract time or delay work schedule.

1.14 ENGINEERED SUBMITTALS

.1 Submittals for items required to be sealed by a professional engineer (engineered) are to be duly prepared, sealed, and signed under direct control and supervision of a qualified professional engineer licensed in jurisdiction of the work. Professional engineer is to conform to requirements specified in this Section in article entitled Requirements for Contractor Retained Engineers.

.2 Engineered submittals are to include, but not be limited to, following:

.1 complete CAD layout drawings indicating equipment, piping schematic, pipe routing and sizing, zones, devices, wiring schematics, and any other pertinent data;

.2 listing of design data used to determine system layout and sizing;

.3 complete copies of design calculations and listing of design data used in preparing calculations;

.4 list detailing standards, codes, regulations, etc. adhered to when designing system;

.5 items as noted in other Sections of the Specification.

.3 Professional engineer responsible for engineered submittals is to perform periodic field reviews, including review of associated mock-ups where applicable, at locations wherever work as described by engineered submittal is in progress, during fabrication and installation of such work, and submit a field review report after each visit. Submit field review reports to Consultant and authorities having jurisdiction as required.

.4 Field reviews are to be at intervals as necessary and appropriate to progress of work described by engineered submittal to allow engineer to be familiar with progress and quality of such work and to determine if work is proceeding in general conformity with Contract Documents including reviewed shop drawings and design calculations.

.5 Upon completion of work as described by engineered submittal, professional engineer responsible for preparation of engineered submittal and for performing periodic field reviews is to prepare and submit to Consultant and, if applicable, authorities having jurisdiction, a letter certifying that work has been supplied and installed in accordance with requirements of Contract Documents, authorities having jurisdiction and engineered submittal.

1.15 OPENINGS

.1 Supply opening sizes and locations to Consultant to allow verification of their effect on design, and for inclusion on structural drawings where appropriate.

.2 No openings are permitted through completed structure without written approval from Departmental Representative and reviewed with Consultant. Show required openings on a copy of structural drawings. Identify exact locations, elevations, and size of proposed openings and submit to Consultant for review, well in advance of doing work.

.3 Prior to leaving site at end of each day, walk through areas of work and check for any openings, penetrations, holes, and/or voids created under scope of work of project, and ensure that any openings created under scope of work have been closed off, fire-stopped and smoke-sealed. Unless otherwise directed by Departmental Representative and reviewed with Consultant, do not leave any openings unprotected and unfinished overnight.

1.16 SCAFFOLDING, HOISTING AND RIGGING

.1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to approval from Departmental Representative and reviewed with Consultant.

.2 Use scaffolds in such a manner as to interfere as little as possible with work of other trades.

.3 Do not place major scaffolding/hoisting equipment loads on any portion of structure without approval from Departmental Representative and reviewed with Consultant. No supports, clips, brackets or similar devices are to be welded, bolted or otherwise affixed to any finished member or surface without approval from Departmental Representative and review with Consultant.

.4 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

1.17 PRELIMINARY TESTING

.1 When directed by Consultant, promptly arrange, pay for, and perform site tests on any piece of equipment or any system for such reasonable lengths of time and at such times as may be required to prove compliance with Specification and governing Codes and Regulations, prior to Substantial Performance of the Work.

.2 When, in Consultant’s opinion, tests are required to be performed by a certified testing laboratory, arrange and pay for such tests.

.3 These tests are not to be construed as evidence of acceptance of work, and it is agreed and understood that no claim for delays or damage will be made for injury or breakage to any part or parts of equipment or system due to test where such injuries or breakage were caused by faulty parts and/or workmanship of any kind.

.4 When, in Consultant’s opinion, tests indicate that equipment, products, etc., are defective or deficient, immediately remove such equipment and/or products from site and replace them with acceptable equipment and/or products, at no additional cost.

1.18 PROVISIONS FOR SYSTEMS/EQUIPMENT USED DURING CONSTRUCTION

.1 Permanent building mechanical systems are not to be used for temporary heating or cooling purposes during construction.

.2 Confirm with Consultant what equipment can be used during construction.

.3 Any system or piece of equipment that is specified to be provided under requirements of Documents and is required to be used during construction stages of work prior to issuing of Certificate of Substantial Performance of the Work, are to be provided with special interim maintenance and service to cover systems/equipment during time of use during construction period of project until project has been certified as substantially performed and such systems/equipment are turned over to Departmental Representative.

.4 During this period of construction, such systems/equipment to not become property of Departmental Representative or be Departmental Representative's responsibility for maintenance or service. Systems/equipment are to remain property of respective manufacturers/suppliers or Contractor, who are responsible for full maintenance and servicing of systems/equipment in order to maintain validity of warranties after turn over to Departmental Representative.

.5 Prior to application for a Certificate of Substantial Performance of the Work and turn over to Departmental Representative, such systems/equipment to be cleaned, restored to "new" condition, paint finishes "touched-up", filters cleaned or replaced, etc.

1.19 TEMPORARY SERVICES

.1 Coordinate with Prime Contractor, requirements for temporary services including but not limited to temporary heating, cooling and water. Unless otherwise noted, provide required services in compliance with requirements of local governing building code and local governing inspection authorities.

.2 Maintain fire protection of areas which may include fire watch during temporary shutdowns of existing systems, in accordance with requirements of local governing code and local governing authorities.

.3

1.20 MAINTAINING EQUIPMENT PRIOR TO ACCEPTANCE

.1 Maintain equipment in accordance with manufacturer's instructions prior to start-up, testing and commissioning.

.2 Employ a qualified millwright to check and align shafts, drives, and couplings on all base mounted split coupled motor driven equipment.

.3 Where equipment lubrication fittings are not easily accessible, extend the fittings to accessible locations using copper or aluminium tubing.

.4 All filters are to be new upon Substantial Performance of the Work. This is in addition to any spare filters specified.

1.21 CLEANING

.1 During construction, keep site reasonably clear of rubbish and waste material resulting from work on a daily basis to the satisfaction of Departmental Representative and Consultant. Before applying for a Certificate of Substantial Performance of the Work, remove rubbish and debris, and be responsible for repair of any damage caused as a result of work.

.2 Clean equipment and devices installed as part of this project.

1.22 RECORD AS-BUILT DRAWINGS

.1 Drawings for this project have been prepared on a CAD system using AutoCAD software of release version reviewed with Consultant. For purpose of producing record "as built" drawings, copies of Contract Drawings can be obtained from Consultant, at expense of $25.00 CDN plus HST, per drawing, up to first 10 drawings, and $5.00 CDN plus HST, per any additional drawings thereafter. Drawings may also to be used for preparation of layouts and interference drawings.

.2 Drawings for this project have been prepared on a CAD system using Building Information Modelling (BIM) - Autodesk Revit Architecture (Revit) software of release version confirmed with Consultant. For purpose of producing record "as built" drawings, copies of Contract Drawings can be obtained from Consultant, at expense of $25.00 CDN plus HST, per drawing, up to first 10 drawings, and $5.00 CDN plus HST, per any additional drawings thereafter. Drawings may also to be used for preparation of layouts and interference drawings.

.3 For projects with phased turnover of project (refer to Division 01), review with Consultant completeness of as-built drawings prior to turn over of an area. Copies of hand drawn interim as-built drawings to be made available to Departmental Representative's maintenance personnel.

.4 Retain and pay for services of a land surveyor registered in Place of the Work to measure, verify, and record size, location, invert elevation and pitch of buried piping services, and, when complete, to produce a signed and sealed AutoCAD disc (of release version reviewed with Consultant) of survey work which is to be submitted to Consultant. Transfer survey work to as-built drawings.

1.23 COMMISSIONING

.1 After successful start-up and prior to Substantial Performance of the Work, commission the mechanical work. Commissioning work is the process of Contractor demonstrating to Departmental Representative and Consultant, for purpose of final acceptance, by means of successful and documented functional performance testing, that systems and/or subsystems are capable of being operated and maintained to perform in accordance with requirements of Contract Documents, as further described below.

.1 Retain services of a testing, adjusting, and balancing agency to perform testing and balancing of mechanical system air/fluid flows and capacities, prior to operational performance testing. Refer to Section entitled Testing, Adjusting and Balancing.

.2 Test, adjust and operate equipment and systems after start-up but before functional performance testing, to confirm operations are in accordance with requirements of Contract Documents. Verify modes and sequences of control and monitoring, interlocks, and responses to emergency conditions. Complete commissioning data sheets to document successful operational performance testing.

.3 Repeat successful operational performance testing with completed commissioning data sheet documentation in the presence of Consultant and Departmental Representative to validate and verify equipment and systems are complete in all respects, function correctly, and are ready for acceptance.

1.24 WARRANTY

.1 Unless otherwise specified in Divisions 00 and 01, warrant mechanical work to be in accordance with Contract Documents and free from defects for a period of 1 year from date of issue of a Certificate of Substantial Performance of the Work.

.2 Warranty to include parts, labour, travel costs and living expenses incurred by manufacturer's authorized technician to provide factory authorized on-site service.

.3 Repair and/or replace any defects that appear in Work within warranty period without additional expense to Departmental Representative. Be responsible for costs incurred in making defective work good, including repair or replacement of building finishes, other materials, and damage to other equipment. Ordinary wear and tear and damage caused wilfully or due to carelessness of Departmental Representative's staff or agents is exempted.

.4 Do not include Departmental Representative deductible amounts in warranties.

.5 It is understood that warranties are to commence from time of Substantial Performance of the Work, regardless of what is noted within following Sections of Specification. Be responsible for providing whatever "bridging" or additional extended warranty period is required from time that material is purchased until this time.

.6 Visit building during warranty period with Departmental Representatives. Departmental Representative to organize these visits. At these meetings, Departmental Representatives are to review performance of systems. If performance is satisfactory, then no further action needs to be taken. If unsatisfactory, then correct deficiencies, as directed by Departmental Representatives, to satisfaction of Departmental Representative's representatives. These site visits to occur:

.1 once during 1st month of building operation;

.2 once during 3rd month of building operation;

.3 once between 4th and 10th month in a season opposite to 1st and 3rd month visits.

1.25 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Substantial Performance of the Work, submit required items and documentation specified, including following:

.1 Operating and Maintenance Manuals;

.2 as-built record drawings and associated data;

.3 operating test certificates, i.e. Sprinkler Test Certificate;

.4 final commissioning report and TAB report;

.5 identified keys for equipment and/or panels for which keys are required, and other items required to be submitted;

.6 other data or products specified.

1.26 FINAL INSPECTION

.1 Submit to Consultant, written request for final inspection of systems. Include written certification that:

.1 deficiencies noted during job inspections have been completed;

.2 field quality control procedures have been completed;

.3 systems have been tested and verified, balanced and adjusted, and are ready for operation;

.4 maintenance and operating data have been completed and submitted to, reviewed with Consultant and accepted by Departmental Representative;

.5 tags and nameplates are in place and equipment identifications have been completed;

.6 clean-up is complete;

.7 spare parts and replacement parts specified have been provided and acknowledged by Consultant;

.8 as-built and record drawings have been completed and submitted to and reviewed with Consultant and accepted by Departmental Representative;

.9 Departmental Representative's staff has been instructed in operation and maintenance of systems;

.10 commissioning procedures have been completed.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Mechanical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

Part 2 Products

2.1 PIPING HANGERS AND SUPPORTS

.1 for piping on existing roof – Portable Pipe Hangers (Canada) Inc. "PP" Series prefabricated portable pipe support system components to suit pipe, complete with required accessories including bases, galvanized structural steel frames, and galvanized steel pipe hangers and supports conforming to MSS SP-58;

.2 for piping on new roofs – Lexcor "Flash-Tite" or Thaler Roofing Specialties Products Inc. "MERS" Series insulated aluminum support risers with diameter, height, securement method and flashing to suit the application, channel type aluminum cross members, and galvanized steel pipe hangers and supports conforming to MSS SP-58, complete with all required accessories;

.3 for plastic piping – generally as specified above but in accordance with pipe manufacturer's recommendations;

.4 for bare copper vertical piping – corrosion resistant ferrous clamps with flexible rubber gasket type material (not tape) to isolate pipe from clamp;

.5 insulation protection shields to and including 40 mm (1-½") dia. – MSS Type 40 galvanized steel shields with ribs to keep shield centred on hanger.

Part 3 Execution

3.1 GENERAL PIPING AND DUCTWORK INSTALLATION REQUIREMENTS

.1 Install pipes and ducts parallel to building lines and to each other.

.2 Carefully clean ducts, pipe and fittings prior to installation. Temporarily cap or plug ends of pipe, ducts and equipment which are open and exposed during construction.

.3 Unless otherwise specified and except where space limitations do not permit, piping elbows are to be long radius. Eccentric reducers are to be installed with straight side at top of piping.

3.2 PIPE JOINT REQUIREMENTS

.1 Do not make pipe joints in walls or slabs.

.2 Ream piping ends prior to making joints.

.3 Properly cut threads in screwed steel piping and coat male threads only with Teflon tape or paste, or an equivalent thread lubricant. After pipe has been screwed into fitting, valve, union, or piping accessory, not more than 2 pipe threads are to remain exposed.

.4 Site bevel steel pipe to be welded or supply mill bevelled pipe. Remove scale and oxide from bevels and leave smooth and clean. Use factory made welding tees or welding outlet fittings for piping branches off mains. Do not use shop or site fabricated fittings unless written approval has been obtained.

.5 Welded joints are to be made by CWB certified licensed journeyman welders qualified in accordance with CSA B51, Boiler Pressure Vessel and Pressure Piping Code, and who are in possession of a proper certificate of qualification for each procedure to be performed. Each weld is to be identified with the welder's identification symbol, and welds are not to be concealed until they have been inspected and approved. Electrodes are to be in accordance with CSA W48 Series, Electrodes, and requirements of CAN/CSA W117.2, Safety in Welding, Cutting and Allied Processes are to be followed.

3.3 INSTALLATION OF WATERPROOF MECHANICAL SEALS

.1 Provide watertight link type mechanical seals in exterior wall openings.

.2 Assemble and install each mechanical seal in accordance with manufacturer's instructions.

.3 After installation, periodically check each mechanical seal installation for leakage and, if necessary, tighten link seal bolts until seal is completely watertight.

3.4 DUCT OPENINGS

.1 Duct openings, air inlet and outlet openings, fire damper and similar openings will be provided in new poured concrete work, masonry, drywall and other building surfaces by trade responsible for particular construction in which opening is required.

.2 Size openings for fire dampers to 600 mm (24") high to suit damper arrangement with folding blade out of air stream.

.3 For duct openings except where fire dampers are required, pack and seal space between duct or duct insulation and duct opening as specified above for pipe openings in non-fire rated construction.

3.5 INSTALLATION OF FASTENING AND SECURING HARDWARE

.1 Provide fastening and securing hardware required for mechanical work to maintain installations attached to structure or to finished floors, walls and ceilings in a secure and rigid manner capable of withstanding dead loads, live loads, superimposed dead loads, and any vibration of installed products.

.2 Use fasteners compatible with structural requirements, finishes and types of products to be connected. Do not use materials subject to electrolytic action or corrosion where conditions are liable to cause such action.

.3 Where floor, wall or ceiling construction is not suitable to support loads, provide additional framing or special fasteners to ensure proper securement to structure that is to support the products. Provide reinforcing or connecting supports where required to distribute loading to structural components.

.4 Obtain written consent before using explosive actuated fastening devices. If consent is obtained, comply with requirements of CAN/CSA Z166.1 and CAN/CSA Z166.2.

3.6 INSTALLATION OF PIPE HANGERS AND SUPPORTS

.1 Provide required pipe hangers and supports.

.2 Provide any additional structural steel channels, angles, inserts, beam champs and similar accessories required for hanging or supporting pipe. Unless otherwise shown or specified, hang or support pipes from structure only.

.3 For insulated pipe, size hanger or support to suit diameter of insulated pipe and install hanger or support on outside of insulation and insulation finish.

.4 Support piping on the roof as follows:

.1 on existing roof – provide support members as specified in Part 2 of this Section spaced as per schedule above and of a type to suit the application, and, for each support, carefully scrape away roofing gravel, bed support in a heavy covering of roofing mastic, then scrape gravel back up around support and secure pipes to supports;

.2 on new roof – supply manufactured roof supports as per Part 2 of this Section to accommodate piping involved and support spacing specified above, and hand supports to roofing trade on roof for installation as part of roofing work, then secure piping in place on supports.

.5 Each hanger, support or securement for horizontal bare copper tubing is to be plastic coated to prevent direct contact between pipe and ferrous hanger. Each wall or floor clamp for vertical bare copper piping is to be isolated from pipe by means of strips of flexible rubber inserts. Use of painted ferrous hangers and supports, including those painted with copper coloured paint, is not acceptable. Site application of tape or other types of isolation is not acceptable.

.6 For insulated horizontal piping less than or equal to 40 mm (1-½") diameter, provide galvanized steel insulation protection shields between insulation and hanger or support. Install shields immediately after pipe is insulated.

.7 Do not support piping from steel deck without written consent from Consultant.

3.7 FINISH PAINTING OF MECHANICAL WORK

.1 Finish paint exposed mechanical work as specified and/or scheduled in accordance with requirements of painting Section in Division 09.

.2 Touch-up paint damaged factory applied finishes on mechanical work products.

.3 Finish painting of exposed mechanical work is specified in Division 09 and is part of the work of Division 09.

3.8 PIPE LEAKAGE TESTING

.1 Natural Gas Piping

.1 Test piping in accordance with requirements of CAN/CSA B149.1 and any additional requirements of local governing authorities.

.2 After completion of the verification test, locate required tag stating results of the verification test at the point of entry of gas main into building, affixed to the pipe in a secure manner.

.3 Check piping joints and connections for leaks with a water/soap solution while piping is under pressure.

.2 Refrigerant Piping

.1 Test refrigerant piping for leakage and dehydrate in accordance with requirements of Chapter 18 of ASHRAE Handbook - Fundamentals.

3.9 ELECTRICAL WIRING WORK FOR MECHANICAL WORK

.1 Unless otherwise specified or indicated, following electrical wiring work for mechanical equipment will be done as part of the electrical work:

.1 "line" side power wiring to motor starters or disconnect switches in motor control centres and starters or disconnects on motor starter panels, and "load" side wiring from starters or disconnects to equipment;

.2 "line" side power wiring to individual wall mounted starters, and "load" side wiring from starters to equipment;

.3 "line" side power wiring to pre-wired power and control panels and variable frequency drives (VFD), and "load" side power wiring from the panels and VFD's to equipment;

.4 provision of receptacles for plug-in equipment;

.5 provision of disconnect switches for motors in excess of 10 m (30') from starter location, or cannot be seen from starter location, and associated power wiring;

.6 motor starter interlocking in excess of 24 volts;

.7 wiring from motor winding thermistors in motors 30 HP and larger to motor starter contacts;

.8 120 volt power connections to electrical receptacles integral with small ceiling exhaust fans, including wiring through light switches or speed controllers;

.9 120 volt wiring connections to lighting fixture/switch combinations integral with air handling units;

.10 120 volt wiring connections to duplex receptacles integral with air handling unit control panels.

.2 Mechanical wiring work not listed above or specified herein or on drawings to be done as part of electrical work is to be installed in conduit and is to be done as part of mechanical work in accordance with wiring requirements specified for electrical work.

3.10 EQUIPMENT BASES AND SUPPORTS

.1 For equipment not designed for base mounting, where required, provide welded, cleaned and prime coat painted structural steel stands or supports conforming to following requirements:

.1 provide stands and supports, except those for small equipment, designed by a structural engineer registered in jurisdiction of the work, and submit stamped and signed design drawings with calculations as shop drawings for review;

.2 flange bolt steel stands to concrete housekeeping pads;

.3 seismically restrained stands and supports in accordance with applicable requirements.

3.11 CUTTING, PATCHING AND CORE DRILLING

.1 Unless otherwise provided by General Trades, perform cutting, patching, and core drilling of existing building required for installation of mechanical work. Perform cutting in a neat and true fashion, with proper tools and equipment to Consultant's approval. Patching is to exactly match existing finishes and be performed by tradesmen skilled in particular trade or application. Work is subject to review and acceptance by Consultant.

.2 Do not cut or drill any existing work without approval from Departmental Representative and Consultant. Be responsible for damage done to building and services caused by cutting or drilling.

3.12 CLEANING MECHANICAL WORK

.1 Refer to cleaning requirements specified in Division 01.

.2 Clean mechanical work prior to application for Substantial Performance of the Work.

.3 Include for vacuum cleaning interior of air handling units and ductwork systems.

3.13 CONNECTIONS TO OTHER EQUIPMENT

.1 Carefully examine Contract Documents during bidding period and include for mechanical work piping and/or ductwork connections to equipment requiring such connections.

3.14 SEISMIC RESTRAINT ANCHOR POINTS FOR EQUIPMENT

.1 Mechanical equipment requiring seismic restraint is to be complete with manufacturer designed and rated seismic restraint anchor points and attachments, certified by equipment manufacturers, so equipment may be bolted down or restrained in the field.

.2 Equipment to be restrained must be designed such that the strength and anchorage of the internal components of equipment exceeds force level used to restrain and anchor equipment itself to the supporting structure.

3.15 INSTALLATION OF FLEXIBLE CONNECTORS

.1 Provide flexible connectors in piping connections to seismically restrained equipment, and wherever else shown.

.2 Provide flexible connectors in piping connections to vibration isolated equipment.

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 This Section specifies insulation requirements common to Mechanical Divisions work Sections and it is a supplement to each Section and is to be read accordingly.

1.2 DEFINITIONS

.1 "concealed" – means mechanical services and equipment above suspended ceilings, in non-accessible chases, in accessible pipe spaces, and furred-in spaces.

.2 "exposed" – means exposed to normal view during normal conditions and operations.

.3 "mineral fibre" – includes glass fibre.

.4 "mineral wool" – includes rock wool and slag wool.

.5 "domestic water" or "potable water" – means piping extended from building Municipal supply main.

1.3 SUBMITTALS

.1 At least 4 weeks prior to insulation work commencing, submit a sample of each type of insulation (and insulation accessories and finish), in applied form, for review. Mount samples on a plywood board. Identify each product with manufacturer's name and insulation type, and proposed use of insulation. When sample board has been reviewed, mechanical insulation work is to conform to reviewed sample board.

.2 Submit a product data sheet for each insulation system product.

1.4 QUALITY ASSURANCE

.1 Mechanical insulation is to be applied by a licensed journeyman insulation mechanic, or by an apprentice under direct, daily, on-site supervision of a journeyman mechanic.

.2 Do not apply insulation unless leakage tests have been satisfactorily completed.

.3 Ensure surfaces to be insulated are clean and dry.

.4 Ensure ambient temperature is minimum 13°C (55°F) for at least 1 day prior to application of insulation, and for duration of insulation work, and relative humidity is and will be at a level such that mildew will not form on insulation materials.

.5 Company with sub-contract for mechanical insulation work is to be a member in good standing of Thermal Insulation Association of Canada (TIAC).

.6 Insulation materials must be stored on site in a proper, dry storage area. Any wet insulation material is to be removed from site.

Part 2 Products

2.1 THERMAL PERFORMANCE

.1 Unless otherwise specified, thermal performance of insulation is to meet or exceed values given in Tables entitled Minimum Piping Insulation Thickness Heating and Hot Water Systems and Minimum Piping Insulation Thickness Cooling Systems, as stated in ANSI/ASHRAE/IES Standard 90.1 version referenced in Ontario Building Code.

2.2 DUCTWORK SYSTEM INSULATION MATERIALS

.1 Rigid Mineral Fibre Board

.1 Pre-formed board type insulation to ASTM C612, 48 kg/m^3 (3 lb/ft^3) density, with a factory applied reinforced aluminum foil and kraft paper facing.

.2 Semi-Rigid Mineral Fibre Board

.1 Roll form insulation to ASTM C1393, consisting of cut strips of rigid mineral board insulation glued to an aluminium foil and kraft paper facing.

.3 Blanket Mineral Fibre

.1 Blanket type roll form insulation to ASTM C553, 24 kg/m^3 (1-½ lb/ft^3) density, 40 mm (1-½") thick, with a factory applied vapour barrier facing.

.4 Flexible Foam Elastomeric

.1 Sheet form, CFC free, closed cell, self-adhering elastomeric nitrile rubber insulation with a water vapour permeability rating of 0.08 in accordance with ASTM E96 Procedure A.

2.3 INSULATION FASTENINGS

.1 Aluminium Banding

.1 Minimum 12 mm (½") wide, 0.6 mm (1/16") thick aluminium strapping.

.2 Stainless Steel Banding

.1 0.6 mm (1/16") thick, minimum 12 mm (½") wide type 304 stainless steel strapping.

.3 Duct Insulation Fasteners

.1 Weld-on 2 mm (3/32") diameter zinc coated steel spindles of suitable length, complete with minimum 40 mm (1-½") square plastic or zinc plated steel self-locking washers.

.4 Tape Sealant

.1 Self-adhesive insulation tapes, as required to match surface being sealed.

.5 Mineral Fibre Insulation Adhesive

.1 Clear, pressure sensitive, brush consistency adhesive, suitable for a temperature range of -20°C to 82°C (-4°F to 180°F), compatible with type of material to be secured, and WHMIS classified as non-hazardous.

.6 Flexible Elastomeric Insulation Adhesive

.1 Air-drying contact adhesive.

.7 Lagging Adhesive

.1 White, brush consistency, ULC listed and labelled, maximum 25/50 fire/smoke rated in accordance with ULC S102, lagging adhesive for canvas jacket fabric, suitable for colour tinting, complete with fungicide and washable when dry.

.8 Screws

.1 No. 10 stainless steel sheet metal screws.

2.4 INSULATION JACKETS AND FINISHES

.1 Canvas Jacket Material

.1 ULC listed and labelled, 25/50 fire/smoke rated, roll form, minimum 170 g (6 oz.).

.2 Flexible Insulation Jacketing

.1 Flexible, laminated, self-adhering, protective jacketing, vapour barrier with 0.00 permeability rating and weatherproofing membrane, having a high performance acrylic adhesive capable of installation with no additional mechanical attachment and with a maximum flame spread/smoke developed rating of 25/50 when tested in accordance with ULC S102. Review finish colour requirements with Consultant before ordering.

.3 Roll Form Sheet and Fitting Covers

.1 Minimum 15 mm (½") thick white PVC, maximum 25/50 fire/smoke rated tested in accordance with ULC S102, complete with installation and sealing accessories.

.4 Rigid Aluminium Jacket

.1 0.406 mm (0.016") thick embossed aluminum jacket material to ASTM B209, factory cut to size and complete with polysurlyn moisture barrier and continuous modified Pittsburgh Z-Lock, butt straps with "Fabstraps" to weatherproof the end to end joints, and 2-piece epoxy coated pressed aluminum fittings with weather locking edges.

.5 Stainless Steel Jacket

.1 0.254 mm (0.010") thick type 304 embossed stainless steel jacket material to ASTM A240, factory cut to size and complete with moisture barrier and continuous modified Pittsburgh Z-Lock, butt straps with "Fabstraps" to cover end to end joints, and 2-piece pressed stainless steel fittings with weather locking edges.

.6 Adhesive-Backed Flexible Aluminium

.1 Roll form sheet material with an aggressive rubberized asphalt adhesive backing, high density polyethylene reinforcement, and an embossed aluminum facing.

.7 Thermal Insulating and Finishing Cement

.1 Heat resistant, trowel consistency thermal insulating and finishing cement to CAN/CGSB 51.12, and suitable for the application.

.8 Coating for Foamed Glass Insulation

.1 Foamed glass insulation protective coating is to be flexible acrylic latex weather barrier coating, white unless otherwise specified.

.9 Coating for Flexible Foam Elastomeric Insulation

.1 Flexible foam elastomeric insulation protective coating with weatherproof, water-based latex enamel finish.

Part 3 Execution

3.1 GENERAL INSULATION APPLICATION REQUIREMENTS

.1 Unless otherwise specified, do not insulate following:

.1 factory insulated equipment and piping;

.2 piping unions, except for unions in "cold" category piping.

.2 Install work generally in accordance with TIAC National Insulation Standards Manual except conform to manufacturer's instructions and recommendations, and requirements specified in this Section.

.3 Install insulation directly over pipes and ducts, not over hangers and supports.

.4 Install duct insulation continuous through walls, partitions, and similar surfaces except at fire dampers.

.5 For insulation thicknesses greater than or equal to 75 mm (3"), provide double layer of insulation to achieve required insulation thickness and stagger joint locations.

3.2 DUCTWORK INSULATION REQUIREMENTS – MINERAL FIBRE

.1 Insulate following ductwork systems inside building and above ground with mineral fibre insulation of thickness indicated:

.1 outside air intake ductwork, casings and plenums from fresh air intakes to and including mixing plenums or sections, or, if mixing plenums or sections are not provided, to first heating coil, or if both mixing plenums or sections and heating coil sections are not provided, and fresh air is not tempered, then the fresh air ductwork system complete – minimum 40 mm (1-½") thick as required;

.2 mixed supply air or preheated supply air casings, plenums and sections to and including the fan section where not factory insulated – minimum 25 mm (1") thick rigid board or minimum 40 mm (1-½") thick flexible blanket as required;

.3 supply air ductwork outward from fans, except for supply ductwork exposed in area it serves – minimum 25 mm (1") thick rigid board or minimum 40 mm (1-½") thick flexible blanket as required;

.4 exhaust discharge ductwork for a distance of 3 m (10') downstream (back) from exhaust openings to atmosphere, including any exhaust plenums within the 3 m (10') distance – minimum 25 mm (1") thick rigid board or minimum 40 mm (1-½") thick flexible blanket as required;

.5 any other ductwork, casings, plenums or sections specified or detailed on drawings to be insulated – thickness as specified.

.2 Provide rigid board type insulation for casings, plenums, and exposed rectangular ductwork. Provide blanket type insulation for concealed round, oval or rectangular ductwork. Provide semi-rigid mineral fibre board type insulation for exposed round or oval ducts.

.3 Liberally apply adhesive to surfaces of exposed rectangular ducts and/or casings. Accurately and neatly press insulation into adhesive with tightly fitted butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom and side surfaces. Secure and seal joints with 75 mm (3") wide tape sealant. Additional installation requirements as follows:

.1 at trapeze hanger locations, install insulation between duct and hanger;

.2 provide drywall type metal corner beads on edges of ductwork, casings and plenums in equipment rooms, service corridors, and any other area where insulation is subject to accidental damage, and secure in place with tape sealant.

.4 Liberally apply adhesive to surfaces of concealed rectangular or oval ductwork, and wrap insulation around duct with a top butt joint and tight section to section butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom surfaces. Secure and seal joints with 75 mm (3") tape sealant. At each trapeze type duct hanger, provide a 100 mm (4") wide full length piece of rigid mineral fibre board insulation between duct and hanger.

.5 Accurately cut sections of insulation to fit tightly and completely around exposed and concealed round or oval ductwork. Liberally apply adhesive to surfaces of duct, and wrap insulation around duct with a top butt joint and tight section to section butt joints. Seal joints with tape sealant. At duct hanger locations install insulation between duct and hanger. At each hanger location for concealed ductwork where flexible blanket type insulation is used, provide a 100 mm (4") wide full circumference strip of semi-rigid board type duct insulation between duct and hanger.

.6 Insulation application requirements common to all types of rigid ductwork are as follows:

.1 at duct connection flanges, insulate flanges with neatly cut strips of rigid insulation material secured with adhesive to side surfaces of flange with a top strip to cover exposed edges of the side strips, then butt the flat surface duct insulation up tight to flange insulation, or, alternatively, increase insulation thickness to depth of flange and cover top of flanges with tape sealant;

.2 installation of fastener pins and washers is to be concurrent with duct insulation application;

.3 cut insulation fastener pins almost flush to washer and cover with neatly cut pieces of tape sealant;

.4 accurately and neatly cut and fit insulation at duct accessories such as damper operators (with standoff mounting) and pitot tube access covers;

.5 prior to concealment of insulation by either construction finishes or canvas jacket material, patch vapour barrier damage by means of tape sealant.

3.3 DUCTWORK INSULATION REQUIREMENTS – FLEXIBLE ELASTOMERIC

.1 Insulate exposed exterior ductwork (except fresh air intake ductwork) and associated plenums and/or casings outside building with minimum 50 mm (2") thick flexible elastomeric sheet insulation as required, applied in two minimum 25 mm (1") thick layers with staggered tightly butted joints.

.2 Install with adhesive in strict accordance with manufacturer's instructions to produce a weather-proof installation. Ensure sheet metal work joints are sealed watertight prior to applying insulation.

3.4 APPLICATION OF INSULATING COATINGS

.1 Apply, in accordance with manufacturer's instruction, insulating coatings to following bare metal surfaces:

.1 paint bare metal surfaces clear of "cold" piping and/or equipment insulation for a distance of from 300 mm (12") to 600 mm (24") clear of pipe or equipment insulation, with anti-condensation coating;

.2 paint bare metal surfaces associated with mechanical systems with an operating temperature 60°C (140°F) with insulating coating.

.2 Apply coatings with a brush. Remove any splatter or excess coating from adjacent surfaces.

3.5 INSULATION FINISH REQUIREMENTS

.1 Canvas Jacket Material

.1 Unless otherwise shown and/or specified, jacket exposed mineral fibre insulation, and calcium silicate duct insulation work inside building with canvas secured in place with a full covering coat of lagging adhesive. Accurately cut canvas with scissors or a knife. Do not rip or tear canvas to size. Remove lagging adhesive splatter from adjacent uninsulated surfaces.

.2 Flexible Insulation Jacketing

.1 Flexible insulation jacketing is to be considered equivalent to canvas and lagging, PVC, and rigid metal jacketing, and may be provided in lieu of aforementioned materials/products. Submit list with shop drawing submittal indicating which services are to be provided with flexible insulation jacketing. For services inside building, ensure product utilized has been tested to CAN/ULC S102 and meets local governing flame spread/smoke developed requirements.

.2 Confirm finish/colour with Consultant before ordering.

.3 Install in accordance with manufacturer's instructions and recommendations.

.3 Rigid Aluminum Jacket

.1 Install rigid aluminum jacket material tightly in place with overlapped circumferential joints positioned to shed water and covered with butt straps supplied with jacket. Provide aluminum jacket for following insulation:

.4 Adhesive-Backed Flexible Aluminum

.1 Install adhesive-backed flexible aluminum to cleaned and primed metal surfaces in strict accordance with manufacturer's instructions and details, including shingle type overlap joints to shed water, use of a hand roller to concentrate pressure on seams, and ambient temperature application requirements.

.2 Provide adhesive-backed flexible aluminum jacket for following insulation:

.5 Rigid Stainless Steel Jacket

.1 Install rigid stainless steel jacket material tightly in place with overlapped circumferential joints positioned to shed water and covered with butt straps supplied with jacket. Provide stainless steel jacket for following:

.6 Coating for Flexible Foam Elastomeric Insulation

.1 Apply 2 coats (with 24 hr. between coats) of specified coating to flexible elastomeric insulation outside building.

END OF SECTION

Part 1 General

1.1 APPLICATION

.1 This Section specifies requirements, criteria, methods and execution for mechanical demolition work that are common to one or more mechanical work Sections, and it is intended as a supplement to each Section and is to be read accordingly.

1.2 SUBMITTALS

.1 Submit documentation to confirm reclaimed refrigerant has been properly removed and stored, recycled, or disposed of as applicable.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 DISCONNECTION AND REMOVAL OF EXISTING MECHANICAL WORK

.1 Where indicated on drawings, disconnect and remove existing mechanical work, including hangers, supports, insulation, etc. Disconnect at point of supply, remove obsolete connecting services and make system safe. Cut back obsolete piping behind finishes and cap water-tight unless otherwise specified.

.2 Scope and extent of demolition or revision work is only generally indicated on drawings. Estimate scope, extent and cost of work at site during bidding period site visit(s). Claims for extra costs for demolition work not shown or specified but clearly visible or ascertainable at site during bidding period site visits will not be allowed.

.3 If any re-design is required due to discrepancies between mechanical drawings and site conditions, notify Consultant who will issue a Site Instruction. If, in the opinion of Consultant, discrepancies between mechanical drawings and actual site conditions are of a minor nature, required modifications are to be done at no additional cost.

.4 Where existing mechanical services extend through, or are in an area to serve items which are to remain, maintain services in operation. Include for rerouting existing services concealed behind existing finishes and which become exposed during renovation work, so as to be concealed behind new or existing finishes.

3.2 INTERRUPTION TO AND SHUT-DOWN OF MECHANICAL SERVICES AND SYSTEMS

.1 Co-ordinate shut-down and interruption to existing mechanical systems with Departmental Representative. Generally, shut-downs may be performed only between the hours of 12:00 midnight Friday until 6:00 a.m. Monday morning.

.2 Upon award of contract, submit a list of anticipated shut-down times and their maximum duration.

.3 Prior to each shut-down or interruption, inform Departmental Representative in writing 5 business days in advance of proposed shut-down or interruption and obtain written consent to proceed. Do not shut-down or interrupt any system or service without such written consent.

.4 Perform work associated with shut-downs and interruptions as continuous operations to minimize shut-down time and to reinstate systems as soon as possible, and, prior to any shut-down, ensure materials and labour required to complete the work for which shut-down is required are available at site.

3.3 DECOMMISSIONING OR ALTERATIONS TO REFRIGERATION EQUIPMENT

.1 Remove and reclaim refrigerant from applicable equipment to be decommissioned and/or altered. Refrigerant reclaim and recycling work is to be in accordance with Refrigerant Management Canada guidelines, and governing codes and regulations. Do not under any circumstances vent refrigerant from existing equipment to atmosphere.

.2 Use refrigerant recovery equipment designed specifically to reclaim and recycle refrigerant, and use only skilled refrigeration mechanics to perform reclaim and recycle work.

.3 Provide approved, properly sized and sealable refrigerant containers for reclaimed refrigerant.

.4 Dispose of reclaimed refrigerant by engaging services of a licensed firm specializing in recycling of reclaimed refrigerant. Submit documentation to confirm refrigerant has been properly removed from site and recycled or disposed.

3.4 ROOFING WORK

.1 Where roof revisions and/or replacements are part of project, include for disconnecting, lifting, or temporarily removing mechanical equipment on roof as required to permit completion of roofing work, and for re-installing equipment when roofing work is complete.

END OF SECTION

Part 1 General

1.1 QUALITY ASSURANCE

.1 Gas system work is to be in accordance with requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code, as amended by local Gas Codes.

.2 Gas system work is to be performed only by licensed gas pipe fitters (holding Gas Technician 1 Certificate) authorized under TSSA Act.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 DEMOLITION

.1 Perform required gas system demolition work. Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.2 NATURAL GAS PIPING INSTALLATION REQUIREMENTS

.1 Provide required natural gas distribution piping and connect gas fired or operated equipment, and provide required vent piping to atmosphere, including vent piping from pressure regulators. Perform piping work in accordance with requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code, as amended by local Gas Codes.

.2 Piping is to be as follows:

.1 for aboveground piping, uncoated Schedule 40 black steel, hard temper or soft copper, or, if permitted, flexible stainless steel.

.3 Ensure supports for roof mounted piping are sized (height) to accommodate roof slope and required piping slope, and to permit installation of low point dirt pockets.

.4 Identify natural gas piping aboveground with 2 coats of safety yellow enamel applied over primer, and SMS Ltd. or equal coil type vinyl identification makers with arrows.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Submit shop drawings/product data sheets for all products specified in this Section except shop fabricated ductwork and fittings.

Part 2 Products

2.1 GALVANIZED STEEL DUCTWORK

.1 Galvanized steel sheet is to be hot dipped in accordance with requirements of ASTM A653. G60 galvanizing for bare uncovered duct to be finish painted. G90 for all other galvanizing.

.2 Rectangular

.1 Lock forming grade hot dip galvanized steel, ASTM A653, shop fabricated, minimum #26 gauge.

.3 Round

.1 Factory machine fabricated, spiral, mechanically locked flat seam, single wall duct, fittings and couplings.

.4 Flat Oval

.1 Factory machine fabricated, single wall, 4-ply spiral lock seam duct, fittings and couplings.

2.2 RECTANGULAR STAINLESS STEEL DUCTWORK

.1 300 Series stainless steel, type 304 or type 316 as specified in Part 3 of this Section, ASTM A167 and ASTM A480, with a #4 finish where bare (uncovered) and exposed in finished areas and a #2B finish elsewhere, with, unless otherwise specified, metal gauges in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit duct location and working pressure classification, and stainless steel support hardware to match duct material.

2.3 ROUND STAINLESS STEEL DUCTWORK

.1 Factory made, spiral, mechanically locked flat seam, single wall duct fabricated from type 316 stainless steel to ASTM A240 with metal gauges in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible for 2.5 kPa (0.36 psi) pressure. Type 316 stainless steel fittings equipped with leak-proof stainless steel couplings secured to connecting duct by means of stainless steel sheet metal screws and duct sealer. Duct system performance is to meet SMACNA's Leakage Class 3 requirements at system design static pressure. Stainless steel finish is to be a #2B mill finish where concealed or exposed in unfinished areas and a #4 finish where exposed in finished areas.

2.4 ROUND STAINLESS STEEL LINED DUCTWORK

.1 Double wall self-sealing duct system constructed from type 316 stainless steel to ASTM A240 and consisting of 24 kg/m^3 (1.5 lb/ft^3) density, 25 mm (1") thick glass fibre insulation meeting NFPA 90A requirements and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102 and wrapped in a thick non-woven polyester fabric, sandwiched between double wall duct and fittings. Spiral, mechanically locked, flat seam outer casing, and perforated inner liner with 3.2 mm (⅛") perforations on 6.4 mm (¼") staggered centres. Fittings and couplings constructed as for ducts and air-tight to SMACNA Leakage Class 3 requirements. Concealed duct and exposed duct in unfinished areas is to have a #2B mill finish. Exposed duct in finished areas is to have a #4 finish.

2.5 METAL DUCT SYSTEM JOINT SEALANT

.1 ULC listed and labelled, premium grade, grey colour, water base, non-flammable duct sealer, brush, or gun applied, with a CAN/ULC S102 tested maximum flame spread rating of 5 and smoke developed rating of 0.

2.6 ACOUSTIC LINING

.1 Minimum 25 mm (1") thick acoustic lining material meeting 25/50 flame spread and smoke developed ratings tested in accordance with CAN/ULC S102, meeting NFPA 90A, ASTM C1071, and ASTM G21 requirements, not supporting microbial growth, flexible for round ducts, board type for rectangular ducts, consisting of a bonded fiberglass mat coated on inside (airside) face with a black fire-resistant coating.

2.7 ROUND TO RECTANGULAR DUCT CONNECTIONS

.1 Equal to Flexmaster Canada Ltd. galvanized steel, flared, flanged or notched "Spin-On" round duct take-off collars with locking dampers in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.8 ROOF DUCT SUPPORTS

.1 Equal to PHP Systems Design Model PHP-D adjustable duct support assemblies sized to suit duct size, each assembly complete with injection moulded recycled plastic and carbon black bases and tubular hot dip galvanized steel framing.

2.9 DUCTWORK DRAIN POINTS

.1 Equal to Ductmate Canada Ltd. "Moisture Drain", 20 mm (¾") diameter moisture drains with galvanized sheet metal funnel, and chrome plated brass threaded drain, nut and cap.

2.10 WIRE MESH (BIRDSCREEN)

.1 Heavy-gauge galvanized steel or aluminum mesh, 12 mm x 12 mm (½" x ½") secured in a rigid galvanized steel or aluminum framework, sized as indicated on drawings, and constructed so as to be removable.

Part 3 Execution

3.1 CLEANLINESS REQUIREMENTS FOR HANDLING AND INSTALLATION OF DUCTWORK

.1 Handle and install ductwork in accordance with CSA Z317.2, Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Healthcare Facilities and SMACNA's Duct Cleanliness for New Construction Guidelines at the Advanced Level.

3.2 FABRICATION AND INSTALLATION OF GALVANIZED STEEL DUCTWORK

.1 Provide required ductwork, rectangular, round and/or flat oval. Where rectangular ductwork is shown, round or flat oval ductwork of equivalent cross-sectional area is acceptable.

.2 It is to be understood that all duct dimensions shown on drawings are clear internal dimensions.

.3 Unless otherwise specified, construct and install ductwork in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit duct pressure class designation of minimum 500 Pa (2" w.c.) positive or negative as applicable, a minimum velocity of 10 m/s (2000 fpm), and so ductwork does not "drum". Flat surfaces of rectangular ductwork are to be cross-broken. Duct system sealing is to meet ANSI/SMACNA Seal Class A requirements.

.4 Confirm routing of all ductwork at site and site measure ductwork prior to fabrication. Duct dimensions may be revised to suit site routing and building element requirements, if dimension revisions are reviewed with and approved by Consultant. Duct routing and/or dimension revisions to suit conditions at site are not grounds for a claim for an extra cost.

.5 Refer to structural drawings. Where ductwork is to be run within or through open web steel joists, ductwork shown on mechanical drawings is schematic only and is to be altered as required to suit steel joist configuration, spacing, panel points, and cross-bridging at no additional cost.

.6 Wherever ductwork is required at locations where sprayed fireproofing is applied to building construction, install ductwork only after fireproofing work is complete and do not compromise fire rating of sprayed fireproofing.

.7 Install (but do not connect) duct system mounted automatic control components supplied as part of the automatic control work.

.8 Where indicated, provide duct connections to fan powered heat transfer equipment with integral coils.

.9 Flange connect ductwork to hot water reheat coils in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Coils will be suspended independent of connecting ductwork as part of the heat transfer work.

.10 Support horizontal rectangular ducts inside building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but use trapeze hangers with, unless otherwise specified, galvanized steel channels, and galvanized steel hanger rods for exposed ducts and concealed ducts wider than 500 mm (20"). Support hardware constructed of same material as duct for metal duct, and, unless otherwise specified, type 316 stainless steel for non-metal duct. Supports for "heavy" duct such as cementitious core duct is to be suitable in all respects for the application and approved by Consultant.

.11 Support round and flat oval ducts inside building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but, unless otherwise specified, for both uninsulated and insulated ducts exposed in finished areas, use bands and secure at top of duct to a hanger rod, all similar to Ductmate Canada Ltd. type "BA". If duct is insulated, size strap to suit diameter of insulated duct. Unless otherwise specified, duct support hardware for metal duct is constructed of same material as duct, and for non-metal duct, type 316 stainless steel.

.12 Where flanged duct joints are used, do not locate joints in wall or slab openings, or immediately at wall or slab openings. Do not use flanged joints for exposed uninsulated ducts in finished areas.

.13 Where watertight horizontal ductwork is required, construct ducts without bottom longitudinal seams. Solder or weld joints of bottom and side sheets. Seal all other joints with duct sealer. Slope horizontal duct to hoods, risers, or drain points. Provide drain points. Provide watertight ductwork for:

3.3 INSTALLATION OF ALUMINUM DUCTWORK

.1 Provide aluminum ductwork, rectangular or round.

3.4 INSTALLATION OF STAINLESS STEEL DUCTWORK

.1 Provide stainless steel ductwork, round or rectangular.

.2 Provide stainless steel ductwork as follows:

.1 Extension for existing stainless steel ductwork;

3.5 INSTALLATION OF ROUND TO RECTANGULAR DUCT CONNECTIONS

.1 Cut round holes in rectangular ducts and provide round to rectangular lock-in fittings with dampers for connection of flexible round ductwork.

3.6 INSTALLATION OF ROOF MOUNTED DUCT SUPPORTS

.1 Supply equal to B-line series Dura-Blok supports for roof mounted ductwork if structural mounted support not used.

.2 Hand adjustable structural supports to roofing trade on roof for installation and flashing into roof construction as part of roofing work. Accurately mark exact locations and spacing of structural supports and supervise installation. Provide properly sized hot dip galvanized structural steel angles between structural supports and secure in place on support studs. Support ductwork on the angles and provide galvanized steel banding to secure ducts to the angles.

3.7 INSTALLATION OF WIRE MESH (BIRDSCREEN)

.1 Provide framed, removable wire mesh panels over openings in ducts and/or walls where shown and/or specified on drawings. Rigidly secure in place but ensure panels are removable.

.2 Provide wire mesh panels for open-end return air ducts in ceiling spaces whether shown on drawings or not.

3.8 INSTALLATION OF LOUVRES

.1 Provide louvres for wall openings.

.2 Install louvre assemblies and secure in place in accordance with manufacturer's instructions and details.

.3 Confirm exact louvre sizes and finish prior to ordering.

3.9 INSTALLATION OF LOUVRE BLANK-OFF PANELS

.1 Provide blank-off panels for inactive portions of exterior wall louvres.

.2 Secure panels in place with non-ferrous hardware so they cannot move or rattle, yet are easily removable.

.3 Confirm exact finish of panels prior to fabrication.

3.10 DUCT SYSTEM PROTECTION, CLEANING AND START-UP

.1 Temporarily cover all open ends of ducts during construction.

.2 Remove all dirt and foreign matter from entire duct systems and clean duct system terminals and interior of air handling units prior to operating fans.

.3 Prior to starting any supply air handling system provide 50 mm (2") thick glass fibre construction filters at fan equipment in place of permanent filters.

.4 Provide cheesecloth over duct system inlets and outlets and run system for 24 hours, after which remove cheesecloth and construction filters, and install new permanent filters.

.5 Include all labour for a complete site walk-through with testing and balancing personnel following route of all duct systems to be tested, adjusted and balanced for the purpose of confirming proper position and attitude of dampers, location of pitot tube openings, and any other work affecting testing and balancing procedures. Perform corrective work required as a result of this walk-through.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 Standards.

.3 CAN3-C235-83(R2010), 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.

.3 Ontario Electrical Safety Code (OESC), 2015

1.3 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.

1.4 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 review.

.3 Submit for review single line electrical diagrams under plexiglass and in glazed frames and locate as indicated, if applicable and any revision on Single Line Diagram.

.1 Electrical distribution system in main electrical room.

.4 Submit for review fire alarm riser diagram, plan and zoning of building in glazed frames under plexiglass at fire alarm control panel and annunciator.

.5 Shop drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit 600x600 mm minimum size drawings to authority having jurisdiction.

.6 If changes are required, notify Departmental Representative of these changes before they are made.

.6 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment or material is not available, submit such material or equipment to authority having jurisdiction 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.

.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.

.7 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for review.

.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.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, indoors, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect equipment and materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new at no extra cost.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of padding, packaging materials, crates, pallets, as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, 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 labels and nameplates 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 or material is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03- Control Devices except for conduit, wiring and connections below 50 V which are related to control systems as shown on mechanical drawings or specified in mechanical sections.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative and authority having jurisdiction.

.2 Porcelain enamel or decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with labels and nameplates as follows:

.1 Nameplates: lamicoid 3 mm, matt white finish face, black core, lettering accurately aligned and engraved into core and mechanically attached with self tapping screws.

.2 Sizes as follows:

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

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on labels and nameplates to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per label or nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. [_____] for Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes and numbered, 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.

2.8 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.

.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
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 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 outdoor electrical equipment "equipment green" finish.

.2 Paint indoor switchgear and 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.

.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.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.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 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32- Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.6 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 Local switches: 1400 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Roof Receptacles: 1000 mm

.3 Panelboards: as required by Code or as indicated.

.4 Fire alarm speakers: as indicated on the drawings

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

.1 Load Balance:

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00- Quality Control.

- .1 Power distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .5 Systems: fire alarm and communications.
- .6 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.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 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.

3.9 SYSTEM STARTUP

.1 Instruct Departmental Representative 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.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for selective demolition and removal of electrical components including removal of conduit, junction boxes, and panels to source (home run removal) and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 13– Selective Site Demolition

.2 Section 02 41 19.13– Selective Building Demolition

.3 Section 02 41 19.16– Selective Interior Demolition

.4 Section 02 41 00.08– Demolition - Minor Works

.5 Section 02 42 00– Removal and Salvage of Construction Materials

.6 Section 02 81 00– Transportation and disposal of hazardous materials

.7 Section 02 82 00.02– Asbestos abatement - intermediate precautions

.8 Section 02 84 00– Polychlorinated Biphenyl Remediation

.9 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA)

.1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.2 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

1.4 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.3 Remove and Salvage: Detach items from existing construction and deliver them to Representative ready for reuse.

.4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide in accordance with Section 01 33 00– Submittal Procedures before starting work of this Section:

.1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19– Construction Waste Management and Disposal.

.2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

.2 Scheduling: Account for Representative’s continued occupancy requirements during selective demolition with Section 02 41 19.13 and Section 02 41 19.19 and schedule staged occupancy and worksite activities as a defined Activity and Critical Path item in accordance with Section 01 32 16– Construction Progress Schedule.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: Perform work of this Section in accordance with:

.1 Provincial/Territorial Workers’ Compensation Boards/Commissions and Federal Workers’ Compensation Service, if there is any conflict between provincial and Federal regulation, immediately inform Departmental Representative and obtain direction.

.2 Government of Canada, Labour Program: Workplace Safety and Provincial/Territorial Occupational Health and Safety Standards and Programs. if there is any conflict between provincial and Federal regulation, immediately inform Departmental Representative and obtain direction.

1.8 SITE CONDITIONS

.1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted and at time of site examination before tendering.

.2 Existing Hazardous Substances: Owner has performed a hazardous substances assessment and identified materials requiring abatement as follows:

.1 Hazardous substances are as defined in Hazardous Products Act.

.2 Hazardous substances will be removed by Contractor as a part of Contract before starting Work in accordance with work results described in Related Requirements listed above.

.3 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Representative if materials suspected of containing hazardous substances are encountered and perform following activities:

.1 Refer to Section 01 41 00– Regulatory Requirements for directives associated with specific material types.

.2 Hazardous substances will be as defined in Hazardous Products Act.

.3 Stop work in area of suspected hazardous substances.

.4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.

.5 Hazardous substances will be removed by Owner under a separate contract or as a change to Work.

.6 Proceed only after written instructions have been received from Representative.

Part 2 Products

2.1 NOT USED REPAIR MATERIALS

.1 General Patching and Repair Materials: Refer to Section 02 41 19.23 and Section 02 41 19.13 for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.

.2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.

.3 Firestopping Repair Materials: Use firestopping materials compatible with existing firestopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

2.2 SALVAGE AND DEBRIS MATERIALS

.1 Material Ownership: Demolished materials become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property.

.2 Salvaged Materials: Carefully remove materials designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00. For salvage material or equipment, refer to drawings.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect work of this Section before tendering Bid; Owner will not

consider claims for extras for work or materials necessary for proper execution and completion of contract that could have been determined by a site visit.

3.2 PREPARATION

.1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:

- .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
- .2 Notify Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
- .3 Prevent debris from blocking drainage inlets.
- .4 Protect mechanical systems that will remain in operation.

.2 Protection of Building Occupants: Sequence demolition work so that interference with use of the building by Owner and users is minimized and as follows:

- .1 Prevent debris from endangering safe access to and egress from occupied buildings.
- .2 Notify Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

.1 Removal and Demolition: Coordinate requirements of this Section with information contained in Section 02 41 19.13 and Section 02 41 19.19 and as follows:

- .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
- .2 Remove existing electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
- .3 Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
- .4 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.
- .5 Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
- .6 Perform demolition work in a neat and workmanlike manner:
  - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
  - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
- .7 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as “SPARE”.
- .8 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.

.9 Remove existing conduits, boxes, cabling and wiring associated with removed electrical devices and equipment.

.10 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.

.11 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 CLOSEOUT ACTIVITIES

.1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with Section 02 42 00.

.2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 81 00.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code (24th Edition)

.2 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.3 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

.4 Ontario Electrical Safety Code (OESC), 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of packaging materials, pallets, crates, padding, as specified in Waste Reduction Workplan and Construction Waste Management Plan in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

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

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

.3 Clamps or connectors for flexible conduit, aluminum sheathed cable, armoured cable, non-metallic sheathed cable and TECK cable as required to: CAN/CSA-C22.2 No.18.

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 wire and box connectors 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 Remove insulation carefully from ends of conductors and cables.

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 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.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA C22.1-18, Canadian Electrical Code (24th Edition)

.2 Ontario Electrical Safety Code (OESC), 2015.

1.3 PRODUCT DATA

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse by manufacturer and return of padding, pallets, packaging materials and crates in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 12 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Non- Jacketed.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Conductors:

.1 Grounding conductor: copper, stranded conductor, size as per CEC.

.2 Circuit conductors: Copper, stranded conductor, size as indicated.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating: 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: galvanized steel or aluminum, interlocking.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project and sunlight Resistant.

.7 Fastenings:

.1 One-hole zinc coated or galvanized steel 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

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:

.1 Watertight, approved for TECK90 cable.

2.3 ARMOURED CABLES

.1 Conductors: XLPE insulated, copper, stranded conductor, size as indicated, 1000V rated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum or galvanized steel strip.

.4 Type: PVC, flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project and wet locations and sunlight Resistant.

.5 Connectors: anti short connectors.

2.4 ALUMINUM SHEATHED CABLE

.1 Conductors: Copper, stranded conductor, size as indicated.

.2 Insulation: cross linked polyethylene type RA90 rated 1000 V.

.3 Sheath: aluminum applied to form continuous smooth, corrugated, seamless sheath.

.4 Outer jacket: Thermoplastic applied over sheath and to be compliant to applicable Building Code classification for this project and wet locations and sunlight Resistant.

.5 Fastenings for aluminum sheathed cable:

.1 One-hole zinc coated or galvanized steel straps to secure surface cables 25 mm and smaller. Two-hole steel straps for cables larger than 25 mm. Use aluminum strap only with single conductor cable.

.2 Channel type supports for two or more cables at

.3 Threaded rods: 6 mm diameter to support suspended channels.

2.5 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket, cotton braid, and armour of closely wound aluminum wire, sunlight resistant.

.2 Type: low energy 300 V control cable: stranded annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: PVC.

.2 Shielding: copper braid over each pair and overall.

.3 Overall covering: interlocked armour of flat galvanized steel and PVC jackets sunlight resistant.

.3 Type: 600 V conductors, sizes as indicated: annealed copper.

.1 Insulation: RW90 (x-link).

.2 Shielding: copper braid shielding over each pair and overall.

.3 Overall covering: interlocked armour of flat galvanized steel and PVC jackets sunlight resistant.

2.6 Manufacturers:

.1 Nexans, Southwire, Texcan or approved equal.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

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

.2 Perform tests over installation in presence of Departmental Representative and local authority having jurisdiction.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Lay cable in cable trays in accordance with Section 26 05 36- Cable Trays for Electrical Systems.

.2 Terminate cables in accordance with Section 26 05 20- Wire and Box Connectors - (0-1000 V).

.3 Install Teck cables with distance of larger cable diameter.

.4 Cable Colour Coding: to Section 26 05 00- Common Work Results for Electrical.

.5 Conductor length for parallel feeders to be identical.

.6 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.7 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.8 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.9 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34- Conduits, Conduit Fastenings and Conduit Fittings.

.2 In surface and lighting fixture raceways in accordance with Section 26 05 00.

.3 All conduits to be water tight. All flexible conduits to be water tight with PVC jacket rated for -40, flame retardant and resistant against UV and under sunshine.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible.

.2 Install cable exposed, securely supported by straps, staples or hangers.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.6 INSTALLATION OF ALUMINUM SHEATHED CABLE

.1 Group cables wherever possible on channels.

3.7 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

3.8 INSTALLATION OF NON-METALLIC SHEATHED CABLE

.1 Install cables.

.2 Install straps and box connectors to cables as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition).

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

.2 Ontario Electrical Safety Code (OESC), 2015.

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 connectors and terminations and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates: obtain inspection certificate of compliance covering high voltage stress from Departmental Representative and include it with operation and maintenance manuals and as-built drawings.

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 connectors and terminations for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, packaging materials, crates, padding, as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

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

.2 Contact aid for aluminum cables where applicable.

.3 2, 3, 4-way joint boxes wet location type in accordance with Section 26 05 33- Raceway and Boxes for Electrical Systems.

.4 2, 3, 4-way junction boxes with respective pothead for 2, 3, 4 conductor cables X - linked polyethylene cable with or without aluminum sheath, and overall jacket in accordance with Section 26 05 33- Raceway and Boxes for Electrical Systems.

Part 3 Execution

3.1 EXAMINATION

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

.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 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (OESC), 2015

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground and 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.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of crates, padding, pallets, packaging materials as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 SUPPORT CHANNELS

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

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 hangers and supports 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 Secure equipment to hollow and solid masonry, tile and plaster surfaces with lead anchors and nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole zinc coated or hot dip galvanized steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole zinc coated or hot dip galvanized steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 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.

.8 For surface mounting of two or more conduits use channels.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 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.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 Ontario Electrical Safety Code (OESC), 2015

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00- Submittal Procedures.

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on cover or hinged door.

.4 NEMA 4X for room

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating voltage and phase and system name or as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1, 24th Edition.

.2 Ontario Electrical Safety Code (OESC), 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

.7 All outlet and conduit boxes and condulets to be hot dip galvanized steel type.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished plaster walls.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONDUIT BOXES

.1 Hot dip galvanized steel FS or FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.5 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

.1 Hot dip galvanized steel type, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.6 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

.5 All fittings to be hot dip galvanized steel type.

2.7 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2-piece stainless steel with satin aluminum housing finish for 1 duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

.2 Pedestal type 'low tension' fitting made of 2 pieces stainless steel with satin aluminum housing finish to accommodate one or two amphenol jack connectors.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code (24th Edition)

.2 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.3 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.4 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.5 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.

.6 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.

.7 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

.2 Ontario Electrical Safety Code (OESC), 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 CABLES AND REELS

.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.

.4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with expanded ends and with couplings.

.4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal, hot dip galvanized steel type with sun resistant PVC jacket.

2.3 CONDUIT FASTENINGS

.1 One-hole galvanized steel straps to secure surface conduits 50 mm and smaller.

.1 Two-hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.

.2 Coating and material: same as conduit.

.3 Ensure factory "ells" where 90 degrees bends for 21 mm and larger conduits.

.4 Watertight connectors and couplings.

.1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.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.

.4 Galvanized steel type

2.6 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Surface mount conduits except where specified otherwise.

.4 Use rigid hot dipped galvanized steel threaded conduit except where specified otherwise.

.5 Use epoxy coated conduit in corrosive areas.

.6 Use electrical metallic tubing (EMT) only for installation above 2.4 m not subject to mechanical injury.

.7 Conduit installation on the roof to be liquid-tight.

.8 Use rigid pvc conduit only in corrosive areas.

.9 Use liquid tight flexible metal conduit for connection to mechanical equipment, motors or vibrating equipment in damp, wet or corrosive locations.

.10 Minimum conduit size for lighting and power circuits: 19 mm.

.11 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.12 Mechanically bend steel conduit over 19 mm diameter.

.13 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.14 Install fish cord in empty conduits.

.15 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.16 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface or suspended channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11- Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA C22.1 No.126.1-02, Metal Cable Tray Systems.

.3 CAN/CSA C22.1 No.126.2-02, Non- Metallic Cable Tray Systems.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA FG 1-1993, Fibreglass and Cable Tray Systems.

.2 NEMA VE 1-2002, Metal Cable Tray Systems.

.3 NEMA VE 2-2001, Cable Tray Installation Guidelines.

.3 Ontario Electrical Safety Code (OESC), 2015

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data: submit manufacturer's product data sheets for cable tray indicating dimensions, materials, and finishes, including classifications and certifications.

.3 Shop Drawings: submit shop drawings showing materials, finish, dimensions, accessories, layout, and installation details.

.4 Identify types of cabletroughs used.

.5 Show actual cable trough installation details and suspension system.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 CABLETROUGH

.1 Cable troughs and fittings: to CAN/CSA C22.1 No. 126.1 and 126.2.

.2 Ladder type, class as per loading an span to CAN/CSA C22.2 No.126.1 and 126.2.

.3 Trays: galvanized steel, 150, 300, 450, 600 and 750 mm wide as per existing onsite and with depth of 100 and 150 mm as existing.

.4 Fittings: horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required, manufactured accessories for cable trough supplied.

.1 Radii on fittings: 300, 600 and 900 mm minimum. To be finalized onsite.

.5 Solid covers for complete cabletrough system including fittings.

.6 Barriers where different voltage systems are in same cabletrough.

.7 Ground cable trays with #2 AWG bare copper conductor attached to each tray section in accordance with CEC requirements.

.8 Provide fire stop material at firewall penetrations.

.9 Cable tray, cover, bends, supports and all accessories (including nuts and fastening parts) to be post hot dip galvanized steel type.

2.2 SUPPORTS

.1 Provide splices, supports for a continuously grounded system as required.

.2 Provide post hot dip galvanized steel supports for cable tray installation.

2.3 INSTALLATION

.1 Install complete cabletrough system in accordance with NEMA VE 2.

.2 Support cabletrough on both sides.

.3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.

2.4 CABLES IN CABLETROUGH

.1 Install cables individually.

.2 Lay cables into cabletrough. Use rollers when necessary to pull cables.

.3 Secure cables in cabletrough at 6m centres, with nylon ties.

.4 Identify cables every 20 m with size 2 nameplates.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.

.3 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.4 CSA C22.2 No.55-M1986(R2008), Special Use Switches.

.5 CSA C22.2 No.111-10, General-Use Snap Switches (Bi-national standard, with UL 20).

.2 Ontario Electrical Safety Code (OESC), 2015

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 wiring devices and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

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 wiring devices for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors, off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of crates, padding, pallets, packaging materials as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 SWITCHES

.1 15 A, 120 V, single pole or double pole, three-way switches to: CSA C22.2 No.55 and CSA C22.2 No.111.

.2 Manually-operated general-purpose AC switches with following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.

.3 Urea or melamine moulding for parts subject to carbon tracking.

.4 Suitable for back and side wiring.

.5 Ivory toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor and heating loads.

.4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-20 R, 125 V, 20 A, U ground, to: CSA C22.2 No.42 with following features:

.1 Ivory urea moulded housing.

.2 Suitable for No. 10 AWG for back and side wiring.

.3 Break-off links for use as split receptacles.

.4 Eight back wired entrances, four side wiring screws.

.5 Triple wipe contacts and rivetted grounding contacts.

.6 Weather proof type for roof mounted receptacles.

.2 Other receptacles with ampacity and voltage as indicated.

.3 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.4 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

2.4 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

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 wiring devices 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 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height as indicated and in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height as indicated and in accordance with Section 26 05 00- Common Work Results for Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles for roof mounted receptacles.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 26 and 28.

1.2 PAYMENT

.1 Payment for field testing of ground fault equipment performed by equipment manufacturer in accordance with Section 01 29 83- Payment Procedures: Testing Laboratory Services.

1.3 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA C22.2 No.144-M91(R2006) , Ground Fault Circuit Interrupters.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA PG 2.2-1999(R2009), Application Guide for Ground Fault Protection Devices for Equipment.

1.4 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 ground fault circuit interrupters and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.4 Test and Evaluation Reports: submit test report for field testing of ground fault equipment to Departmental Representative and certificate that system as installed meets criteria specified.

1.5 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for ground fault circuit interrupters for incorporation into manual.

1.6 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 off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect ground fault circuit interrupters from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials, pallets, padding, crates, as specified in Construction Waste Management Plan and Waste Reduction Workplan in accordance with Section 01 74 19-Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Equipment and components for ground fault circuit interrupters (GFCI): to NEMA PG 2.2 and CAN/CSA C22.2 No.144.

.2 Components comprising ground fault protective system to be of same manufacturer.

2.2 BREAKER TYPE GROUND FAULT INTERRUPTER

.1 20A single pole ground fault circuit interrupter for roof receptacles.

2.3 GROUND FAULT LIFE PROTECTOR

.1 Single pole circuit breaker to supply power to mains of receptacles.

.1 Automatic shunt trip breaker.

.2 Zero sequence current sensor.

.3 Facilities for testing and reset.

.4 CSA Enclosure NEMA 3R, surface mounted.

.5 Ground fault trip indicator light.

2.4 GROUND FAULT PROTECTOR UNIT

.1 Self-contained with 20 A, 120 V circuit interrupter and duplex receptacle complete with:

.1 Solid state ground sensing device.

.2 Facility for testing and reset.

.3 CSA Enclosure NEMA 2, surface mounted with stainless steel or painted face plate.

.4 All outdoor and wet location mounted enclosure to be NEMA 4X type.

.5 weather proof type

2.5 SYSTEM GROUND FAULT PROTECTION PANEL

.1 Self-contained panel suitable for receptacle supply. Panel to have following features:

.1 Automatic 100 A breaker with shunt trip.

.2 Ground fault relay factory set at 10 mA with inverse time delay characteristics from pick-up 1 s to 0.025 s.

.3 Zero sequence current sensor.

.4 Provision for testing and reset.

.5 CSA Enclosure NEMA 2, surface mounted.

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 ground fault circuit interrupters 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 not ground neutral on load side of ground fault relay.

.2 Pass phase conductors including neutral through zero sequence transformers.

.3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical and co-ordinate with Section 01 45 00- Quality Control.

.2 Arrange for field testing of ground fault equipment by equipment manufacturer before commissioning service.

.3 Demonstrate simulated ground fault tests.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for fire alarm systems.

.2 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.

.3 Trouble signal devices.

.4 Power supply facilities.

.5 Manual alarm stations.

.6 Automatic alarm initiating devices.

.7 Audible signal devices.

.8 End-of-line devices.

.9 Annunciators.

.10 Visual alarm signal devices.

.11 Ancillary devices.

.2 Related Requirements

.1 All specification sections and drawings included in the Section 00 01 10 “Table of Contents” of this project for Div. 01, 26 and 28.

1.2 REFERENCE STANDARDS

.1 Government of Canada

.1 TB OSH Chapter 3-03, 1997-01-28, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire Protection Electronic Data Processing Equipment.

.2 TB OSH Chapter 3-04, 1994-12-22, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 National Fire Protection Agency

.1 NFPA 72-2002, National Fire Alarm Code.

.2 NFPA 90A-2002, Installation of Air Conditioning and Ventilating Systems.

.4 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.5 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-2016, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S525-2016, Audible Signal Device for Fire Alarm Systems.

.3 CAN/ULC-S526-2016, Visual Signal Devices for Fire Alarm Systems.

.4 CAN/ULC-S527-2017, Control Units.

.5 CAN/ULC-S528-2014, Manual Pull Stations for Fire Alarm Systems.

.6 CAN/ULC-S529-2016, Smoke Detectors for Fire Alarm Systems.

.7 CAN/ULC-S530-M1991, Heat Actuated Fire Detectors for Fire Alarm Systems.

.8 CAN/ULC-S531-2014, Standard for Smoke Alarms.

.9 CAN/ULC-S536-S537-2013, Burglar and Fire Alarm Systems and Components.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00- Submittal Procedures.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00- Submittal Procedures.

.2 Shop Drawings:

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

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

.2 Include:

.1 Layout of equipment.

.2 Zoning.

.3 Complete wiring diagram, including schematics of modules.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00- Submittal Procedures.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.3 Manufacturer's Field Reports: manufacturer's field reports specified.

.4 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00- Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.

.3 Submit to Authority of Jurisdiction 2 sets of approved submittals and drawings immediately after approval but no later than 15 working days to prior to final inspection.

.4 Submit following:

.1 Manufacturer's Data for:

.1 Alarm horns.

.2 Visible appliances.
.3 Wiring.
.4 Conduit.
.5 Outlet boxes.
.6 Fittings for conduit and outlet boxes.
.7 Trouble buzzer or bell.
.8 Mark data which describe more than one type of item to indicate which type will be provided.
.9 Submit 1 original for each item and clear, legible, first-generation photocopies for remainder of specified copies.

.2 System wiring diagrams:
.1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
.2 Show modules, relays, switches and lamps in control panel.

.3 Design data: Power Calculations:
.1 Submit design calculations for existing system and new work specified to substantiate that battery capacity exceeds supervisory and alarm power requirements.
.2 Show comparison of detector power requirements per zone versus control panel smoke detector power output per zone in both standby and alarm modes.
.3 Show comparison of notification appliance circuit alarm power requirements with rated circuit power output.

.4 Instructions for operation:
.1 Projected beam smoke detector.

.5 Schedules:
.1 Conductor wire marker schedule.

.6 Test Reports:
.1 Open-area 2-wire smoke detectors.
.2 Preliminary testing:
.1 Final acceptance testing.
.2 Submit for inspections and tests specified under Field Quality Control.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in fire alarm system installations approved by manufacturer with 5 documented experience.

.2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.

.3 System:

.1 To TB OSH Chapter 3-04.

.2 Subject to Fire Commissioner of Canada (FC) approval.

.3 Subject to FC inspection for final acceptance.

.4 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.5 Maintenance Service:

.1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 61 00- Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Waste Management and Disposal: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

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

2.2 MATERIALS

.1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.2 Power supply: to CAN/ULC-S524.

.3 Audible signal devices: to CAN/ULC-S525.

.4 Visual signal devices: to CAN/ULC-S526.

.5 Control unit: to CAN/ULC-S527.

2.3 SYSTEM OPERATION

.1 Provide separate circuits from control panel to each zone of initiating devices. Transmission of signals from more than one zone over common circuit to control panel is prohibited.

.2 Single stage operation. Operation to actuation following:

.1 Manual station.
.2 Heat detector.
.3 Smoke detector.
.4 Automatic fire sprinkler system.
.5 Fire extinguishing system.
.6 Fire standpipe system.

.3 Actuation of single operation device to initiate following:

.1 Building evacuation alarm devices to operate continuously.
.2 Zone of alarm device to be indicated on control panel and remote annunciators.
.3 Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
.4 Fire doors and smoke control doors if normally held open, to close automatically.
.5 Electro-magnetic door holders to de-energize.
.6 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.

.4 Capability to program smoke detector status change confirmation on any or zones in accordance with CAN/ULC-S527, Appendix C.

2.4 CONTROL PANEL (Not applicable)

2.5 POWER SUPPLY (Not applicable)

2.6 MANUAL ALARM STATIONS (Not applicable)

2.7 AUTOMATIC ALARM INITIATING DEVICES (Not applicable)

2.8 ALARM INITIATING DEVICE SPACING AND LOCATION (Not applicable)

2.9 DUCT SMOKE DETECTORS (Not applicable)

2.10 PROJECTED BEAM SMOKE DETECTOR (Not applicable)

2.11 AUDIBLE SIGNAL DEVICES (Existing on the roof to relocated as per drawings, existing in the building to remain)

.1 Provide remote system trouble 100 mm buzzer arranged to operate in conjunction with panel's integral trouble signal.

.2 Locate remote trouble as indicated.

.1 Provide external trouble buzzer at control panel arranged to operate in conjunction with panel's integral trouble signal.
.2 Provide trouble buzzer with white on red engraved identification sign which reads "FIRE ALARM SYSTEM TROUBLE".
.3 Lettering on identification sign: minimum 25 mm high.

.3 Audible device(s):

.1 Bells: surface mounted, weather proof for roof mounted devices, single stroke, polarized, Voltage to match the existing fire alarm system, dimensions to be finalized onsite.

.2 Signal chimes: heavy duty, single stroke, 24 V dc, with solid striking plunger and resonating chamber.

.3 Bells: vibrating type, gongs of special alloy steel, 24 V dc, 150 mm.

.4 Horns: surface mounting, 24 V dc, weatherproof.

.5 Mini-horns: surface mounting, Red colour, 24 V dc.

.4 Do not exceed 80 percent of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown if required to meet this requirement.

.5 Provide appliances specifically listed for outdoor use in locations exposed to weather.

.6 Finish appliances in red enamel.

.7 For surface mounting provide appliance manufacturer's approved back box. Back box finish to match appliance finish.

2.12 CONDUIT

.1 Rigid Steel Conduit:

.1 Hot dip galvanized steel.

.2 Intermediate Metal Conduit (IMC):

.1 Hot dip galvanized steel.

.3 Electrical Metallic Tubing (EMT):

.1 Hot dip galvanized steel.

.4 Flexible conduits on the roof:

.1 Water tight galvanized interlocked steel with sun resistant PVC jacket.

2.13 WIRING

.1 All wiring using for fire alarm system to be certified for fire alarm application.

.2 Wire for 120 V circuits: No. 12 AWG minimum stranded copper conductor.

.3 Wire for low voltage DC circuits: No. 14 AWG minimum stranded copper conductor.

.4 Wire to remote annunciators: No. 18 AWG minimum stranded copper conductor.

.5 Insulation 105 degrees C minimum with flame retardant PVC jacket.

.6 Colour code wiring.

.7 All wiring on the roof to be armoured flexible conduit with sun resistant PVC jacket.

2.14 AS-BUILT RISER DIAGRAM

.1 Fire alarm system riser diagram: in glazed frame on black lamicoid sheet with bevelled edges, white lettering and designations, minimum size 600 x 600 mm.

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 datasheet.

3.2 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.

.2 Connect alarm circuits to main control panel.

.3 Locate and install roof mounted fire alarm signalling devices on the roof and connect to existing signalling circuits and zone.

.4 Connect signalling circuits to main control panel.

.5 Install end-of-line devices at end of alarm and signalling circuits.

3.3 FIELD QUALITY CONTROL

.1 Site Tests:

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

.1 Test each device and alarm circuit to ensure manual stations, detectors, sprinkler system and Halon system transmit alarm to control panel and actuate ancillary devices and general alarm.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

.4 Class A circuits.

.1 Test each conductor on circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.5 Class B circuits.

.1 Test each conductor on circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most

remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 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 - 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.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.3 Verification requirements in accordance with Section 01 47 17- Sustainable Requirements: Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Low-emitting materials.

3.4 TRAINING

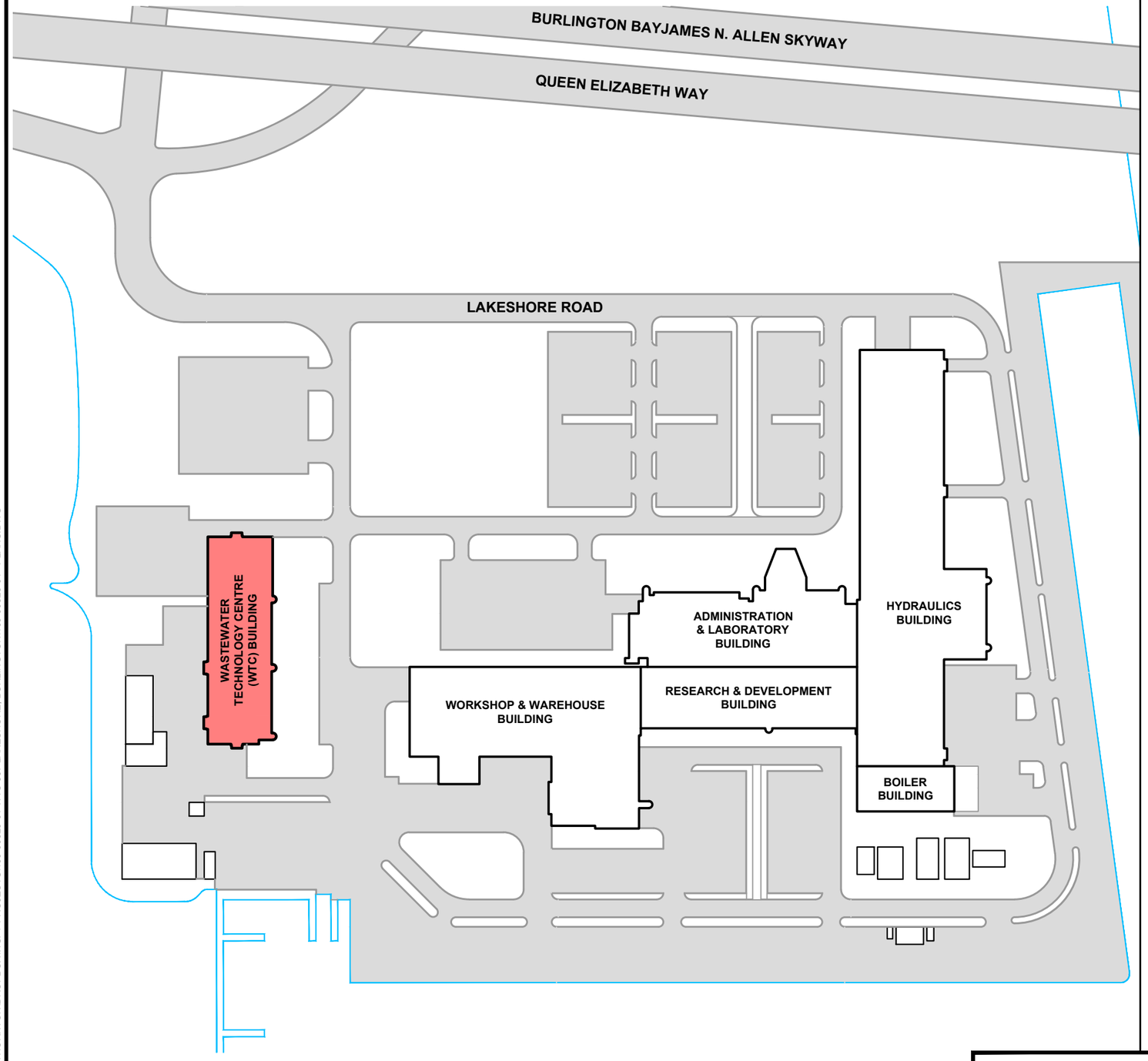
.1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

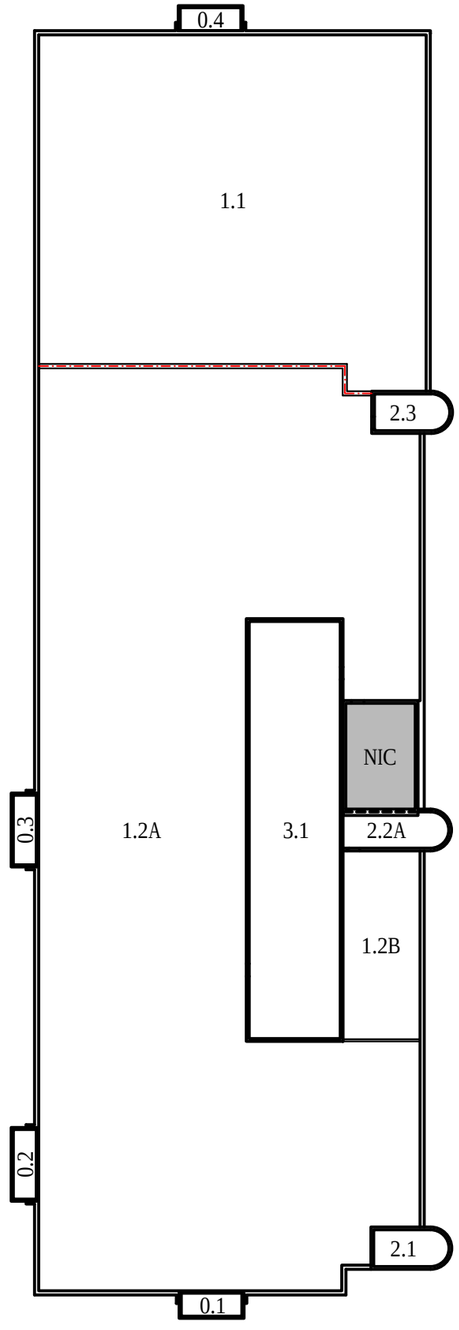
3.5 CLEANING

.1 Proceed in accordance with Section 01 74 00- Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION





APPROXIMATE ROOF AREAS

2018 ROOF REPLACEMENT

0.1	9.3 m^2 (100 ft^2)
0.2	9.3 m^2 (100 ft^2)
0.3	9.3 m^2 (100 ft^2)
0.4	9.3 m^2 (100 ft^2)
1.2A	1523.6 m^2 (16,400 ft^2)
1.2B	92.9 m^2 (1,000 ft^2)
2.1	18.6 m^2 (200 ft^2)
2.2A	18.6 m^2 (200 ft^2)
2.3	18.6 m^2 (200 ft^2)
3.1	218.3 m^2 (2,350 ft^2)
TOTAL:	1927.7 m^2 (20,750 ft^2)

EXISTING ROOF ASSEMBLIES*

SECTIONS 1.2A, 1.2B, 2.1, 2.2, 2.3 & 3.1

- 2-PLY MODIFIED BITUMEN MEMBRANE
- 13MM (0.5") OVERLAY BOARD
- 51MM (2") POLYISO INSULATION
- FELT/ASPHALT VAPOUR RETARDER
- GYPSUM PANELS (ON STEEL DECK)
- STEEL/CONCRETE DECKS (REFER TO ROOF PLAN RP2 FOR CONCRETE DECK LOCATIONS)

* IT IS THE BIDDER'S CHOICE TO VERIFY EXISTING DIMENSIONS & ASSEMBLIES PRIOR TO BID SUBMISSION OR TO BASE THEIR BID ON THE INFORMATION PROVIDED. EXTRAS WILL NOT BE ALLOWED IF THE INFORMATION PROVIDED IS NOT ACCURATE.

ISSUED/REVISED

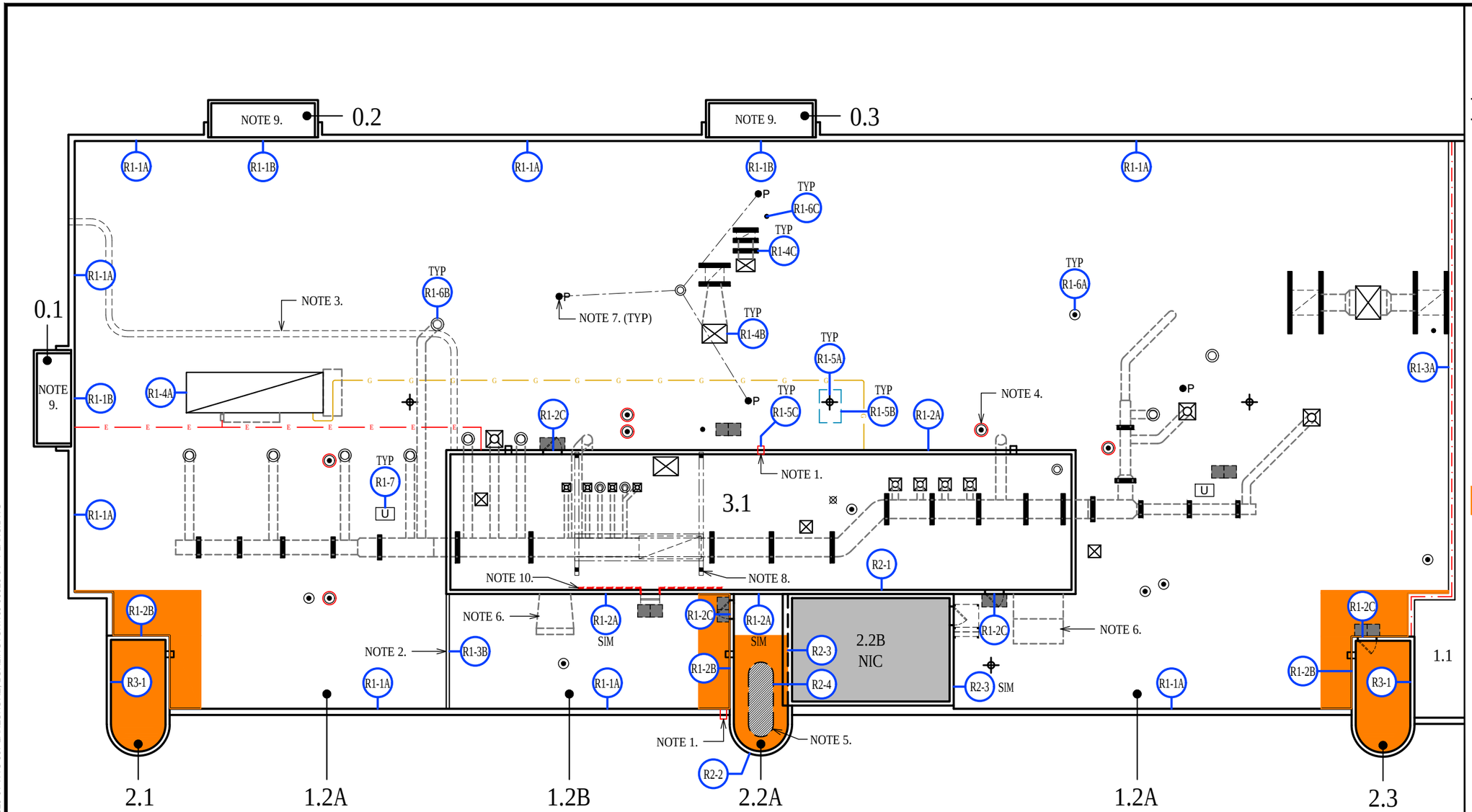
100% SUBMISSION	2018-06-07
99% SUBMISSION	2018-04-30
55% SUBMISSION	2018-03-15

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

SITE PLAN

582 LANCASTER STREET WEST, KITCHENER, ON, CANADA N2K 1M3
PHONE: 519.743.8777 wsp.com FAX: 519.743.8778

DATE: 07/06/2018	SCALE: NTS
DRAWN BY: JRT	CHECKED BY: XXX
PROJECT NO. 169-00325-01	
DRAWING NO. RP1	



NOTES

1. FABRICATE AND INSTALL NEW SCUPPER. AT ALL EXISTING SCUPPER LOCATIONS, REMOVE EXISTING THRU-WALL SCUPPERS AND PIPES AND CUT OUT SECTION OF PARAPET TO ACCOMMODATE NEW OPEN SCUPPER DESIGN. REFER TO DETAIL R1-5C AND SECTION 01 11 00 SCOPE OF WORK FOR SPECIFICS.
2. CONSTRUCT NEW CONTROL JOINT.
3. ADJUST CABLES AND TRAY AS REQUIRED TO SUIT NEW ROOF AND PARAPET HEIGHTS.
4. DENOTES GLASS STACK.
5. EXISTING SKYLIGHT TO BE REMOVED, CURB TO REMAIN, INSULATED AND CLOSED PRIOR TO INSTALLATION OF NEW ROOFING MATERIALS.
6. EXISTING DUCTS AND LOUVRES TO BE TEMPORARILY REMOVED TO ACCOMMODATE INSTALLATION OF NEW ROOF.
7. FOR PITCH POCKET DETAILS, INSTALL NEW SPECIFIED PREMANUFACTURED PENTRATION SEALANT SYSTEM.
8. AT STRUCTURAL COLUMN PENETRATIONS, FLASH WITH PMMA LIQUID APPLIED MEMBRANE FLASHING.
9. AT CANOPIES 0.1, 0.2 & 0.3, ROOF ASSEMBLIES TO BE REPLACED WITH SIMILAR DETAILING TO SECTION 1.2A.
10. AT TOP OF LADDER, PROVIDE AND INSTALL FALL PROTECTION GUARDRAIL. REFER TO SUMMARY OF WORK.

LEGEND

HVAC CURB	MECHANICAL CURB
SKYLIGHT	HVAC ON SLEEPERS
ROOF HATCH	UNIT ON SLEEPERS
CONDUIT BOX	SLEEPER
B-VENT	EXHAUST VENT
SOIL PIPE	GAS PIPE FLASHING
SLEEVE/COLLAR	CONDUIT
POST	ROOF ANCHOR
DRAIN (EXISTING)	DRAIN (NEW)
SCUPPER (EXISTING)	SCUPPER (NEW)
GAS LINE	ELEC. LINE
LADDER	SATELLITE DISH
PAVER	ANTENNA BASE
PITCH PAN	UNUSED
CONTROL JOINT	EXPANSION JOINT

CONCRETE DECK AREAS

ISSUED/REVISED	
100% SUBMISSION	2018-06-07
99% SUBMISSION	2018-04-30
55% SUBMISSION	2018-03-15

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

ROOF DETAIL PLAN

582 LANCASTER STREET WEST, KITCHENER, ON, CANADA N2K 1M3
PHONE: 519.743.8777 wsp.com FAX: 519.743.8778

DATE: 07/06/2018	SCALE: NTS
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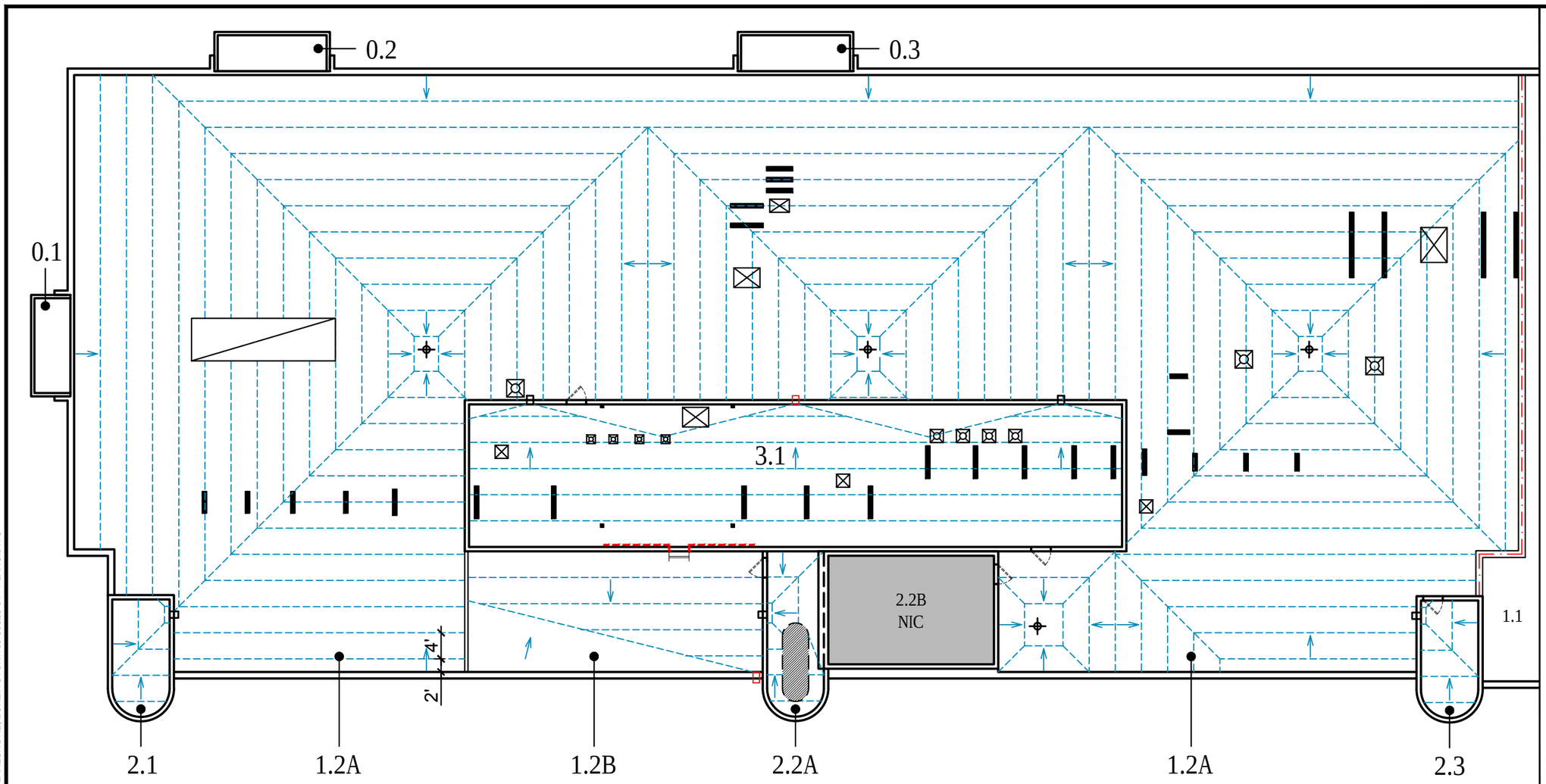
PROJECT NO. 169-00325-01	
DRAWING NO. RP2	



LEGEND

HVAC CURB	MECHANICAL CURB
SKYLIGHT	HVAC ON SLEEPERS
ROOF HATCH	UNIT ON SLEEPERS
CONDUIT BOX	SLEEPER
B-VENT	EXHAUST VENT
SOIL PIPE	GAS PIPE FLASHING
SLEEVE/COLLAR	CONDUIT
POST	ROOF ANCHOR
DRAIN (EXISTING)	DRAIN (NEW)
SCUPPER (EXISTING)	SCUPPER (NEW)
GAS LINE	ELEC. LINE
LADDER	SATELLITE DISH
PAVER	ANTENNA BASE
P PITCH PAN	U UNUSED
CONTROL JOINT	EXPANSION JOINT

NOTES

- FULLY TAPERED POYISOCYANURATE INSULATION
- FIELD SLOPE = 1%
- CRICKET SLOPE = 4%
- BEGINNING THICKNESS AT DRAINS AND SCUPPERS = 13mm (0.5")
- ROOFING CONTRACTOR TO SUPPLY BASE INSULATION
- INSTALL TAPERED INSULATION CRICKETS AT HIGH SIDE OF ALL CURBS AND SLEEPERS.

ISSUED/REVISED	
100% SUBMISSION	2018-06-07
99% SUBMISSION	2018-04-30
55% SUBMISSION	2018-03-15

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

TAPERED INSULATION PLAN

582 LANCASTER STREET WEST, KITCHENER, ON, CANADA N2K 1M3
PHONE: 519.743.8777 wsp.com FAX: 519.743.8778

DATE:	SCALE:
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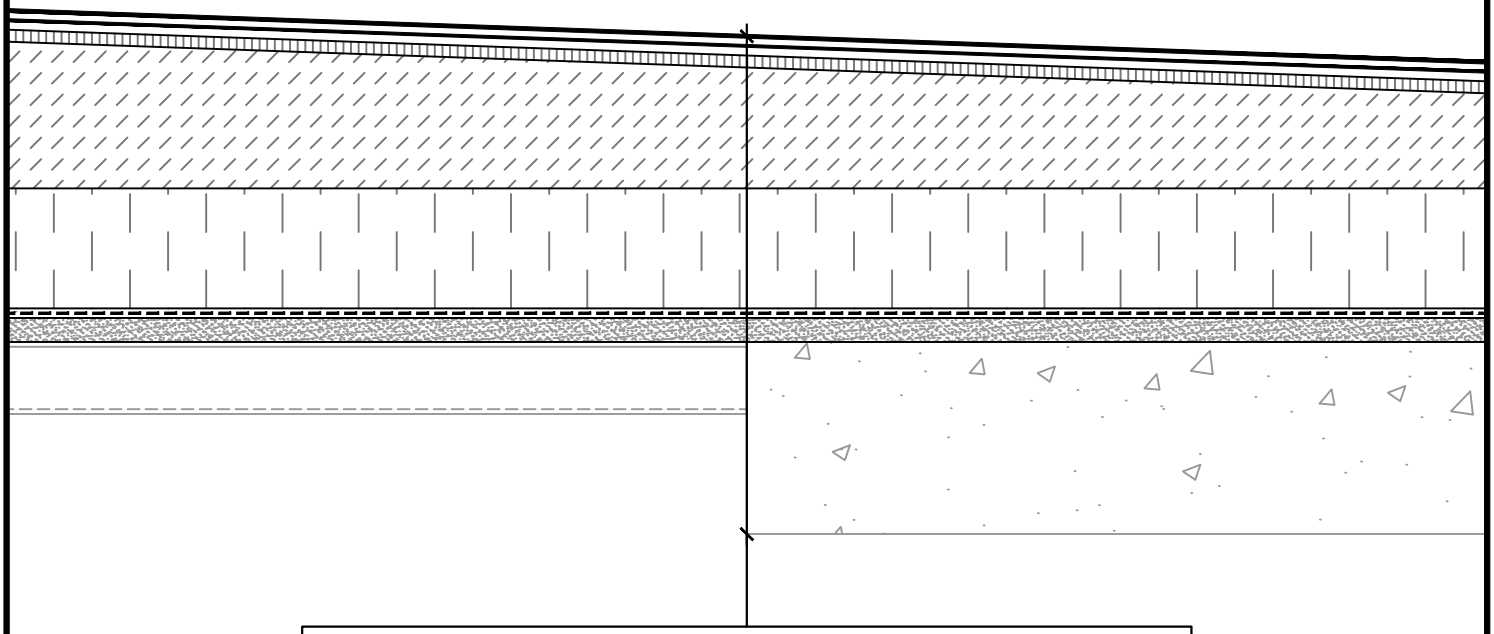
DRAWING NO. RP3	



NEW ROOF ASSEMBLY (R1)

ROOF SECTIONS 1.2A, 1.2B, 0.1, 0.2, 0.3 & 0.4

- 250gm SBS MOD. BIT. CAP SHEET
- 180gm SBS MOD. BIT. BASE SHEET
- 6mm (0.25") ASPHALTIC PROTECTION BOARD
- FULLY TAPERED POLYISOCYANURATE INSULATION (REFER TO ROOF PLANS AND SHOP DRAWINGS FOR TAPERED SPECIFICS)
- 64mm (2.5") BASE LAYER POLYISOCYANURATE INSULATION
- SELF ADHERED MODIFIED BITUMEN VAPOUR RETARDER
- 13mm (0.5") GYPSUM CORE DECK OVERLAY BOARD
- STEEL AND CONCRETE DECKS (REFER TO ROOF PLAN RP2 FOR LOCATIONS OF CONCRETE DECK)

867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

NEW ROOF ASSEMBLY
R1

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
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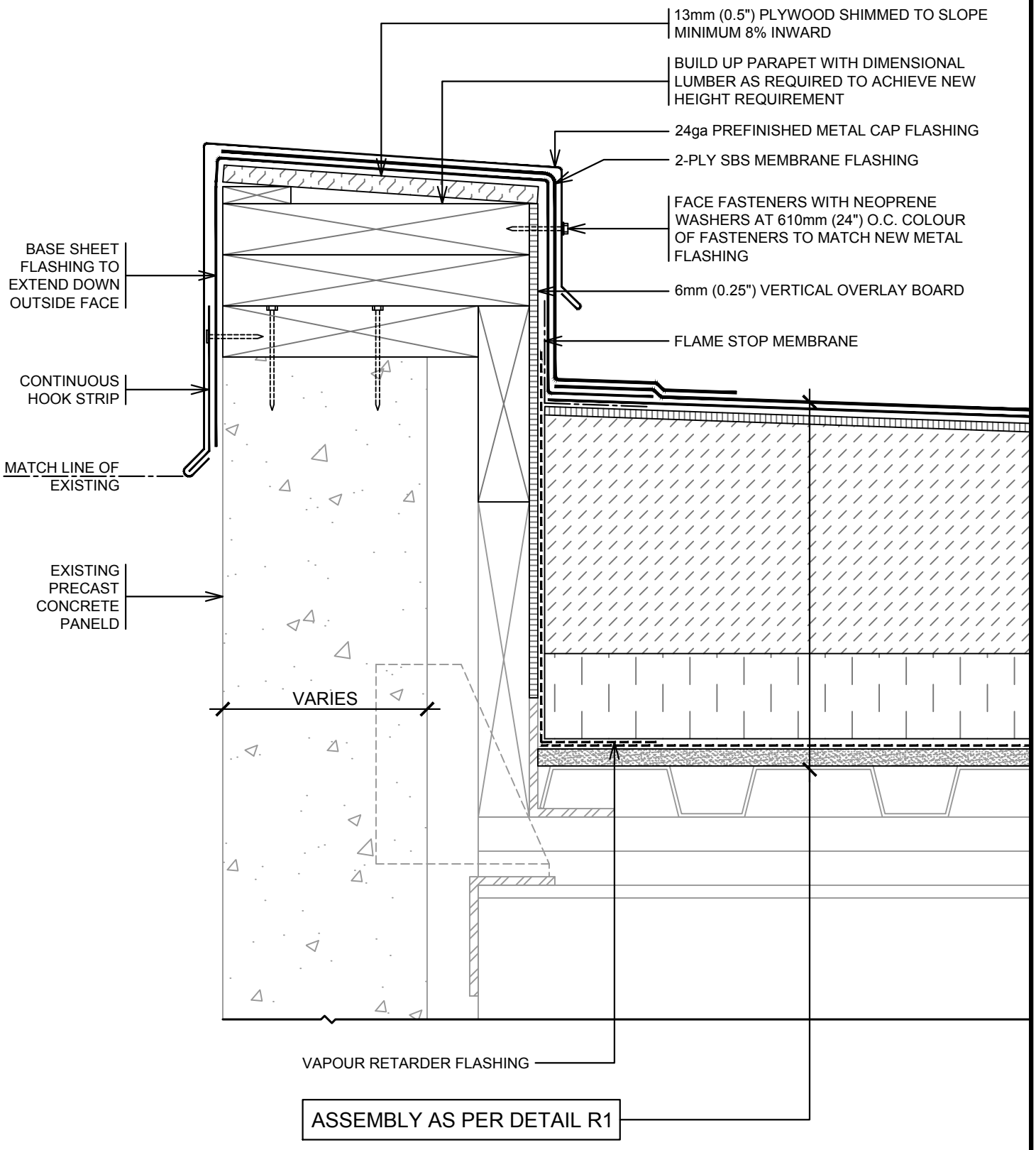
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

PARAPET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
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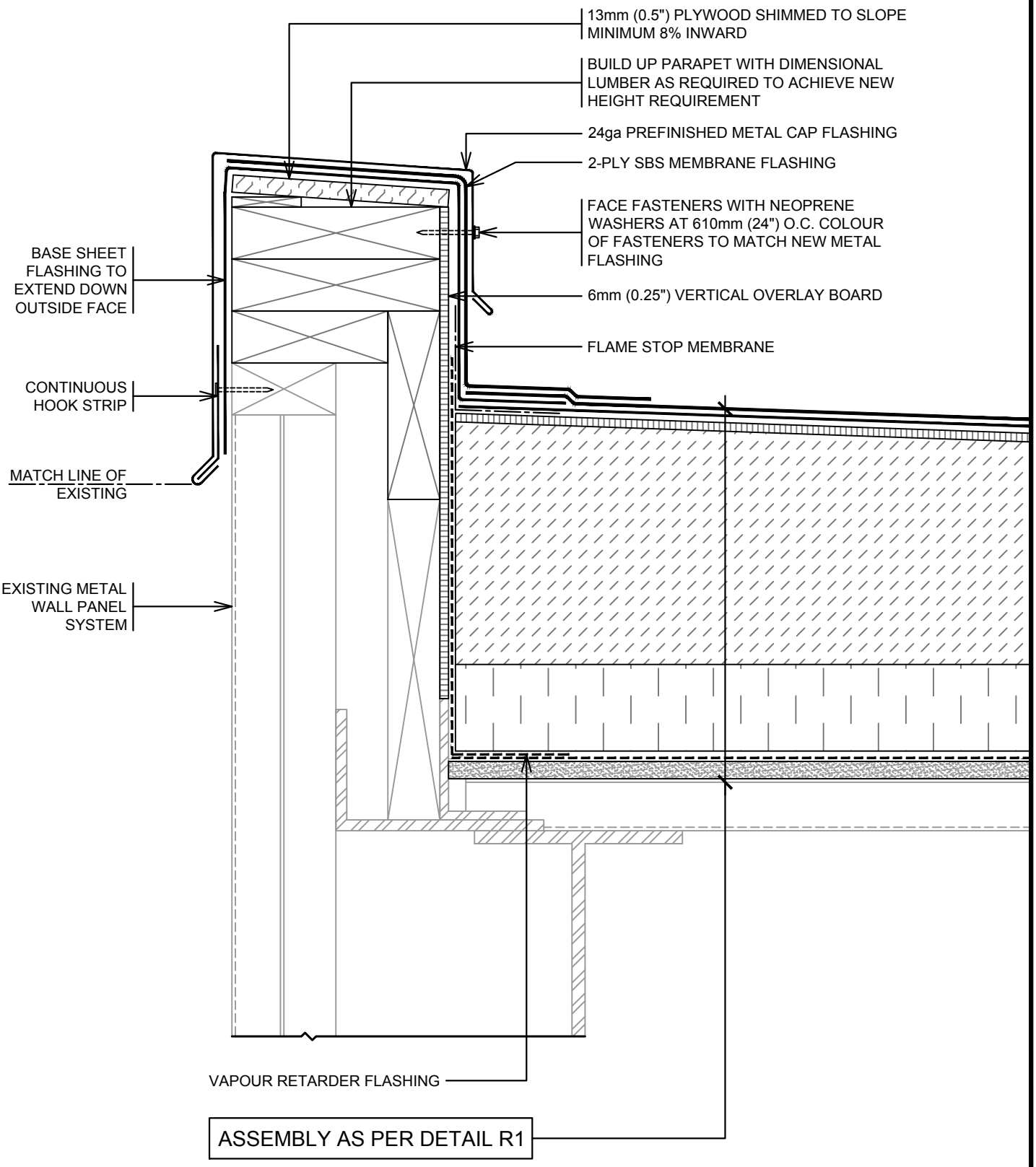
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-1A



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

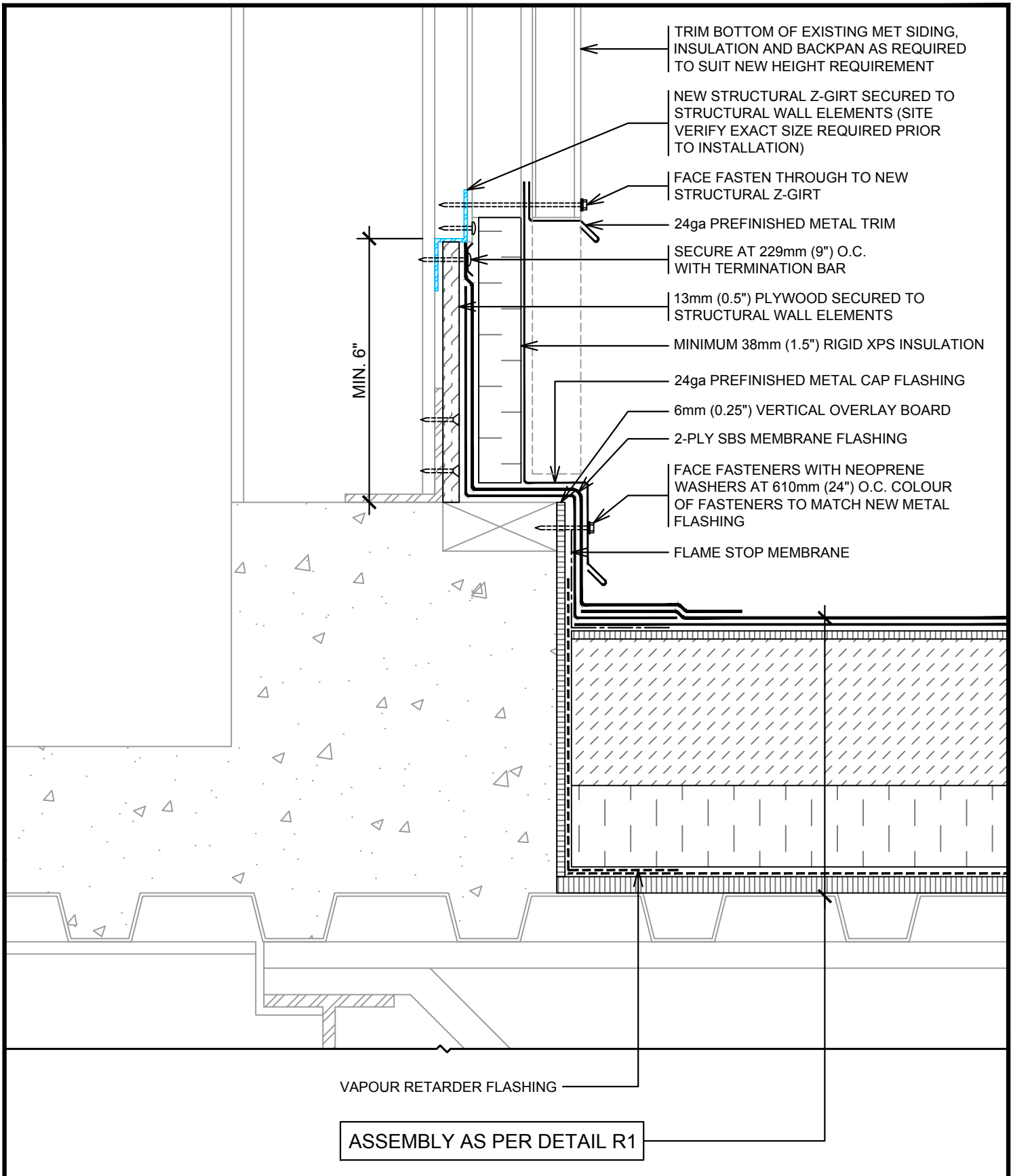
PARAPET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
DRAWN BY:	CHECKED BY:
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-1B

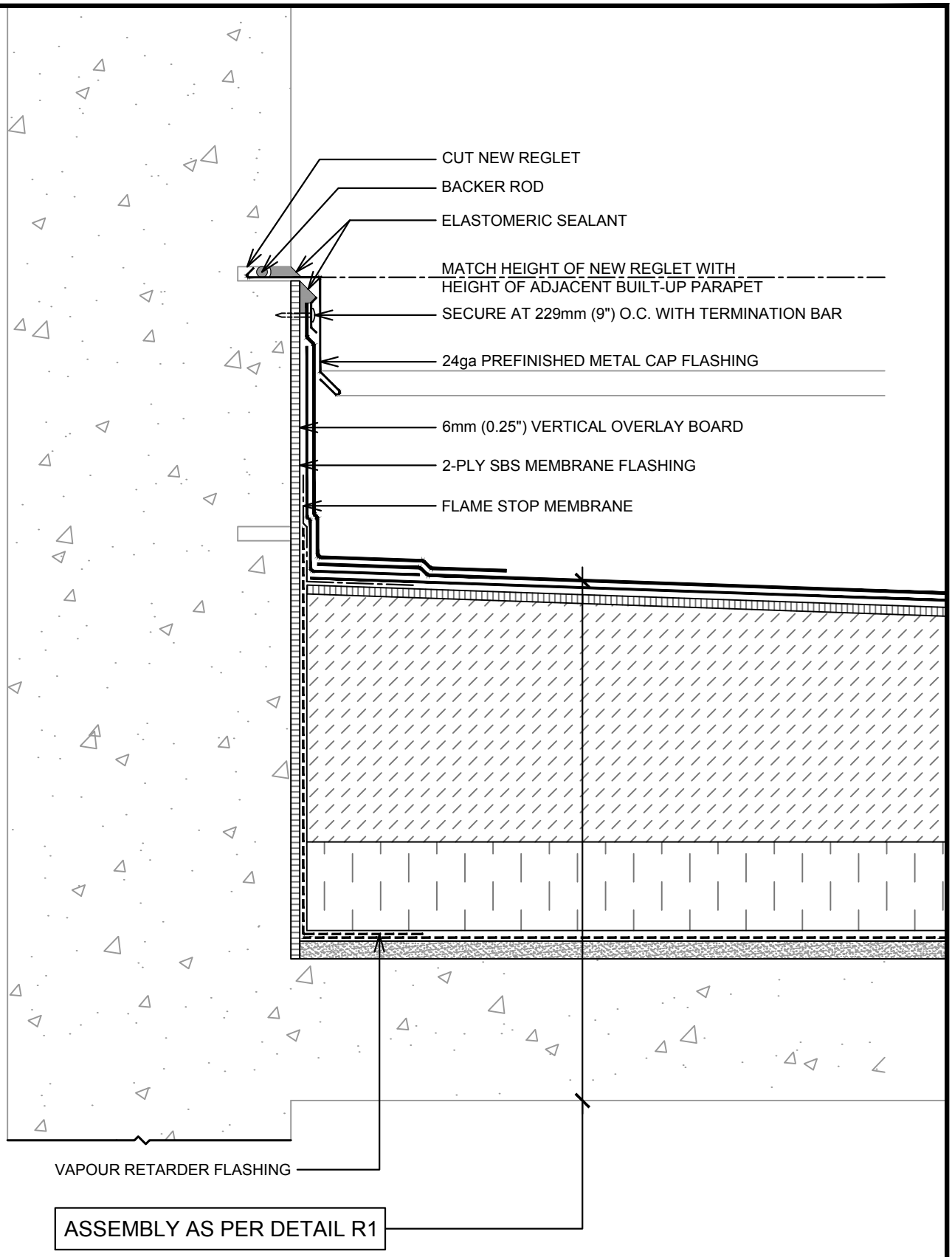


867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

WALL

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
DRAWN BY:	CHECKED BY:
JRT	XXX
PROJECT NO.	
169-00325-01	
DRAWING NO.	
R1-2A	



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

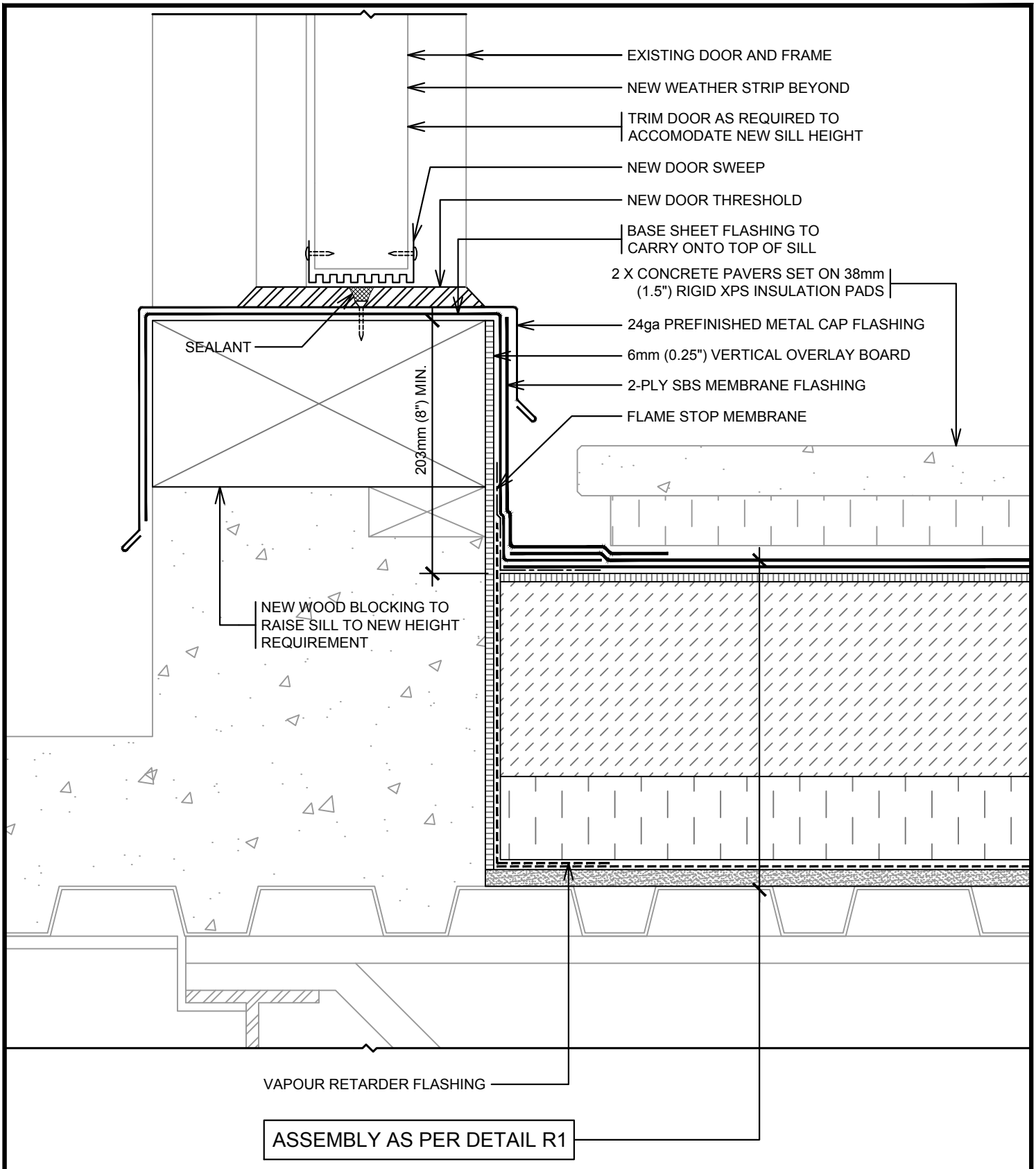
WALL REGLET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
DRAWN BY:	CHECKED BY:
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-2B



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

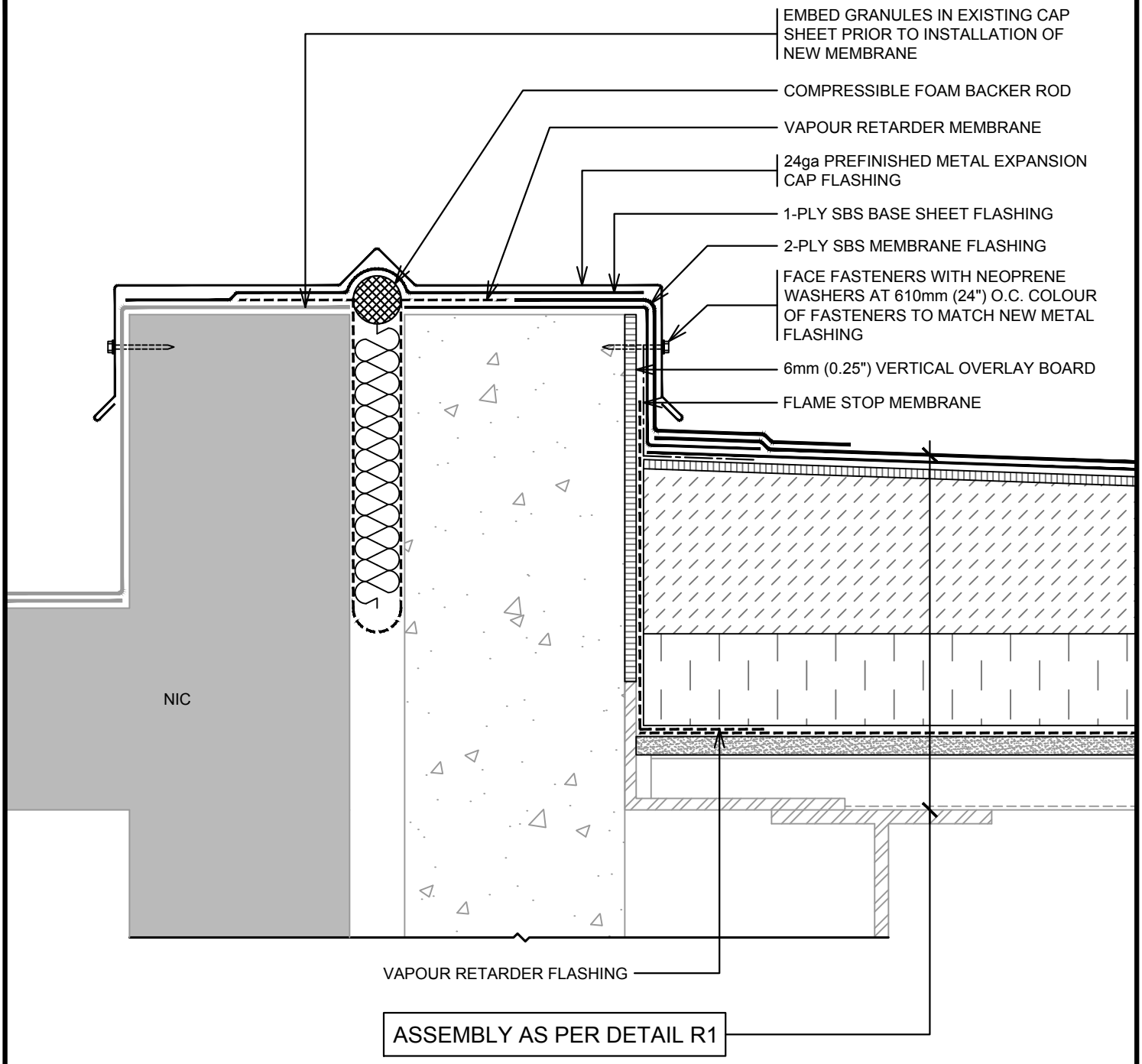
DOOR SILL

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
DRAWN BY:	CHECKED BY:
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-2C



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

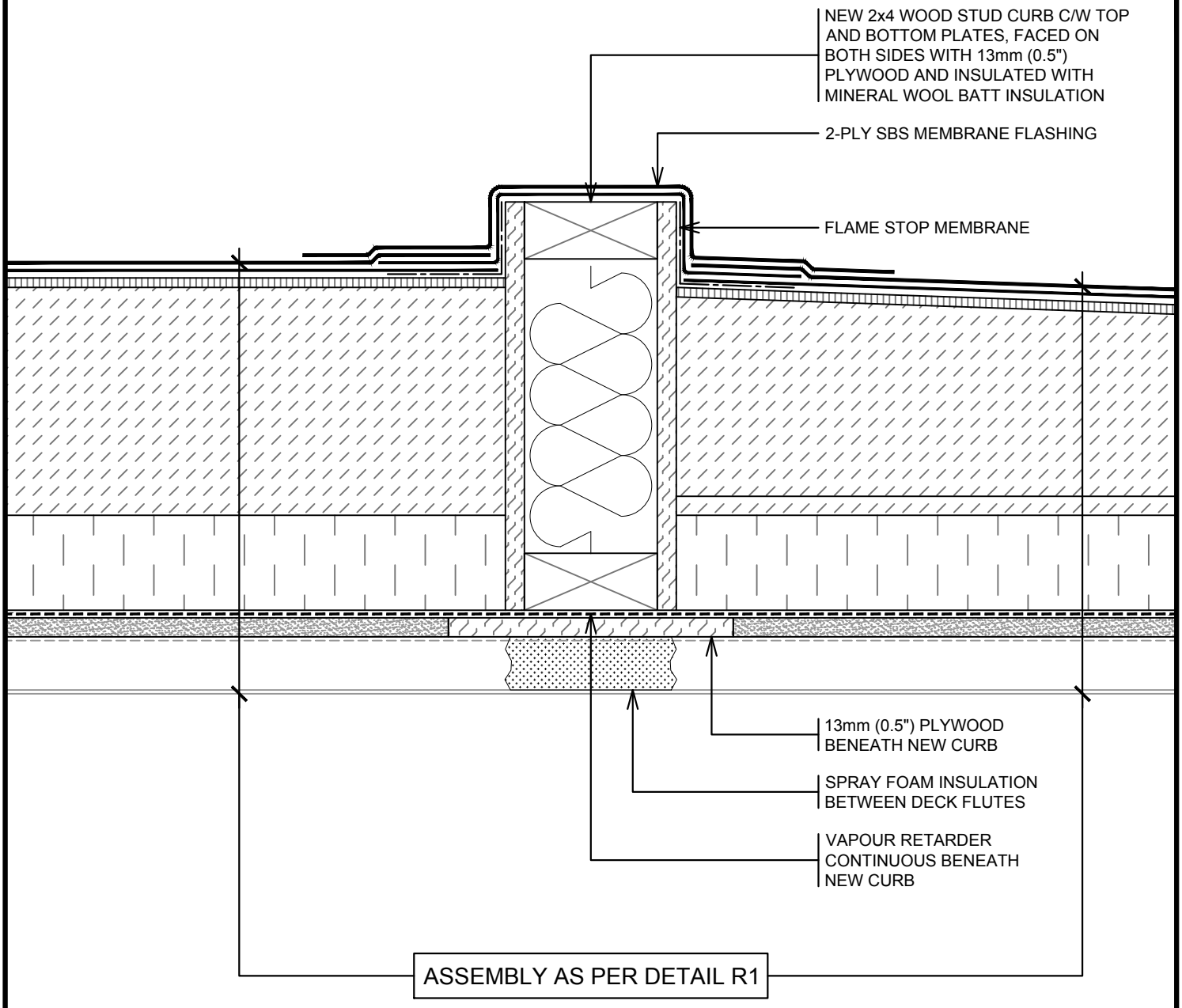
EXPANSION JOINT

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

DATE:	SCALE:
07/06/2018	NTS
DRAWN BY:	CHECKED BY:
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-3A



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

NEW CONTROL JOINT

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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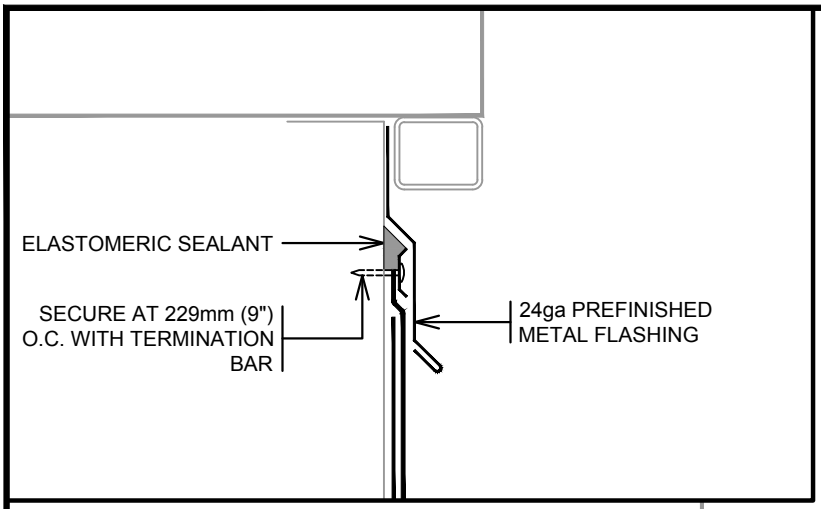
JRT	XXX

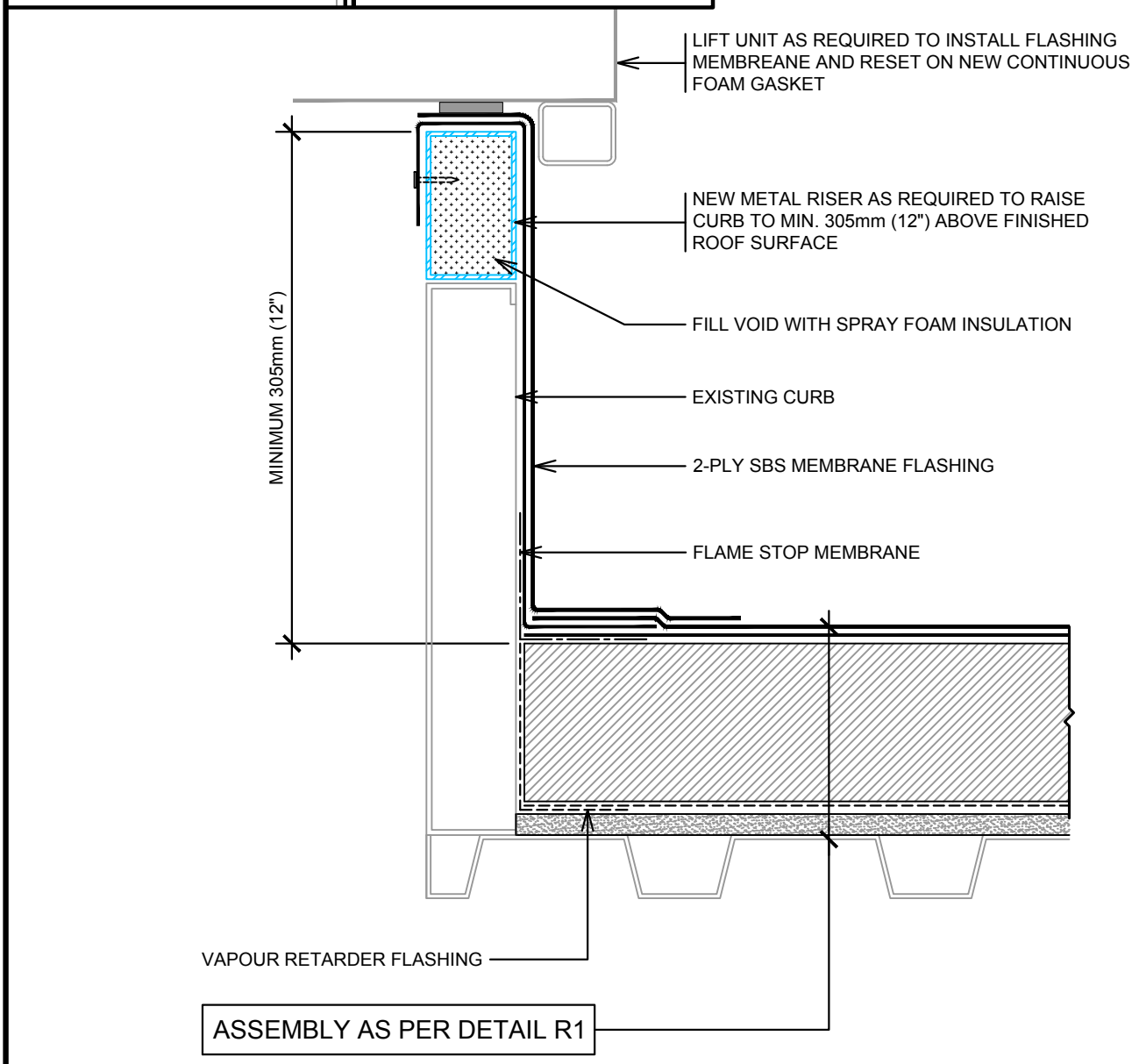
PROJECT NO.
169-00325-01

DRAWING NO.
R1-3B



NOTES

1. DISCONNECT, EXTEND AND RECONNECT MECHANICAL AND ELECTRICAL SERVICES AS REQUIRED TO RAISE UNIT.
2. IF UNIT MEETS HEIGHT REQUIREMENT AND DOES NOT REQUIRE LIFTING, LEAVE UNIT IN PLACE AND FLASH AS PER DETAIL ABOVE.



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TYPICAL RTU CURB

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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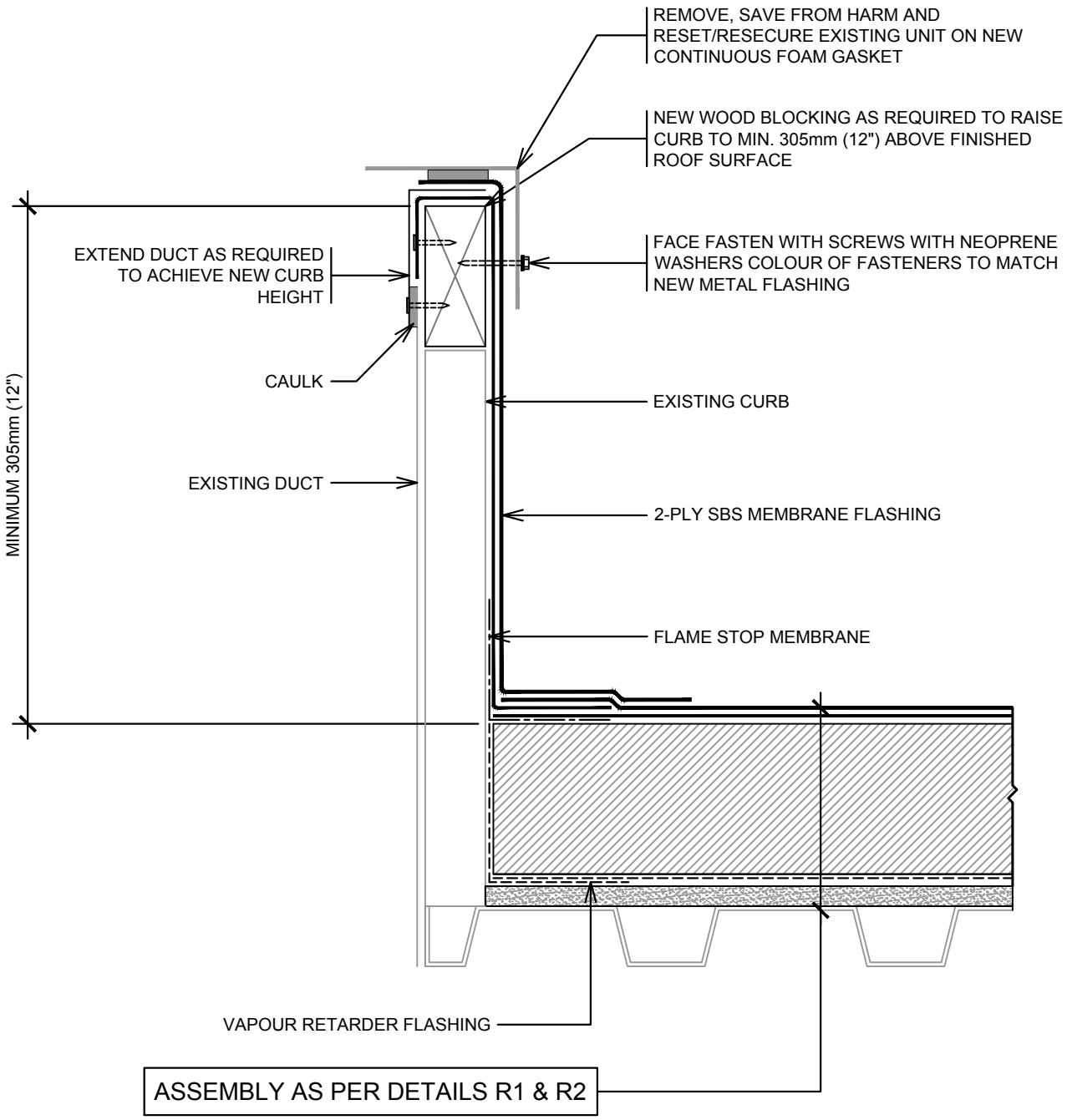
JRT	XXX
PROJECT NO.	
169-00325-01	
DRAWING NO.	
R1-4A	

NOTE:

1. UNITS ON CURBS MAY DIFFER FROM THAT SHOWN.
2. WITHIN AREAS OF TAPERED INSULATION, PROVIDE FIBREBOARD CRICKETS AT HIGH SIDE OF CURBS.
3. REPLACE ANY DAMAGED OR ROTTED WOOD AS REQUIRED.



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TYPICAL MECHANICAL UNIT CURB

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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JRT	XXX

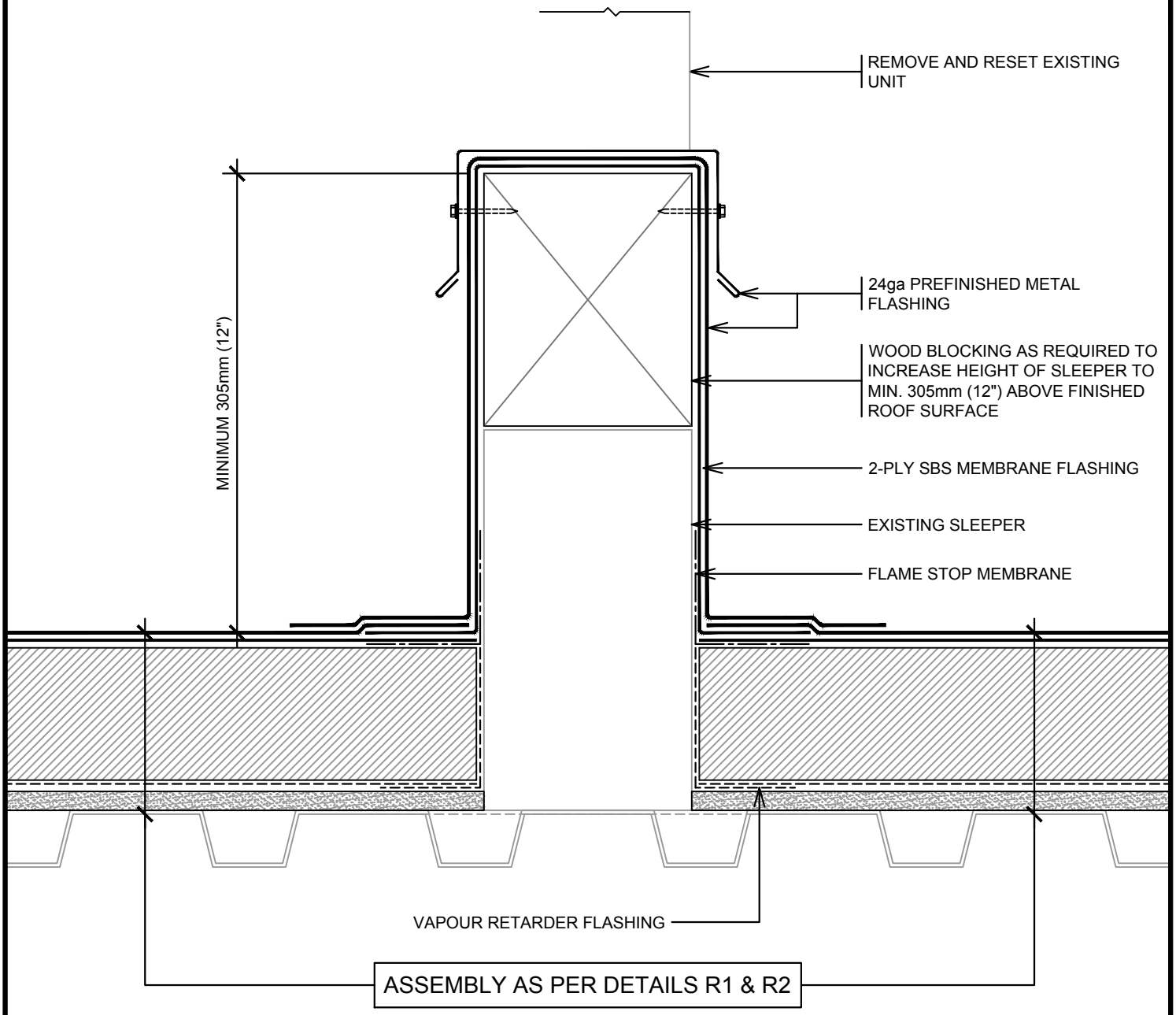
PROJECT NO. 169-00325-01

DRAWING NO. R1-4B

NOTE:

1. DISCONNECT, EXTEND AND RECONNECT MECHANICAL AND ELECTRICAL SERVICES AS REQUIRED TO RAISE UNIT.

2. IF EXISTING SLEEPER MEETS HEIGHT REQUIREMENT AND DOES NOT REQUIRE REMOVAL, LIFT UNIT ONLY AS REQUIRED TO COMPLETE DETAIL BELOW WITHOUT ADDITIONAL WOOD BLOCKING.



ASSEMBLY AS PER DETAILS R1 & R2

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WTC BUILDING ROOF REPLACEMENT

TYPICAL SLEEPER

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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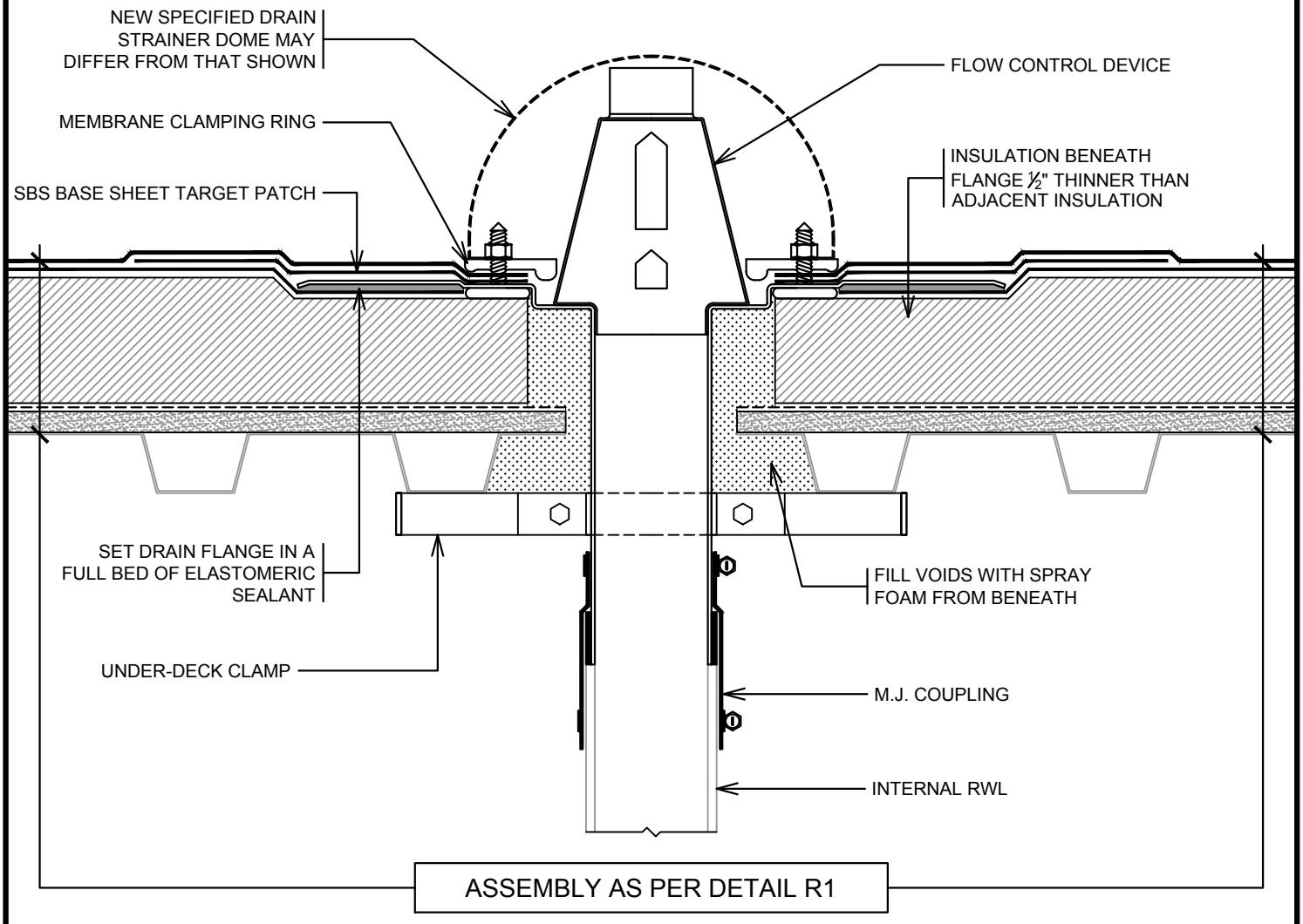
JRT	XXX
PROJECT NO.	
169-00325-01	
DRAWING NO.	
R1-4C	

NOTES:

1. REFER TO ROOF PLANS AND SHOP DRAWINGS FOR TAPERED INSULATION SLOPE AND THICKNESS.



ASSEMBLY AS PER DETAIL R1

867 LAKESHORE RD, BURLINGTON
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TYPICAL DRAIN

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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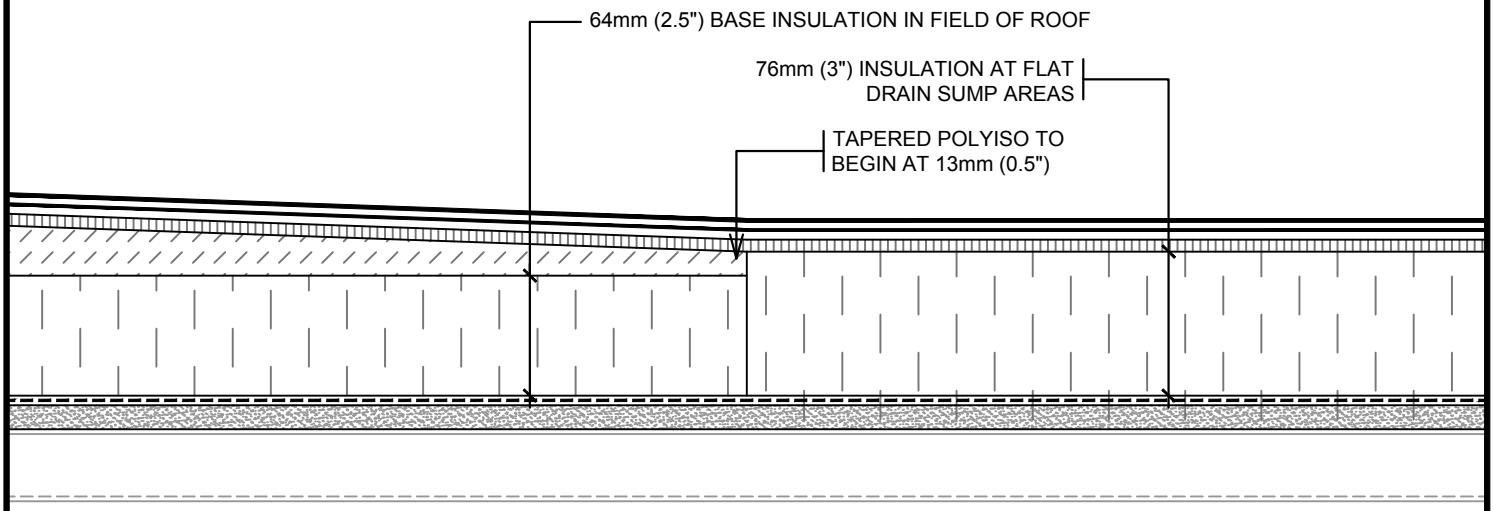
PROJECT NO. 169-00325-01

DRAWING NO. R1-5A



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DRAIN SUMP TRANSITION

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

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07/06/2018	NTS
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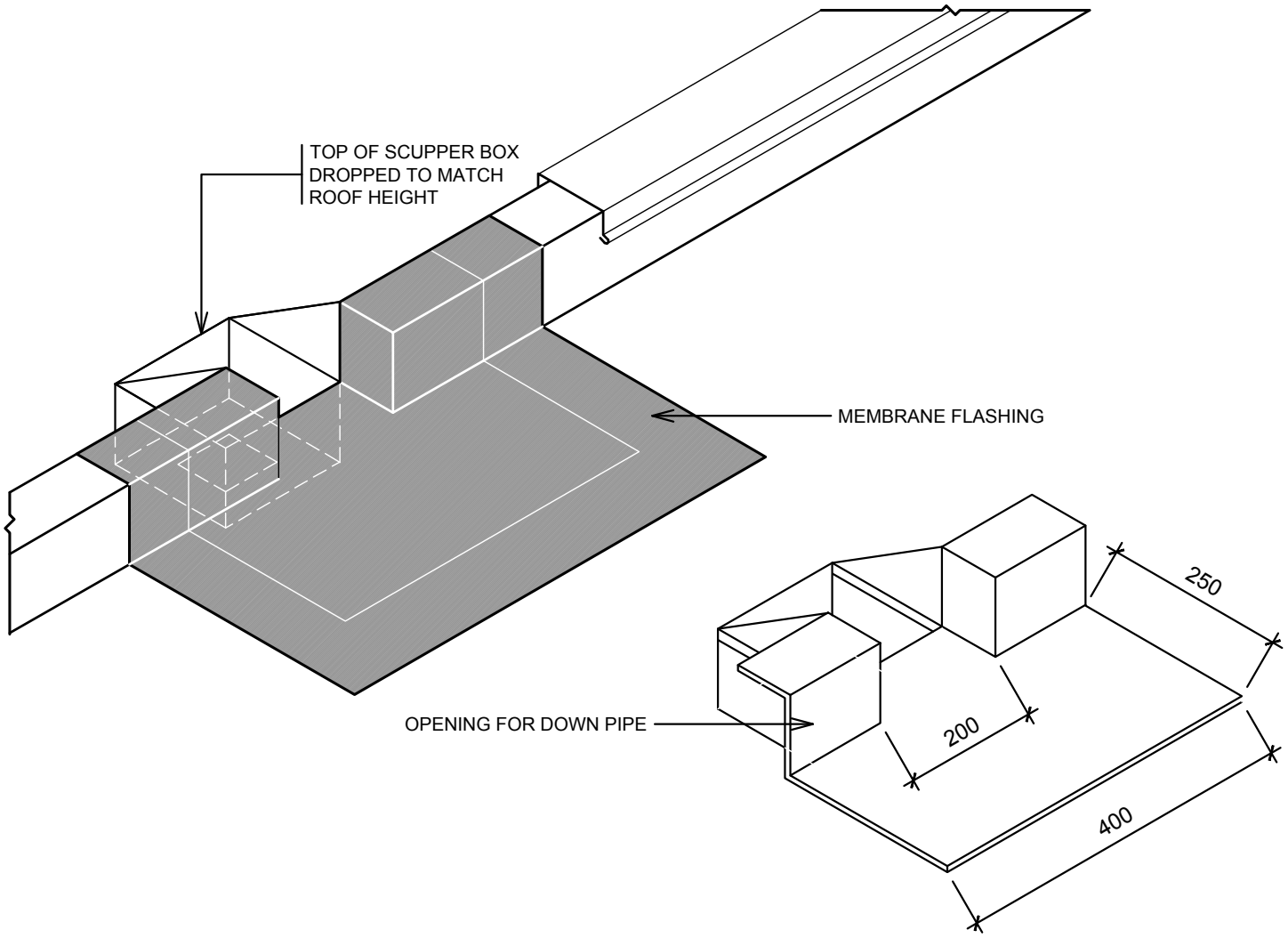
PROJECT NO.
169-00325-01

DRAWING NO.
R1-5B



NOTE:

1. INSTALL SCUPPER DRAIN SUMP TO ENSURE NO WATER WILL BE HELD ON ROOF SECTION AFTER FINAL INSTALLATION OF SCUPPER.
2. FABRICATE SCUPPER FROM PREFINISHED METAL TO MATCH CAP FLASHING.
3. ALL SEAMS TO BE CONTINUOUSLY SOLDERED OR WELDED.

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SCUPPER

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

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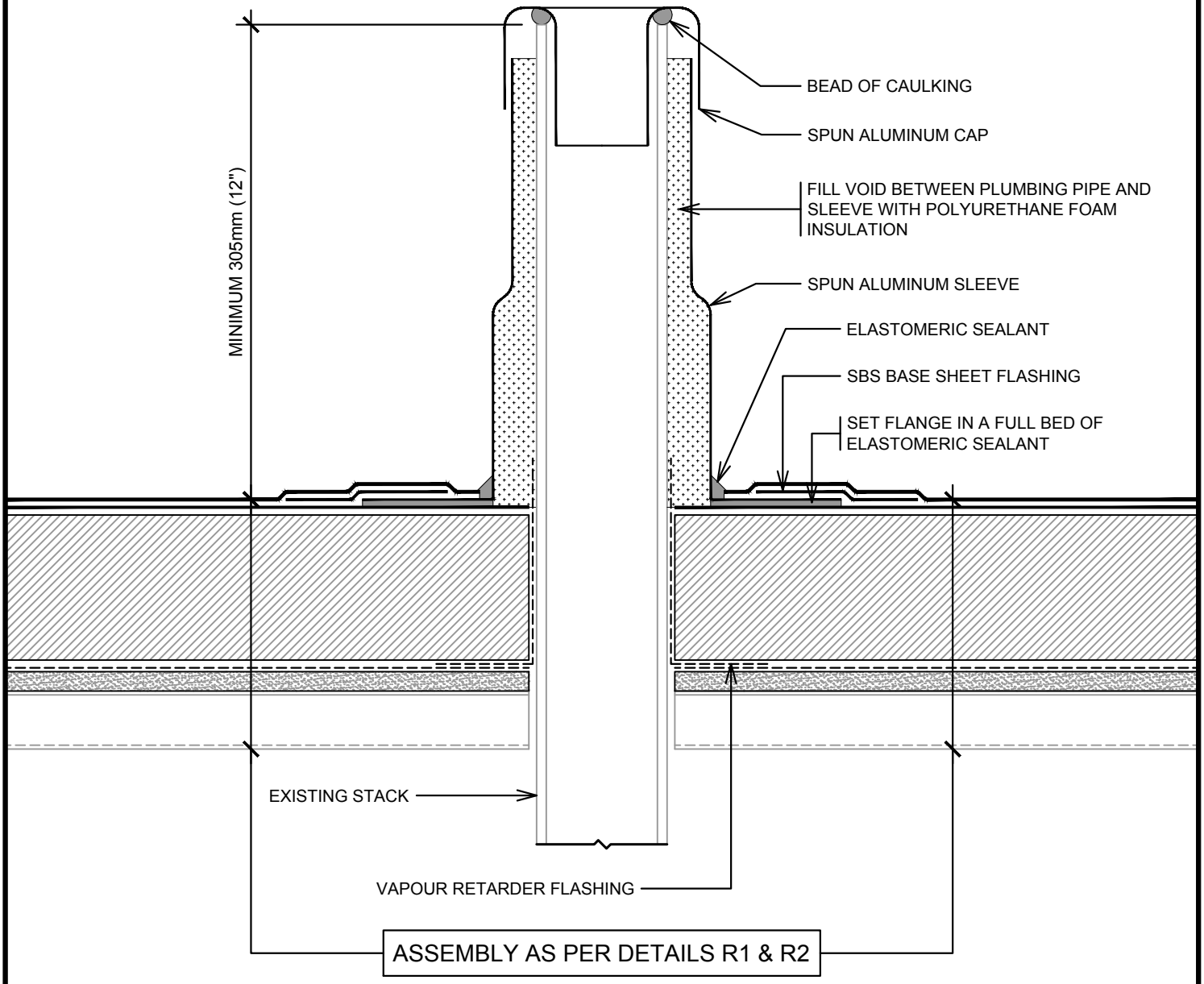
PROJECT NO. 169-00325-01

DRAWING NO. R1-5C



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

TYPICAL SOIL PIPE

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
PHONE: 905.529.4414 wsp.com FAX: 905.333.3903

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07/06/2018	NTS
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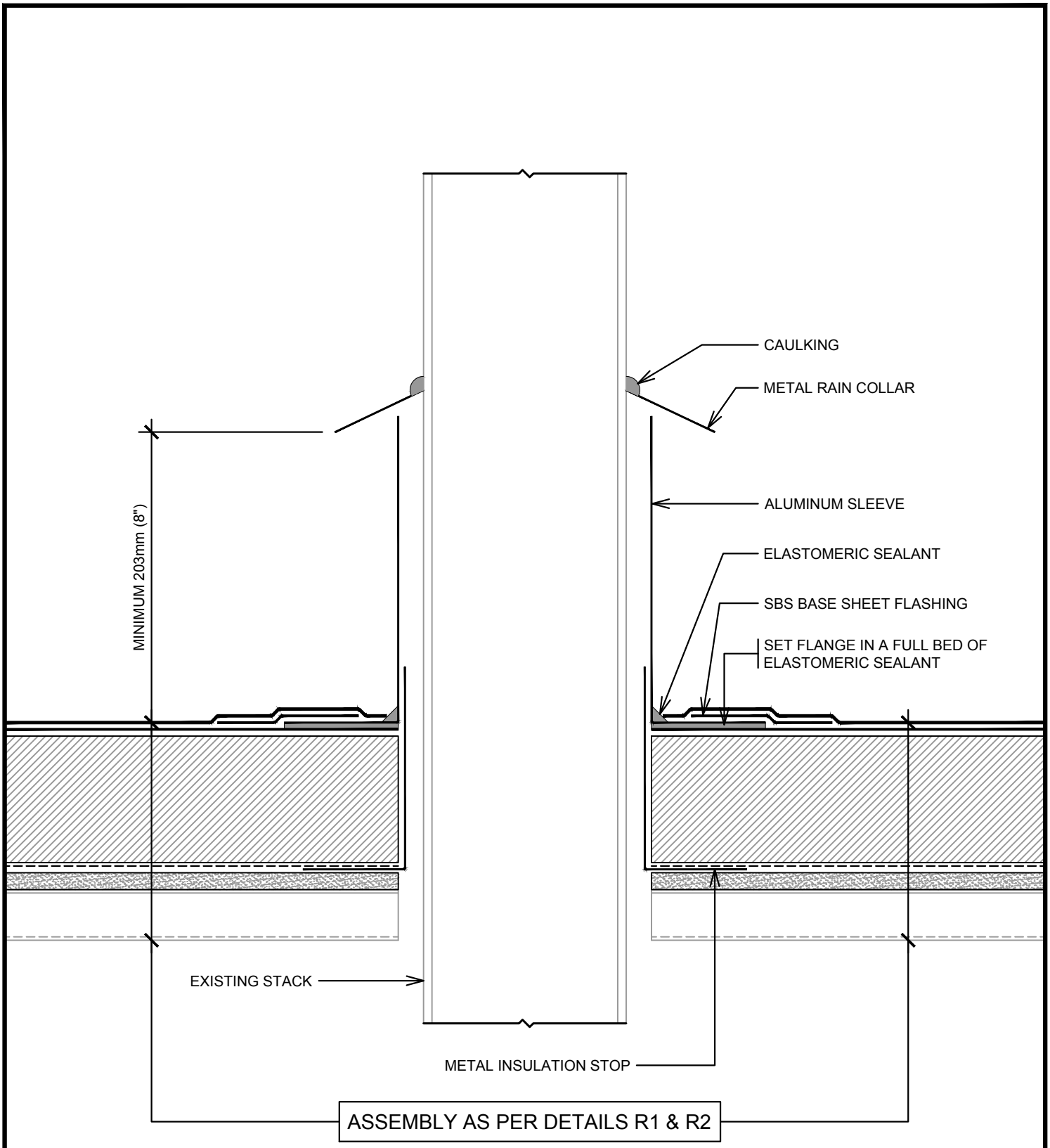
PROJECT NO.
169-00325-01

DRAWING NO.
R1-6A



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WTC BUILDING ROOF REPLACEMENT

TYPICAL B-VENT

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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07/06/2018	NTS
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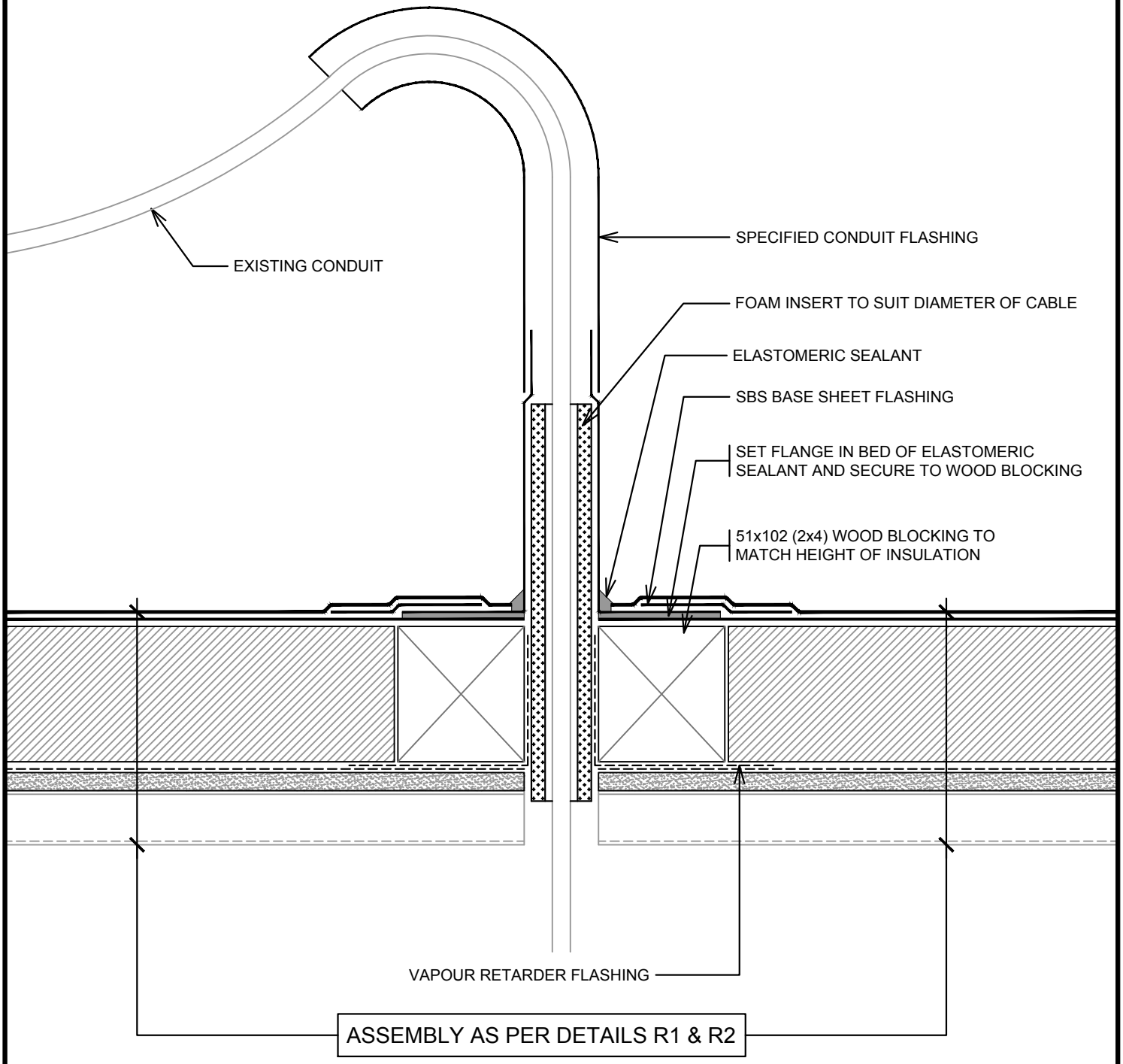
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-6B

NOTE:

1. DISCONNECT AND RECONNECT ELECTRICAL AND/OR GAS SERVICES AS REQUIRED.



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WTC BUILDING ROOF REPLACEMENT

TYPICAL CONDUIT FLASHING

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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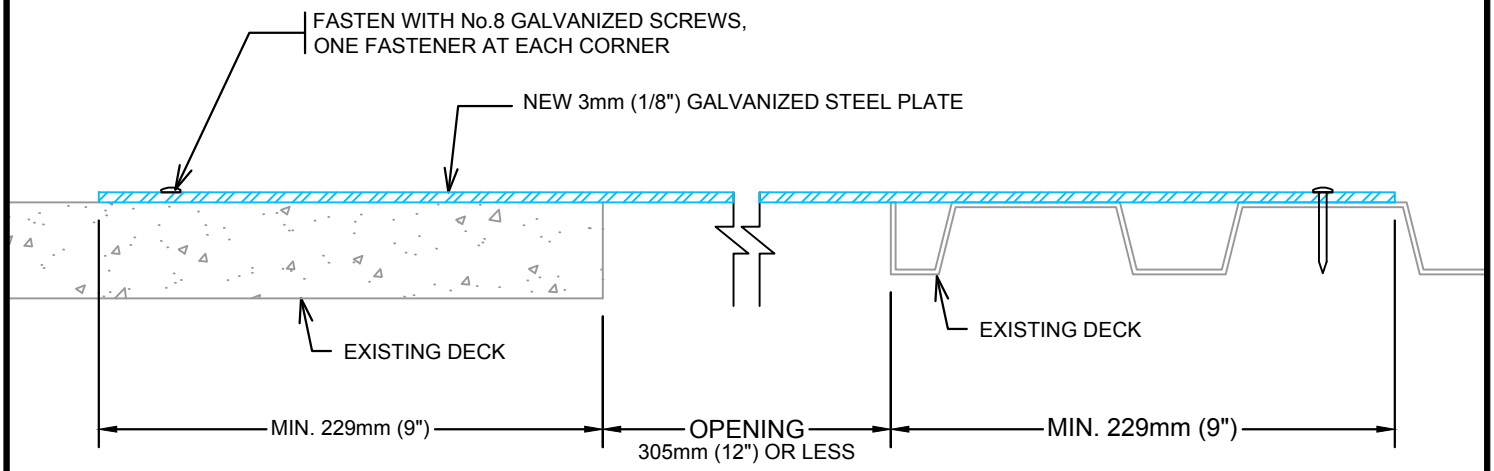
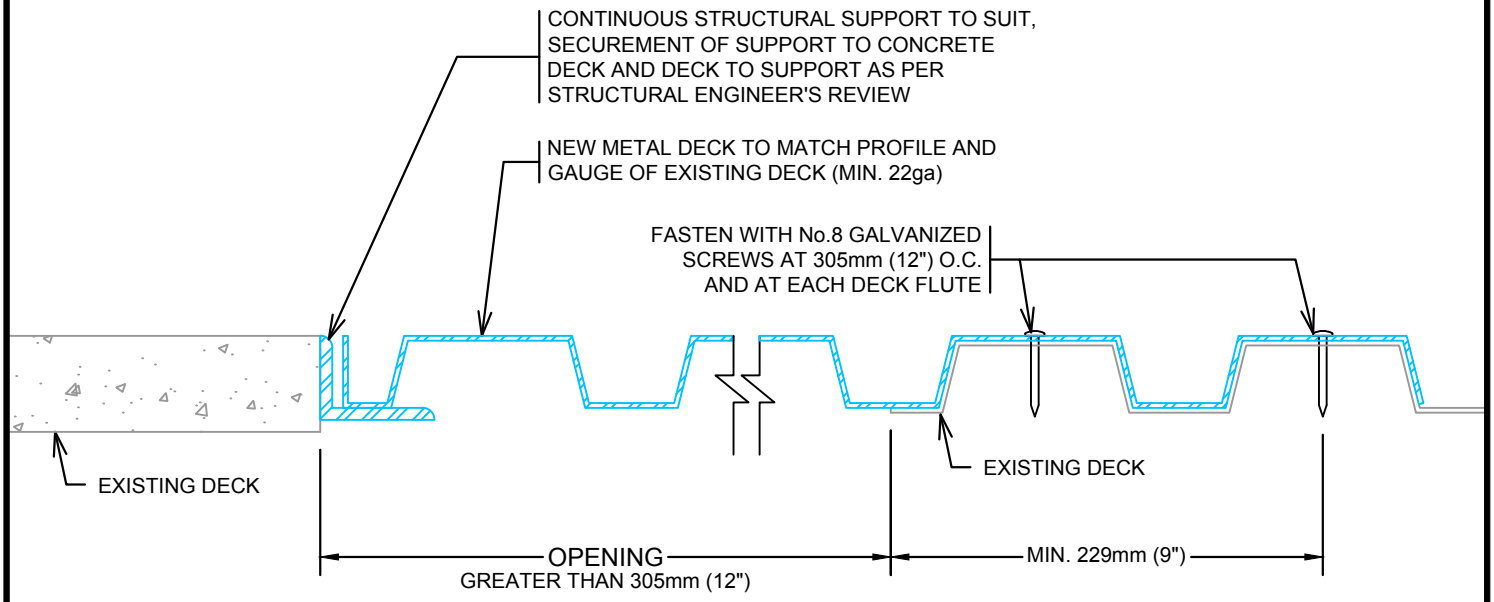
169-00325-01

DRAWING NO.
R1-6C





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DECK CLOSURE

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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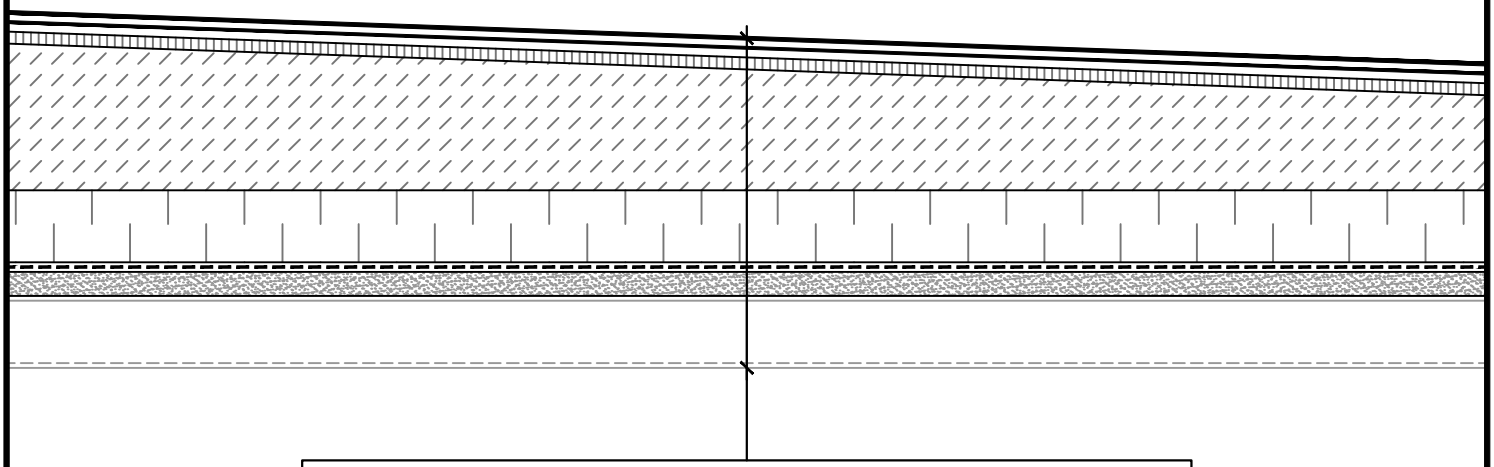
JRT	XXX

PROJECT NO.
169-00325-01

DRAWING NO.
R1-7



NEW ROOF ASSEMBLY (R2)

ROOF SECTIONS 2.2A & 3.1

- 250gm SBS MOD. BIT. CAP SHEET
- 180gm SBS MOD. BIT. BASE SHEET
- 6mm (0.25") ASPHALTIC PROTECTION BOARD
- FULLY TAPERED POLYISOCYANURATE INSULATION (REFER TO ROOF PLANS AND SHOP DRAWINGS FOR TAPERED SPECIFICS)
- 38mm (1.5") BASE LAYER POLYISOCYANURATE INSULATION
- SELF ADHERED MODIFIED BITUMEN VAPOUR RETARDER
- 13mm (0.5") GYPSUM CORE DECK OVERLAY BOARD
- STEEL DECK

867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

NEW ROOF ASSEMBLY
R2

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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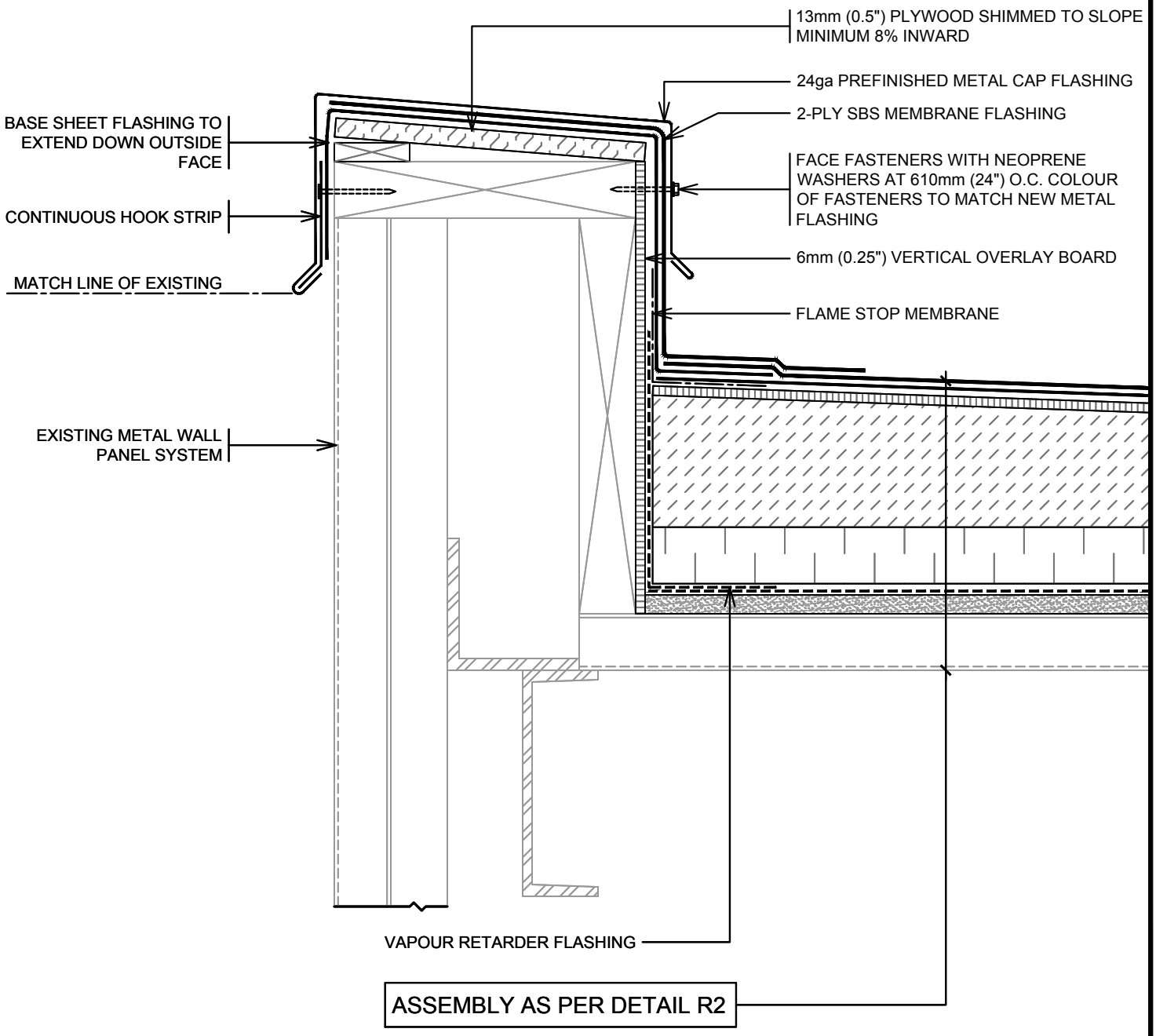
DRAWING NO.
R2



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

PARAPET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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PROJECT NO.
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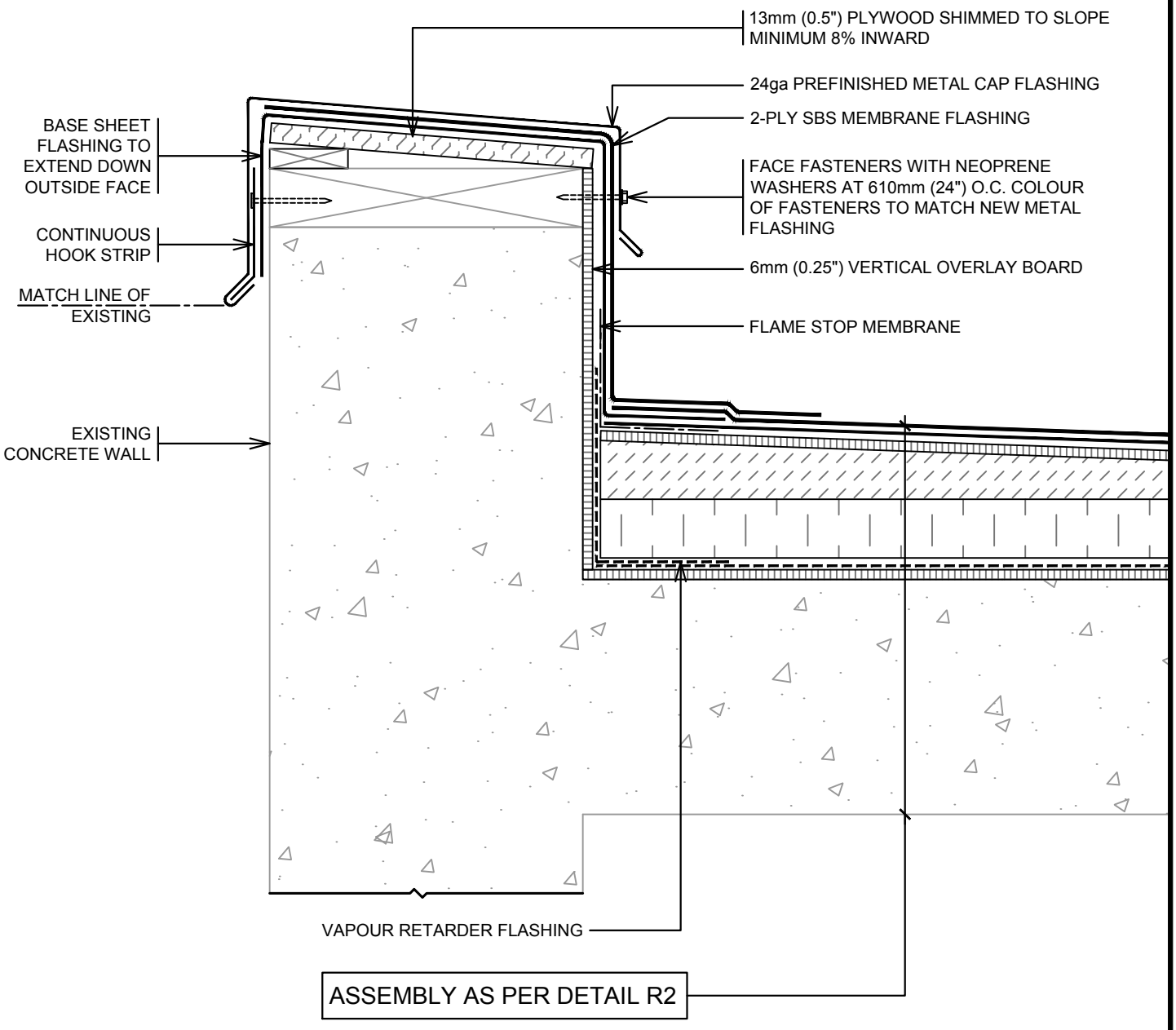
DRAWING NO.
R2-1



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

PARAPET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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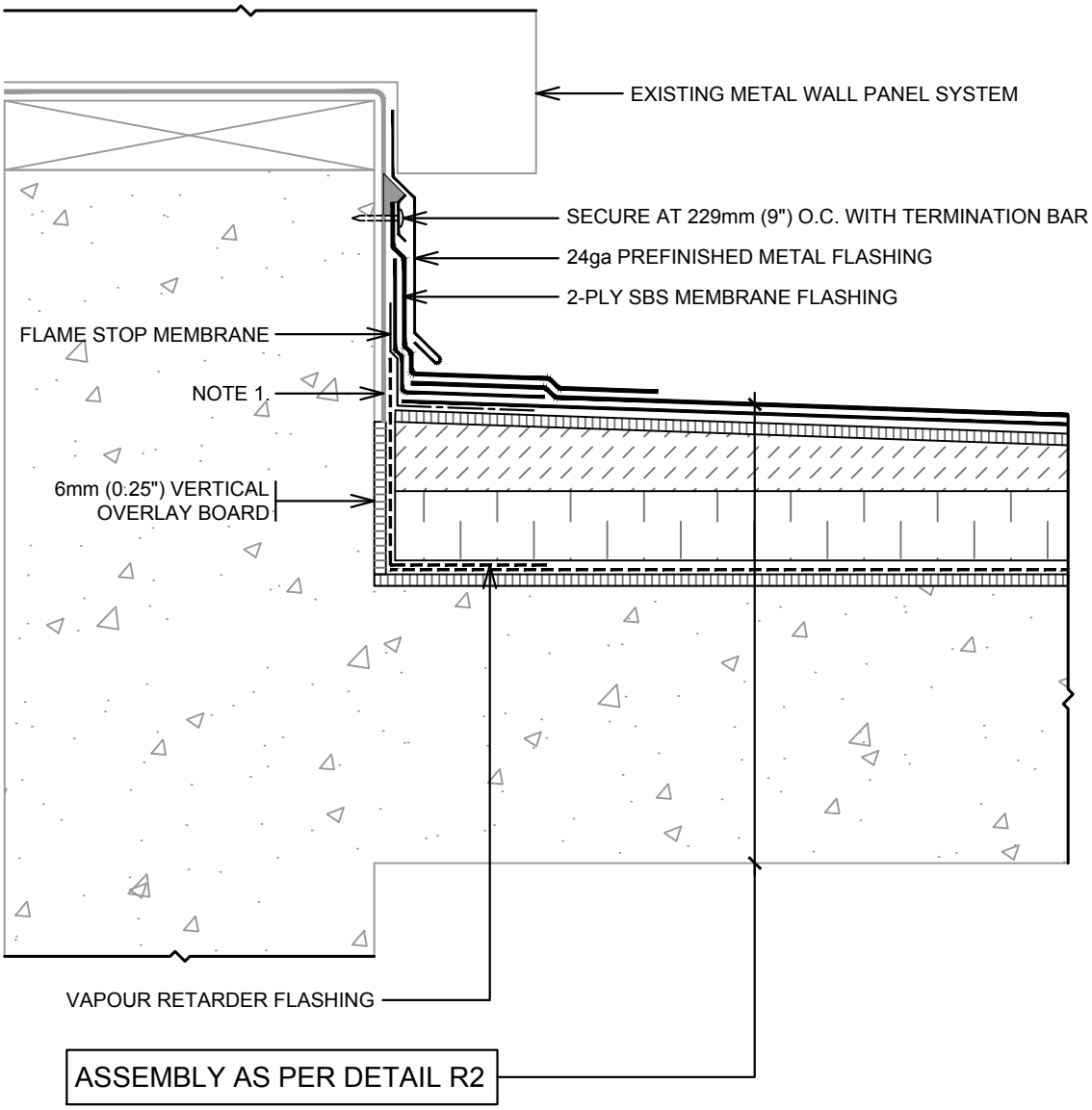
PROJECT NO.
169-00325-01

DRAWING NO.
R2-2

NOTES:

1. TRIM BOTTOM OF EXISTING MODIFIED BITUMEN FLASHINGS AT APPROXIMATELY THE SAME LEVEL AS THE NEW ROOF ASSEMBLY. LEAVE REMAINDER OF MEMBRANE IN PLACE FOR TIE-IN WITH NEW MEMBRANE FLASHINGS. EMBED GRANULES IN EXISTING CAP SHEET PRIOR TO NEW MEMBRANE APPLICATION.



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

WALL

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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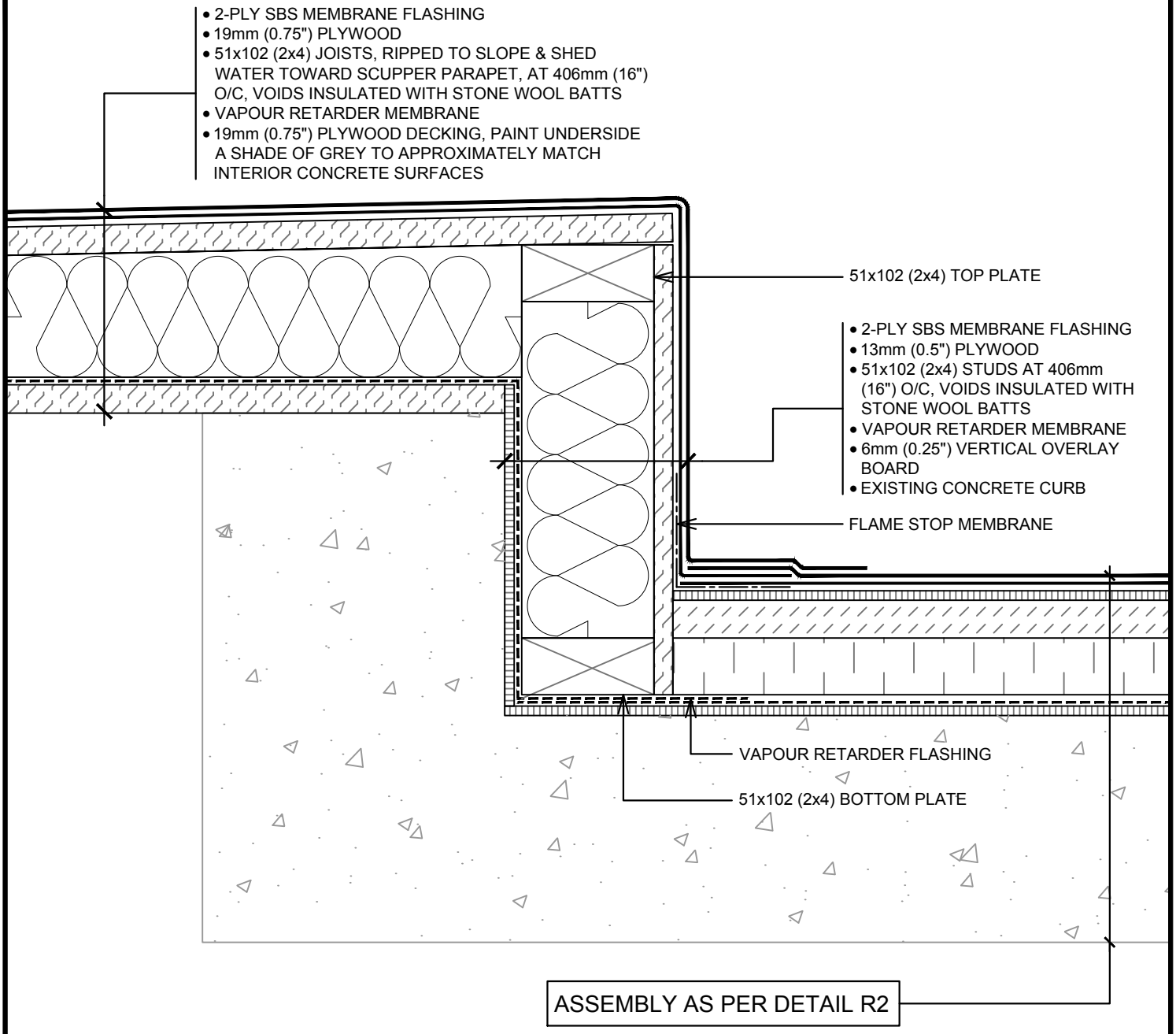
DRAWING NO.
R2-3



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

FORMER SKYLIGHT CURB

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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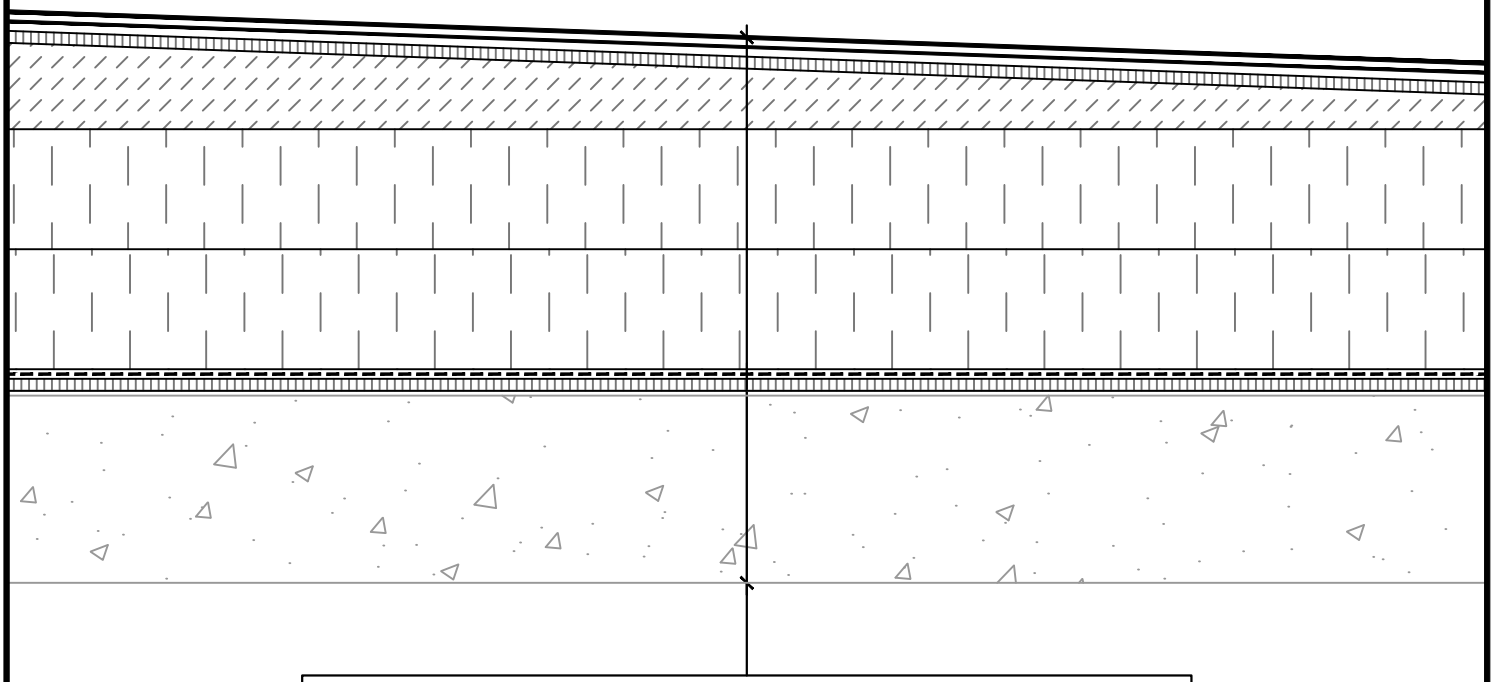
DRAWING NO.	
R2-4	



NEW ROOF ASSEMBLY (R3)

ROOF SECTIONS 2.1 & 2.3

- 250gm SBS MOD. BIT. CAP SHEET
- 180gm SBS MOD. BIT. BASE SHEET
- 6mm (0.25") ASPHALTIC PROTECTION BOARD
- FULLY TAPERED POLYISOCYANURATE INSULATION (REFER TO ROOF PLANS AND SHOP DRAWINGS FOR TAPERED SPECIFICS)
- TWO LAYERS OF 64mm (2.5") POLYISOCYANURATE INSULATION
- SELF ADHERED MODIFIED BITUMEN VAPOUR RETARDER
- 6mm (0.25") PROTECTION BOARD
- CONCRETE DECK

867 LAKESHORE RD, BURLINGTON
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NEW ROOF ASSEMBLY
R3

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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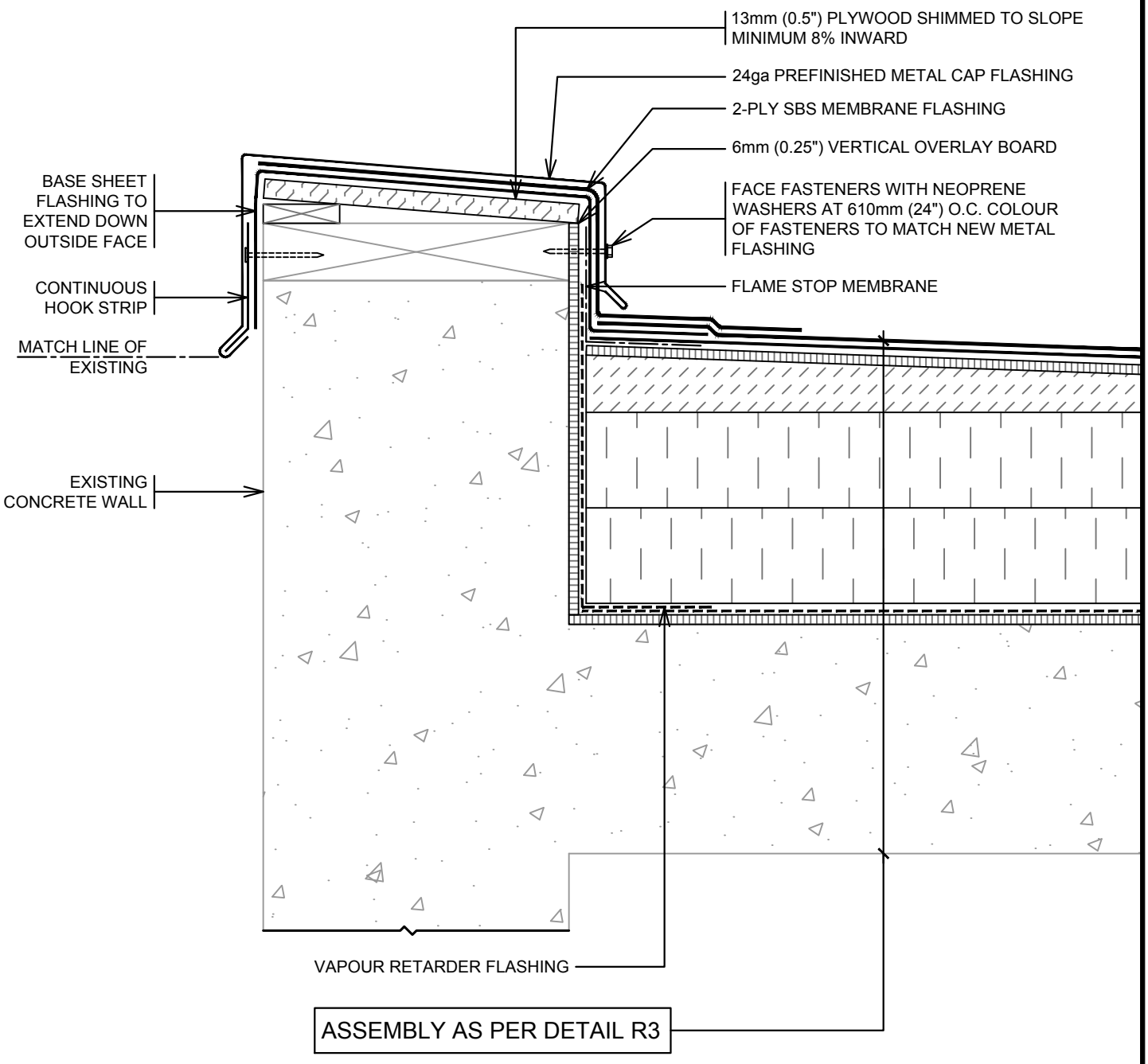
DRAWING NO.	
R3	



867 LAKESHORE RD, BURLINGTON
WTC BUILDING ROOF REPLACEMENT

PARAPET

4 HUGHSON ST. SOUTH, SUITE 300, HAMILTON, ON, CANADA L8N 3Z1
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PROJECT NO.
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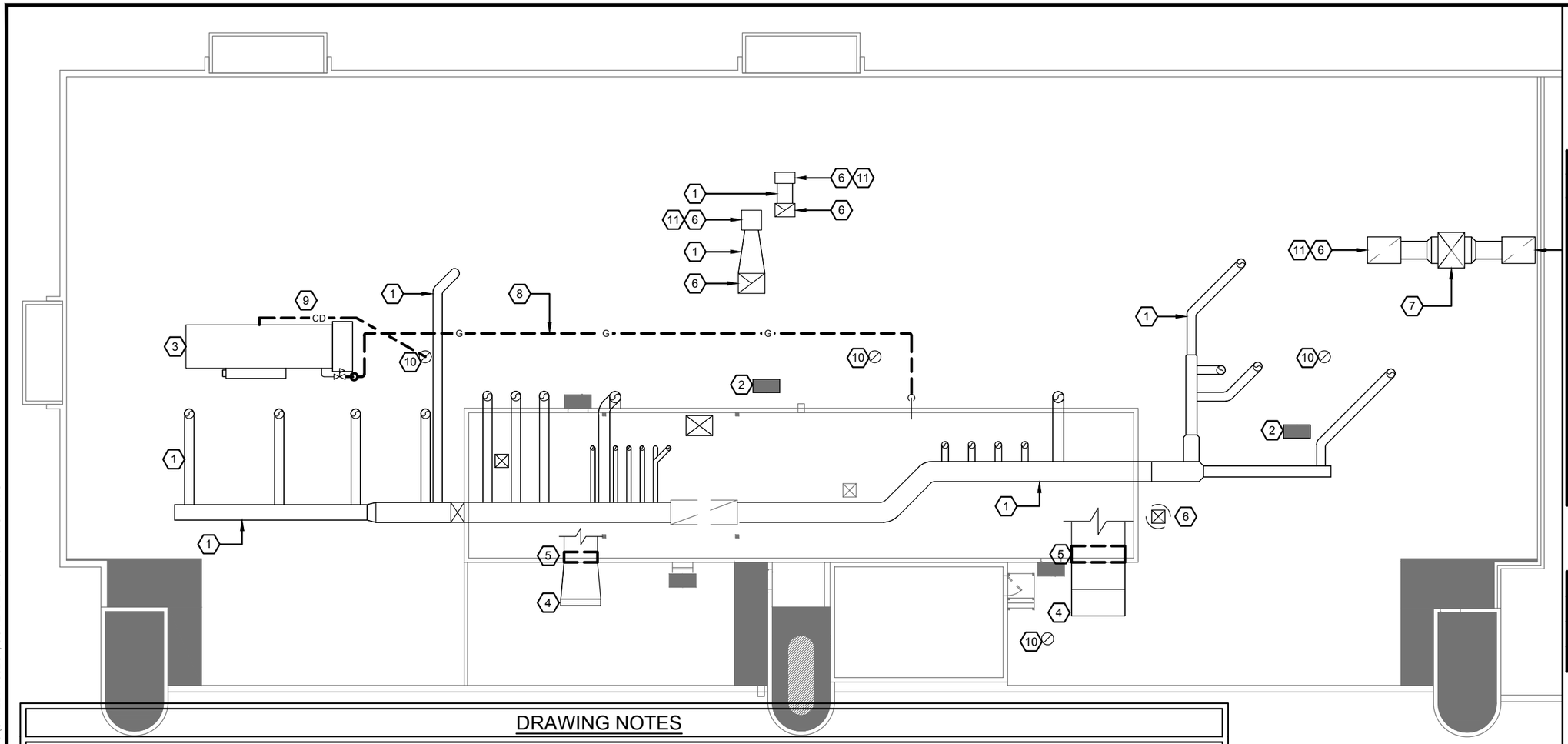
DRAWING NO.
R3-1



DRAWING NOTES

1. EXISTING INSULATION FOR ALL DUCTWORK ON ROOF TO BE REPLACED WITH WEATHERPROOF INSULATION JACKET. REPLACE EXISTING DUCTWORK SUPPORT ON ROOF WITH DURA-BLOK™ ROOFTOP SUPPORTS OR APPROVED EQUAL. ROOF TOP MOUNTED SUPPORT SHALL MODIFY BY ARCH. (TYPICAL)
2. TEMPORARY DISCONNECT THE EXISTING CONDENSING UNIT FOR ROOF REPLACEMENT INSTALLATION. MODIFY THE REFRIGERANT PIPING AND TEMPORARY CAP REFRIGERANT PIPING FOR ROOF TOP INSTALLATION. KEEP EXISTING UNIT SUPPORT AND RAISE THE CONDENSING UNIT TO SUIT NEW ROOF INSTALLATION. MECHANICAL CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR FOR A/C UNITS RELOCATED POSITION ON THE ROOF TO SUIT THE EXISTING CABLE LENGTH PRIOR TO INSTALLATION.
3. EXISTING AHU TO REMAIN.
4. EXISTING MAKE UP AIR UNIT 5' x 8' INTAKE LOUVRE AND WEATHER HOOD TO BE TEMPORARILY REMOVE FROM WALL FOR INSTALLATION OF NEW ROOF. RE-INSTALL THE LOUVRE AND WEATHER HOOD AFTER THE INSTALLATION OF NEW ROOF. THE BOTTOM OF THE INTAKE LOUVRE TO BE 12" ABOVE FINISHED ROOF SURFACE. ARCH TO MODIFY EXISTING WALL OPENING TO SUITE NEW LOUVRE ELEVATED POSITION. CONTRACTOR TO VERIFY ON THE FOR EXACT DUCTWORK DIMENSION, REFER TO ARCHITECTURAL DRAWING FOR NEW ROOF SURFACE ELEVATION.
5. CONTRACTOR TO MODIFY EXISTING DUCTWORK AND PROVIDE NEW TRANSITION DUCTWORK FOR THE ELEVATED LOUVRE MOUNTING HEIGHT BETWEEN THE AIR HANDLING UNIT AND INTAKE LOUVRE.
6. CONTRACTOR TO TEMPORARY DETACH BOTH FAN AND DUCTWORK FOR THE INSTALLATION OF NEW CURB AND ROOFING C/W ALL CONTROL WIRING, RECORD EXISTING CONTROL. REINSTALL AND RAISE EXISTING FAN AND MODIFY THE DUCTWORK TO SUIT NEW ELEVATED ROOF SURFACE. TEMPORARILY CAP EXISTING DUCTWORK OPENING BEFORE RE-INSTALLATION. CONTRACTOR TO VERIFY EXACT DUCTWORK DIMENSION, REFER TO ARCHITECTURAL DRAWING FOR NEW ROOF SURFACE WLEVATION AND RE-COMISSION THE UNIT AFTER INSTALLATION
7. EXISTING EXHAUST PLENUM BOX TO REMAIN. ONLY MODIFY THE DUCTWORK BETWEEN THE BOX AND THE FAN TO SUIT NEW FAN HEIGHT.
8. REMOVE AND REINSTALL THE SECTION OF 2"Ø NATURAL GAS PIPING AS SHOWN BEFORE THE PRV ISOLATION VALVE FOR THE NEW ROOF REPLACEMENT. REINSTALL THE GAS PIPE TO 8" ABOVE FINISHED ROOF SURFACE WITH NEW DURA-BLOK™ ROOFTOP SUPPORTS OR APPROVED EQUAL.
9. EXISTING CONDENSATE PIPE TO BE MODIFIED AND RAISED TO SUITE NEW ROOF ELEVATION.
10. REFER TO ARCH DRAWING FOR ROOF DRAIN DETAILS.
11. THE CONTRACTOR SHALL COORDINATE TEMPORARY SHUT DOWN AND DISCONNECTION/RECONNECTION OF EQUIPMENT, INCLUDING BUT NOT LIMITED TO MECHANICAL UNITS, DUCTWORK, VENTS, GAS LINES OR ELECTRICAL CONNECTIONS, WITH THE OWNER'S REPRESENTATIVE AS REQUIRED TO COMPLETE THE SPECIFIED WORK. THE CONTRACTOR SHALL ASSUME THAT SHUT DOWN OF THIS EQUIPMENT MAY NEED TO BE COMPLETED AFTER HOURS, ON WEEKENDS OR ON HOLIDAYS DEPENDING ON THE IMPACT TO BUILDING OPERATIONS. TYPICAL FOR ALL.

MECHANICAL LEGEND

SYMBOL			DESCRIPTION
EXISTING TO REMAIN	EXISTING TO BE RELOCATED OR DEMOLISHED	NEW OR EXISTING IN RELOCATED POSITION	
	R		DUCTWORK
	R		FLEXIBLE DUCT CONNECTION (8'-0" MAXIMUM LENGTH)
	R		LINEAR SUPPLY AIR DIFFUSER
	R		RETURN AIR GRILLE
	R		LIGHT SUPPLY AIR TROFFER
	R		VAV BOX C/W ATTENUATOR
	R		BYPASS BOX
	R		THERMOSTAT
	R		CONTROL WIRING/TUBING
	R		DUCT TAKE-OFF (SINGLE LINE)
	R		ELBOW UP
	R		ELBOW DOWN
	R	CAP	CAP OFF
	R		"P"-TRAP

DRAWING LIST

M-01	MECHANICAL LAYOUT
M-02	MECHANICAL DETAILS

ISSUED/REVISED

100% SUBMISSION	2018-06-14
99% SUBMISSION	2018-04-23
55% SUBMISSION	2018-03-15

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

MECHANICAL-LAYOUT

582 LANCASTER STREET WEST, KITCHENER, ON, CANADA N2K 1M3
PHONE: 519.743.8777 wsp.com FAX: 519.743.8778

DATE: 14/06/2018	SCALE: N.T.S
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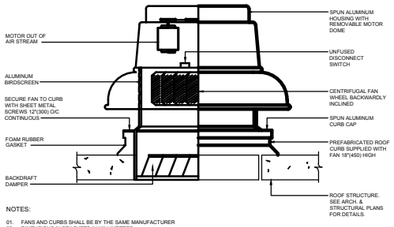
PROJECT NO. 169-00325-01	
DRAWING NO. M-01	

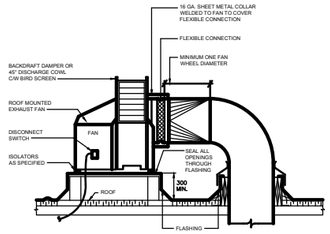


NOTES:

01. FANS AND CURBS SHALL BE BY THE SAME MANUFACTURER
02. DIMENSIONS IN BRACKETS IN MILLIMETRES

1 / M-02 TYPICAL ROOF MOUNTED EXHAUST FAN

N.T.S.



1 / M-02 ROOF MOUNTED UTILITY TYPE EXHAUST FAN

N.T.S.

MECHANICAL LEGEND

SYMBOL			DESCRIPTION
EXISTING TO REMAIN	EXISTING TO BE RELOCATED OR DEMOLISHED	NEW OR EXISTING IN RELOCATED POSITION	
	R		DUCTWORK
	R		FLEXIBLE DUCT CONNECTION (8'-0" MAXIMUM LENGTH)
	R		LINEAR SUPPLY AIR DIFFUSER
	R		RETURN AIR GRILLE
	R		LIGHT SUPPLY AIR TROFFER
VAV	R		VAV BOX C/W ATTENUATOR
	R		BYPASS BOX
T	R	T	THERMOSTAT
	R		CONTROL WIRING/TUBING
	R		DUCT TAKE-OFF (SINGLE LINE)
	R		ELBOW UP
	R		ELBOW DOWN
	R	CAP	CAP OFF
P	R	P	"P"-TRAP

ISSUED/REVISED

100% SUBMISSION	2018-06-14
99% SUBMISSION	2018-04-23
55% SUBMISSION	2018-03-15

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

MECHANICAL-DETAILS

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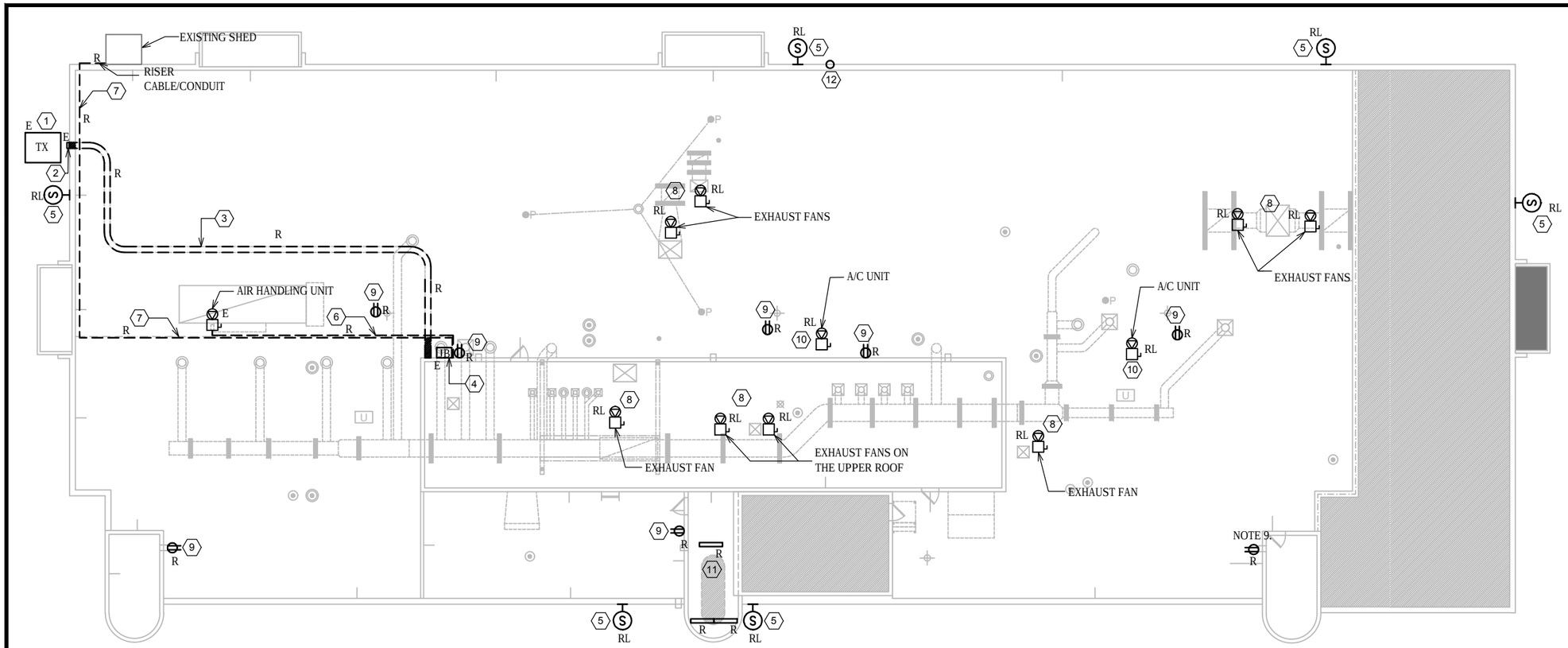
DATE: 14/06/2018	SCALE: N.T.S
DRAWN BY: BK	CHECKED BY: FW
PROJECT NO. 169-00325-01	
DRAWING NO. M-02	



DRAWING NOTES:

1. EXISTING 4160/600V POWER TRANSFORMER TO REMAIN.
2. RISER CABLE TRAY ON THE BUILDING WALL TO REMAIN.
3. DISCONNECT THE EXISTING 5KV AND 600V CABLES. REMOVE THE EXISTING CABLE TRAY ON THE ROOF FROM PENTHOUSE UP TO AND INCLUDING THE BEND ON THE PARAPET. THE EXISTING 5kV AND 600V CABLES RUNNING INSIDE CABLE TRAY TO REMAIN AND TEMPORARILY SUPPORTED TO KEEP BUILDING ENERGIZED DURING ROOFING. ELECTRICAL CONTRACTOR TO INCLUDE ALL ASSOCIATED COST IN THE CONTRACT PRICE FOR TEMPORARY CABLES SUPPORTING.
4. EXISTING WALL MOUNTED 5kV MEDIUM VOLTAGE PULL BOX TO REMAIN.
5. DISCONNECT AND UNINSTALL TEMPORARILY THE EXISTING FIRE ALARM SPEAKERS ON THE ROOF. REFER TO THE NEW PLAN DRAWING FOR NEW TEMPORARY AND PERMANENT INSTALLATION. RECORD THE EXISTING LOCATION AND ZONES. REMOVE EXISTING ROOF FIRE ALARM SPEAKER WIRING AND CONDUITS UP TO THE NEAREST JUNCTION BOX OR FIRE ALARM PANEL IN THE BUILDING.
6. IDENTIFY AND RECORD AIR HANDLING UNIT BREAKER, CABLE AND CONDUIT SIZE. REMOVE EXISTING CONDUIT AND WIRES UP TO THE MCC PANEL IN THE PENTHOUSE.
7. IDENTIFY AND RECORD BREAKER, WIRE AND CONDUIT SIZE FOR EXISTING FEEDER TO SHED ON NORTH-WEST SIDE OF FACILITY. OBTAIN OWNER'S APPROVAL ON ANY SHUT DOWN IN ADVANCE. SUPPLY AND INSTALL TEMPORARY POWER SUPPLY WITH WIRES/CONDUIT TO SHED ENERGIZED DURING ROOFING. REMOVE THE EXISTING WIRES AND CONDUIT. REMOVE THE TEMPORARY POWER SUPPLY AND CABLING ONCE ROOFING WORKS AND PERMANNET WIRE/CONDUIT INSTALLATION COMPLETED. INCLUDE ALL ASSOCIATED COST FOR TEMPORARY POWER SUPPLY. REFER TO E02 DRAWING FOR MORE DETAILS.
8. IDENTIFY AND RECORD THE ROOF MOUNTED EXHAUST FANS BREAKER, WIRE AND CONDUIT SIZES. DISCONNECT AND REMOVE THE CABLES AND CONDUITS UP TO THE ELECTRICAL PANEL IN PENTHOUSE.
9. IDENTIFY AND RECORD THE BREAKER, WIRES AND CONDUIT SIZE AND CIRCUIT NUMBERS FOR EACH ROOF MOUNTED RECEPTACLE. REMOVE EXISTING RECEPTACLES ON THE ROOF WITH WIRES AND CONDUITS.
10. IDENTIFY AND RECORD BREAKER, WIRE AND CONDUIT SIZE FOR EXISTING A/C UNITS ON THE ROOF. REMOVE THE WIRES AND CONDUITS TO UP TO THE ELECTRICAL PANEL.
11. REMOVE THE EXISTING THREE LIGHTING FIXTURES IN THE STAIRWELL IN ROOF LEVEL.
12. IDENTIFY AND RECORD INFORMATION OF EXISTING PHOTOCELL AND THE WIRING ON THE PARAPET AND UN-INSTALL TEMPORARILY WITH WIRING AND STORE IN PROTECTED CONDITION FOR FUTURE INSTALLATION. OBTAIN OWNER APPROVAL ON UN-INSTALLATION AND STORAGE IN ADVANCE.

GENERAL NOTES:

A. ELECTRICAL CONTRACTOR TO PERFORM A SITE VISIT PRIOR TO SUBMIT THE QUOTE TO ENSURE ALL REQUIRED ACTIVITIES INCLUDING SUPPLY, INSTALLATION, TEST AND THE VERIFICATION HAVE BEEN INCLUDED IN THE PRICE.

B. IDENTIFY THE PANEL AND BREAKERS FEEDING EQUIPMENTS ON THE ROOF OR FEEDING THROUGH ROOF PRIOR TO START THE ELECTRICAL WORKS AND REPORT TO OWNER IMMEDIATELY IF DISCREPANCY DETECTED WITH DRAWINGS.

C. ELECTRICAL CONTRACTOR TO COORDINATE WITH ROOFING CONTRACTOR, ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ANY DEMOLITION OR NEW INSTALLATION.

D. COORDINATE WITH ROOFING CONTRACTOR FOR FLASHING CONES LOCATION, SEALING ALL ELECTRICAL PENETRATION AND SUPPORTS FOR ELECTRICAL EQUIPMENT.

E. OBTAIN OWNER'S APPROVAL ON POWER SHUTDOWN IN ADVANCE. SCHEDULE SHUT DOWNS FOR WEEKENDS AND AFTER HOURS TO AVOID INTERRUPTION TO THE BUILDING OPERATION.

LEGEND

- FIRE ALARM SPEAKER
- DUPLEX RECEPTACLE
- CABLE TRAY
- MECHANICAL EQUIPMENT, DIRECT CONNECTION WITH OR WITHOUT DISCONNECT SWITCH
- JB — JUNCTION BOX OR TAP BOX
- TX — TRANSFORMER
- E — EXISTING TO REMAIN
- RL — EXISTING TO RELOCATE
- R — EXISTING TO REMOVE
- WP — WEATHER PROOF
- GFCI — GROUND FAULT CIRCUIT INTERRUPTION
- EXISTING TO REMAIN
- EXISTING TO REMOVE OR RELOCATE

DRAWING LIST	
E01	ROOF DEMOLITION PLAN
E02	ROOF NEW PLAN

NEW ROOF ASSEMBLIES

ISSUED/REVISED

100% REVIEW	2018-06-12
99% REVIEW	2018-04-27
55% REVIEW	2018-03-28

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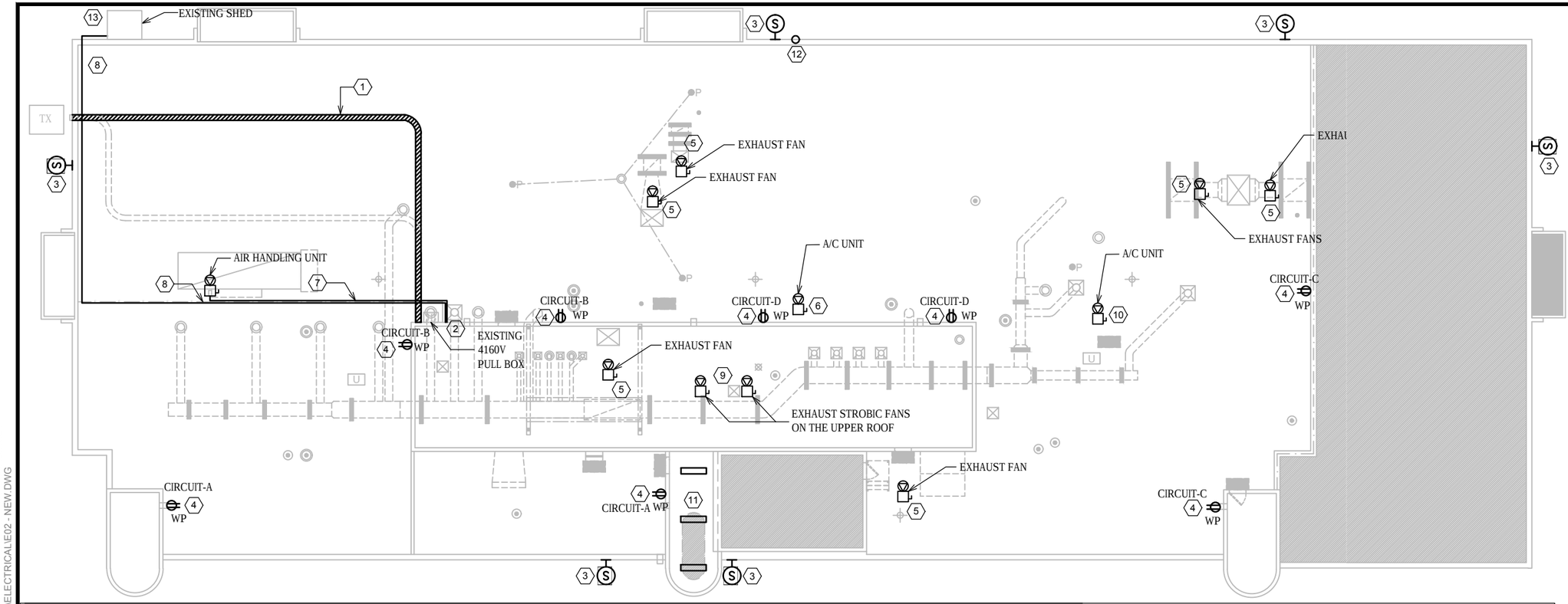
WTC BUILDING ROOF REPLACEMENT

ROOF DEMOLITION PLAN

DATE: 12/06/2018	SCALE: NTS
DRAWN BY: M.H.	CHECKED BY: A.M.
PROJECT NO. 169-00325-01	
DRAWING NO. E01	



LEGEND

FAS	FIRE ALARM SPEAKER
	DUPLEX RECEPTACLE
	CABLE TRAY
	MECHANICAL EQUIPMENT, DIRECT CONNECTION WITH OR WITHOUT DISCONNECT SWITCH
JB	JUNCTION BOX OR TAP BOX
TX	TRANSFORMER
E	EXISTING TO REMAIN
RL	EXISTING TO RELOCATE
R	EXISTING TO REMOVE
WP	WEATHER PROOF
GFCI	GROUND FAULT CIRCUIT INTERRUPTION
— —	EXISTING TO REMAIN
———	EXISTING TO REMOVE OR RELOCATE

NEW ROOF ASSEMBLIES

DRAWING NOTES:

1. SUPPLY AND INSTALL NEW POST HOT DIP GALVANIZED STEEL CABLE TRAY ON THE ROOF COMPLETE WITH COVER, BENDS, SUPPORTS, ALL FITTINGS AND DIVIDING BARRIERS. COORDINATE WITH MECHANICAL AND ARCHITECTURAL DRAWINGS AND ROOFING CONTRACTOR FOR INSTALLATION REQUIREMENTS. THE DIMENSIONS TO BE FINALIZED ON SITE AND MATCH THE EXISTING. FOR PRICING, IT IS ASSUMED CABLE TRAY DIMENSION IS 300mm WIDTH, 150mm HEIGHT AND LENGTH AS REQUIRED. CONNECT THE NEW CABLE TRAY TO THE EXISTING RISER CABLE TRAY ON THE WALL. RUN THE EXISTING 5KV AND 600V CABLES ON THE NEW CABLE TRAY IN SEGREGATED MANNER AND COMPLETE THE TERMINATIONS. CABLE TRAY MOUNTING HEIGHT TO BE MINIMUM 300mm ABOVE FINISHED ROOF LEVEL. ADJUST THE MOUNTING HEIGHT TO MATCH EXISTING CABLE LENGTH. COORDINATE WITH ROOFING CONTRACTOR AND PROVIDE PROVISIONS INCLUDING SUPPLY AND INSTALL ANY TEMPORARY CABLE SUPPORTS FOR CONSTRUCTION PERIOD TO AVOID BUILDING POWER INTERRUPTION DURING ROOFING. PROVIDE NEW PENETRATIONS TO THE PENTHOUSE WALL AS PER MOUNTING HEIGHT OF NEW CABLE TRAY AND CABLE ENTRANCE TO THE PENTHOUSE AND SEAL AND PATCH UP THE UNUSED EXISTING OPENINGS AS REQUIRED.
2. COORDINATE WITH ROOFING CONTRACTOR AND ARCHITECTURAL DRAWING FOR PATCHING THE EXISTING PENTHOUSE WALL PENETRATIONS AND PROVIDE NEW CABLE PENETRATIONS AS REQUIRED. COMPLETE SEALING ON ALL REMAINING OR NEW CABLE PENETRATIONS.
3. INSTALL EXISTING FIRE ALARM SPEAKERS TEMPORARILY ON THE BUILDING EXTERIOR WALL AND CONNECT TO THE EXISTING FIRE ALARM ZONE AND SIGNALING CIRCUIT. COORDINATE THE MOUNTING HEIGHT AND INSTALLATION WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN. SUPPLY AND INSTALL ALL REQUIRED FIRE ALARM WIRES AND CONDUITS AS REQUIRED TO CONNECT THE SPEAKERS TO FIRE ALARM CONTROL PANEL. THE INSTALLATION TO BE LIQUID-TIGHT AND SUN RESISTANT. RELOCATE THE FIRE ALARM SPEAKERS TO THEIR PERMANENT LOCATIONS ON THE PARAPET ONCE ROOFING WORKS WERE COMPLETED. PATCH THE TEMPORARY LOCATIONS AND REMOVE ALL TEMPORARY WIRE/CONDUITS. VERIFY THE FIRE ALARM SPEAKERS ONCE TEMPORARY AND PERMANENT INSTALLATIONS COMPLETED. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR INSTALLATION OF SPEAKERS AND WIRE/CONDUIT ON THE PARAPET PRIOR TO ROUGH-IN.
4. SUPPLY AND INSTALL NEW 5-20R DUPLEX RECEPTACLES COMPLETE WITH IN-USE TYPE WEATHER PROOF COVER. INSTALL RECEPTACLES AT 1000mm ABOVE FINISHED ROOF LEVEL. SUPPLY AND INSTALL HOT DIP GALVANIZED STEEL SUPPORTS AS REQUIRED FOR RECEPTACLE MOUNTING. SUPPLY AND INSTALL RW90XLPE COPPER 2#10+GND WIRES IN 27mm RIGID GALVANIZED STEEL CONDUIT AS REQUIRED TO CONNECT RECEPTACLES TO THE ELECTRICAL PANEL. IDENTIFY THE EXISTING BREAKERS RATING AND AVAILABLE SPACE ON THE EXISTING PANEL. SUPPLY AND INSTALL FOUR NEW 20A GFCI CLASS A TYPE BREAKERS ON THE PANEL FOR ROOF RECEPTACLES. NEW BREAKERS SHORT CIRCUIT RATING TO MATCH THE PANEL RATING. COORDINATE THE INSTALLATION WITH ARCHITECTURAL DRAWINGS AND ROOFING CONTRACTOR PRIOR TO ROUGH-IN.
5. SUPPLY AND INSTALL NEW WIRE AND CONDUIT FROM ELECTRICAL PANEL IN PENTHOUSE UP TO THE ROOF MOUNTED EXHAUST FANS ON THEIR RELOCATED POSITIONS. THE CABLE AND CONDUIT SIZE TO BE CONFIRMED ON SITE PRIOR TO ORDER. FOR PRICING, IT IS ASSUMED AS RW90XLPE 1000V COPPER 3#8AWG WIRES IN 27mm GALVANIZED CONDUIT.
6. SUPPLY AND INSTALL NEW CABLES AND CONDUITS FROM ELECTRICAL PANEL IN PENTHOUSE UP TO THE ROOF MOUNTED A/C UNIT ON THE RELOCATED POSITION. THE CABLE SIZE TO BE FINALIZED ON SITE PRIOR TO ORDER. FOR PRICING PURPOSE, IT IS ASSUMED TWO CIRCUITS EACH ONE INCLUDING ONE RUN OF WIRES/CONDUIT WITH RW90XLPE COPPER 2#10AWG+GND WIRES IN 21MM CONDUIT.
7. SUPPLY AND INSTALL NEW WIRE AND CONDUIT FROM ELECTRICAL PANEL IN PENTHOUSE TO AHU DISCONNECT SWITCH WITH ALL REQUIRED CONDULET, FITTINGS AND SUPPORTS. INSTALL CONDUIT 200mm ABOVE FINISHED ROOF LEVEL. CONFIRM WIRE AND CONDUIT SIZE ON SITE PRIOR TO SUPPLY. FOR PRICING, IT IS ASSUMED RW90XLPE 1000V COPPER 3#2 AWG+GND WIRES IN 53mm HOT DIP GALVANIZED RIGID STEEL CONDUIT.
8. SUPPLY AND INSTALL NEW WIRE AND CONDUIT FROM EXISTING DISCONNECT SWITCH IN PENTHOUSE TO THE SHED LOCATED ON NORTH-WEST SIDE OF BUILDING WITH ALL REQUIRED CONDULET, FITTINGS AND SUPPORTS. INSTALL CONDUIT 200MM ABOVE FINISHED ROOF LEVEL. WIRE AND CONDUIT SIZE TO MATCH THE EXISTING AND FINALIZE ON SITE PRIOR TO ORDER. FOR PRICING, IT IS ASSUMED RW90XLPE 1000V COPPER 4#8 AWG+GND WIRES IN 27mm HOT DIP GALVANIZED RIGID STEEL CONDUIT. PROVIDE PROVISIONS TO SUPPLY THE POWER TO THE SHED DURING ROOFING AND KEEP IT ENERGIZED CONTINUOUSLY AND INCLUDE ALL ASSOCIATED COSTS IN THE PRICE. OBTAIN OWNER'S APPROVAL FOR ANY SHUTDOWN IN ADVANCE.
9. SUPPLY AND INSTALL NEW WIRES AND CONDUITS FROM ELECTRICAL PANEL IN PENTHOUSE UP TO THE UPPER ROOF MOUNTED STROBIC FANS ON THEIR RELOCATED POSITIONS. THE CABLE AND CONDUIT SIZE TO BE CONFIRMED ON SITE PRIOR TO SUPPLY. FOR PRICING PURPOSE, IT IS ASSUMED AS RW90XLPE 1000V COPPER 3#6AWG+GND IN 35mm RIGID HOT DIP GALVANIZED STEEL CONDUIT FOR EACH EXHAUST FAN.
10. SUPPLY AND INSTALL NEW WIRES AND CONDUITS FROM ELECTRICAL PANEL IN THE PENTHOUSE UP TO THE ROOF MOUNTED A/C UNIT ON ITS RELOCATED POSITION. THE CABLE SIZE TO BE CONFIRMED ON SITE PRIOR TO ORDER. FOR PRICING PURPOSE, IT IS ASSUMED TWO CIRCUITS EACH ONE INCLUDING ONE RUN OF WIRES/CONDUIT WITH RW90XLPE COPPER 2#10AWG+GND WIRES IN 21mm CONDUIT.
11. SUPPLY AND INSTALL THREE NEW 1200mm (4'), 40W, 120V LED STRIP LIGHTING FIXTURE (SLSTP SERIES (EATON), OR ZL1D (LITHONIA), OR FW4-LED40 (RAB DESIGN) OR APPROVED EQUAL IN STAIRWELL ROOF LEVEL AND CONNECT TO THE EXISTING LIGHTING CIRCUIT AND CONTROLS. EXTEND THE WIRING AND CONDUITS AS REQUIRED.
12. RE-INSTALL THE EXISTING PHOTOCELL. EXTEND WIRES AND CONDUITS AS REQUITE TO SUIT THE NEW POSITION ONCE ROOFING WORKS WERE COMPLETED. COORDINATE WITH OWNER FOR INSTALLATION.
13. SUPPLY AND INSTALL 30KW, 600V, 3PH, 60HZ TEMPORARY DIESEL GENERATOR, 30A-3P, 600V NEMA-4X DISCONNECT SWITCH, RW90XLPE 1000V COPPER 4#8 AWG+GND WIRES AND 27MM CONDUIT AND ALL REQUIRED INSTALLATION SUPPORTS TO KEEP SHED ENERGIZED DURING THE ROOFING. INSTALL DIESEL GENERATOR ON THE GROUND AND CLOSE BY SHED. FINALIZE THE LOCATION AND CABLE ROUTE ON SITE WITH OWNER. CONNECT THE CABLE TO THE SHED ELECTRICAL LOAD. COORDINATE SHUT DOWN WITH OWNER IN ADVANCE. FINALIZE THE SPECS PRIOR TO SUPPLY.

GENERAL NOTES:

A. ELECTRICAL CONTRACTOR TO PERFORM A SITE VISIT PRIOR TO SUBMIT THE QUOTE TO ENSURE ALL REQUIRED ACTIVITIES INCLUDING SUPPLY, INSTALLATION, TEST AND THE VERIFICATION HAVE BEEN INCLUDED IN THE PRICE.
B. IDENTIFY THE PANEL AND BREAKERS FEEDING EQUIPMENTS ON THE ROOF OR FEEDING THROUGH ROOF PRIOR TO START THE ELECTRICAL WORKS AND REPORT TO OWNER IMMEDIATELY IF DISCREPANCY DETECTED WITH DRAWINGS.
C. ELECTRICAL CONTRACTOR TO COORDINATE WITH ROOFING CONTRACTOR, ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ANY DEMOLITION OR NEW INSTALLATION.
D. COORDINATE WITH ROOFING CONTRACTOR FOR FLASHING CONES LOCATION, SEALING ALL ELECTRICAL PENETRATION AND SUPPORTS FOR ELECTRICAL EQUIPMENT.
E. OBTAIN OWNER'S APPROVAL ON POWER SHUTDOWN IN ADVANCE. SCHEDULE SHUT DOWNS FOR WEEKENDS AND AFTER HOURS TO AVOID INTERRUPTION TO THE BUILDING OPERATION.
F. ALL NEW INSTALLATION TO BE LIQUID-TIGHT AND SUN RESISTANT.
G. INCLUDE OPTIONAL PRICE FOR ALL ASSOCIATED COST FOR PROVIDING ONE RENTAL 600V/3PH/60Hz, 1000KVA EMERGENCY DIESEL GENERATOR FOR 15 DAYS WITH ALL POWER CABLES TO THE PENTHOUSE TO SUPPLY THE BUILDING POWER DURING ROOFING.

ISSUED/REVISED

100% REVIEW	2018-06-12
99% REVIEW	2018-04-27
55% REVIEW	2018-03-28

867 LAKESHORE RD., BURLINGTON
WTC BUILDING ROOF REPLACEMENT

ROOF NEW PLAN

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DATE: 12/06/2018	SCALE: NTS
DRAWN BY: M.H.	CHECKED BY: A.M.
PROJECT NO. 169-00325-01	
DRAWING NO. E02	